8548594

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

November 26, 2024

THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE RECORDS OF THIS OFFICE OF THE FILE WRAPPER AND CONTENTS OF:

APPLICATION NUMBER: *18/197,070*
FILING DATE: *May 14, 2023*
PATENT NUMBER: *11972423*
ISSUE DATE: *April 30, 2024*

Certified by

Katherine Kelly Vidal

Performing the Functions and Duties of the
Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

Petitioner Exhibit 1002-0001

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

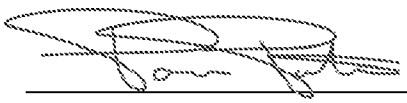
I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

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.

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/SB/424 (12-11)

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:	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS		

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), the prioritized examination fee set forth in 37 CFR 1.17(c), and if not already paid, the publication fee set forth in 37 CFR 1.18(d) have been filed with the request. The basic filing fee, search fee, examination fee, and any required excess claims and application size fees are filed with the request or have been already been paid.

2. The application contains or is amended to contain no more than four independent claims and no more than thirty total claims, and no multiple dependent claims.

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 oath or declaration under 37 CFR 1.63 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 /Benjamin Pezzner/	Date May 14, 2023
Name (Print/Typed) Benjamin Pezzner	Practitioner Registration Number 70711

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below*.*

☐ *Total of _____ forms are submitted.

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.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS
First Named Inventor/Applicant Name:	Paresh K. Patel
Filer:	Benjamin H Pezzner
Attorney Docket Number:	104402-5074-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	64	64
UTILITY SEARCH FEE	2111	1	280	280
UTILITY EXAMINATION FEE	2311	1	320	320
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	1680	1680
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	56	56

Petition:	
Patent-Appeals-and-Interference:	
Post-Allowance-and-Post-Issuance:	
Extension-of-Time:	
Miscellaneous:	
Total in USD ($)	**2400**

Electronic Acknowledgement Receipt

EFS ID:	47997573
Application Number:	18197070
International Application Number:	
Confirmation Number:	5568
Title of Invention:	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS
First Named Inventor/Applicant Name:	Paresh K. Patel
Customer Number:	24341
Filer:	Benjamin H Pezzner
Filer Authorized By:	
Attorney Docket Number:	104402-5074-US
Receipt Date:	14-MAY-2023
Filing Date:	
Time Stamp:	01:44:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$2400
RAM confirmation Number	E20235D246266300
Deposit Account	
Authorized User	

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

Petitioner Exhibit 1002-0007

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	214105 457525203aa120ec7fa629405cb83da08ebc99a9	no	8
Warnings:					
Information:					
2		104402-5074-US_Specification.pdf	428274 e5d287fb0cae198a7cb6d7f4806f6341ad70f494	yes	73

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	67
Claims	68	72
Abstract	73	73

Warnings:					
Information:					
3	Drawings-only black and white line drawings	104402-5074-US_Drawings.pdf	5978985 5adc1fd26e7922d40d33b3ed03dfc67446e021c6	no	45
Warnings:					
Information:					
4	Oath or Declaration filed	104402-5074-US_Declaration.PDF	63528 e26c0c0114f33144a035b8daf93f43344e3b6179	no	1
Warnings:					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73	104402-5074-US_373c.pdf	111843 3e701880789eefb1ead1f247bed96fbe36[illegible]	no	1

Petitioner Exhibit 1002-0008

Warnings:					
Information:					
6	Power of Attorney	104402-5074-US_POA.pdf	41808 9764c2f01ba4943c05e8f6af8b2ff06f14fa8488	no	1
Warnings:					
Information:					
7	Track One Request	104402-5074-US_Track_One.pdf	140087 b6d17e59ffa9cb61cd9a04959506f97f4e691b98	no	2
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	50742 0dec2f1afcd4415dc6acadfa18cf08f805f65081	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	7029372		

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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

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

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 i	US

Mailing Address of Inventor:

Address 1	9600 NE Cascades Pkwy, Suite 280		
Address 2			
City	Portland	State/Province	OR
Postal Code	97220	Country i	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	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS		
Attorney Docket Number	104402-5074-US	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	45	Suggested Figure for Publication (if any)	

Petitioner Exhibit 1002-0010

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

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		

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	Remove
Registration Number					
Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	Remove
Registration Number					

Additional Representative Information blocks may be generated within this form by selecting the **Add** button.

Petitioner Exhibit 1002-0011

PTO/AIA/14 (08-15)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	17973507	2022-10-25

Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17973507	Continuation of	17654732	2022-03-14	11481772	2022-10-25

Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17654732	Continuation of	17147305	2021-01-12	11501296	2022-11-15

Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17147305	Continuation of	15603400	2017-05-23	10891614	2021-01-12

Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15603400	Continuation of	14458199	2014-08-12	9659296	2017-05-23

Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14458199	Continuation in part of	14456683	2014-08-11	9256873	2016-02-09

Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14456683	Continuation of	14335762	2014-07-18	9547859	2017-01-17

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

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 or 371(c) Date (YYYY-MM-DD)
14214644	Claims benefit of provisional	61917936	2013-12-18

Prior Application Status	Patented			Remove	
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. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(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).

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.

Petitioner Exhibit 1002-0013

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is 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 State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

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. ☒

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Petitioner Exhibit 1002-0015

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

Assignee Information including Non-Applicant Assignee Information:

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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.

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Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

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Country i		Postal Code	
Phone Number		Fax Number	
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5074-US
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e. g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Benjamin Pezzner/			Date (YYYY-MM-DD)	
First Name	Benjamin	Last Name	Pezzner	Registration Number	70711

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METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

PRIORITY

[0001] The present application is:

- a continuation of U.S. Patent Application No. 17/973,507, filed October 25, 2022,
- which is a continuation of U.S. Patent Application No. 17/654,732, filed March 14, 2022, and issued as U.S. Patent No. 11,481,772 on October 25, 2022,
- which is a continuation of U.S. Patent Application No. 17/147,305, filed January 12, 2021, and issued as U.S. Patent No. 11,501,296 on November 15, 2022,
- which is a continuation of U.S. Patent Application No. 15/603,400, filed May 23, 2017 and issued as U.S. Patent No. 10,891,614 on January 12, 2021,
- which is a continuation of U.S. Patent Application No. 14/458,199, filed August 12, 2014 and issued as U.S. Patent No. 9,659,296 on May 23, 2017,
- which is a continuation-in-part of U.S. Patent Application Number 14/456,683, filed August 11, 2014 and issued as U.S. Patent No. 9,256,873 on February 9, 2016,
- which is a continuation of U.S. Patent Application Number 14/335,762, filed July 18, 2014 and issued as U.S. Patent No. 9,547,859 on January 17, 2017,
- which is a continuation of U.S. Patent Application Number 14/214,644, filed March 14, 2014 and issued as U.S. Patent No. 8,856,045 on October 7, 2014,
- which claims priority to U.S. Provisional Patent Application Number 61/917,936, filed December 18, 2013.
- U.S. Patent Application Number 14/214,644, filed March 14, 2014, is also a continuation-in-part of U.S. Design Patent Application Number 29/477,025, filed December 18, 2013 and issued as U.S. Design Patent No. D755,183 on May 3, 2016.

The present application is based on and claims priority to these applications, the disclosures of which are hereby incorporated by reference in their entirety.

TECHNICAL FIELD

[0002] The present application relates to the field of payment processing systems, and in particular, to a mobile-device-to-machine payment processing system over a non-persistent network connection.

BACKGROUND

[0003] Vending machines (or "automatic retailing" machines), in the broadest sense, have been around for thousands of years. The first simple mechanical coin operated vending machines were introduced in the 1880s. Modern vending machines stock many different types of products including, but not limited to drinks (e.g., water, juice, coffee, and soda) and edible food products/items (e.g., snacks, candy, fruit, and frozen meals), as well as a wide variety of non-food items. In this fast paced world, vending machines are ubiquitous.

[0004] Vending machines are one type of "payment accepting unit" (payment accepting units are also referred to herein generically as "machines"). A payment accepting unit (or machine) is equipment that requires payment for the dispensing of products and/or services. In addition to vending machines, payment accepting units can also be other machines that require payment for the dispensing of a product and/or services including, but not limited to 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.

[0005] In using a payment accepting unit, a user will (1) approach the payment accepting unit, (2) determine from the face of the payment accepting unit the product (or service) he/she desires, (3) insert payment (e.g., coins, bills, or payment cards), and (4) input his/her selection into the payment accepting unit using a user interface (e.g., a series of buttons, a key pad, touch screen, or other input mechanism using, for example, the column and row at which a product is located). Based on the user's inputted selection, technology within the payment accepting unit provides the desired product (or service) to the user.

[0006] As the number of people with Internet-connected mobile devices proliferates, so does the variety of uses for such devices. Mobile payment is a logical extension. There is a large

development effort around bringing mobile payment to the retail sector in an effort to not only provide options to the user, but also increased convenience.

SUMMARY

[0007] Disclosed herein is a payment processing system or, more specifically, a mobile-device-to-machine payment processing system over a non-persistent network connection with hands-free mode and manual mode (sometimes also herein called "swipe" or "swipe-to-pay" mode).

[0008] In some implementations, a method of presenting representations of payment accepting unit events is performed at a device (e.g., the mobile device 150, Figures 5 and 21) with one or more processors, memory, one or more output devices, and two or more communication capabilities. After sending a request to a payment module (e.g., the adapter module 100, Figures 5 and 20), via a first communication capability (e.g., a short-range communication technology/protocol such as BLE), to initiate a transaction with a payment accepting unit (e.g., the payment accepting unit 120, Figures 5 and 19) (sometimes also herein called "machine 120") associated with the payment module, the method includes obtaining a notification from the payment module via the first communication capability, where the notification indicates an event at the payment accepting unit associated with the payment module. In response to obtaining the notification, the method includes providing a representation of the notification to a user of the mobile device via the one or more output devices of the mobile device (e.g., a message displayed on a display of the mobile device, a vibration produced by a vibration mechanism of the mobile device, an aural alert produced by a speaker of the mobile device, and/or the like).

[0009] In some implementations, a method of retrofitting an offline-payment operated machine to accept electronic payments is performed at a payment module (e.g., the adapter module 100, Figures 5 and 20) with one or more processors, memory, a short-range communication capability (e.g., a short-range communication technology/protocol such as BLE), and a first interface module configured to couple the payment module with a control unit of an offline-payment operated machine (e.g., the payment accepting unit 120, Figures 5 and 19) (sometimes also herein called "machine 120"). The method includes receiving a transaction request via the short-range communication capability from a respective mobile device to perform

a transaction with the offline-payment operated machine. The method includes validating 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 (e.g., the server 130, Figures 5 and 22) via the long-range communication capability (e.g., the long-range communication technology/protocol such as GSM, CDMA, or Wi-Fi). In accordance with a determination that the transaction request is valid, the method includes causing the offline-payment operated machine to perform the requested transaction by issuing a signal to perform the transaction to the control unit of the offline-payment operated machine via the first interface module.

[0010] In some implementations, a device (e.g., the machine 120, (Figures 5 and 19), the adapter module 100 (Figures 5 and 20), the mobile device 150 (Figures 5 and 21), the server 130 (Figures 5 and 22), or a combination thereof) includes one or more processors and memory storing one or more programs for execution by the one or more processors, the one or more programs include instructions for performing, or controlling performance of, the operations of any of the methods described herein. In some implementations, a non-transitory computer readable storage medium storing one or more programs, the one or more programs comprising instructions, which, when executed by a device (e.g., the machine 120, (Figures 5 and 19), the adapter module 100 (Figures 5 and 20), the mobile device 150 (Figures 5 and 21), the server 130 (Figures 5 and 22), or a combination thereof) with one or more processors, cause the computer system to perform, or control performance of, the operations of any of the methods described herein. In some implementations, a device (e.g., the machine 120, (Figures 5 and 19), the adapter module 100 (Figures 5 and 20), the mobile device 150 (Figures 5 and 21), the server 130 (Figures 5 and 22), or a combination thereof) includes means for performing, or controlling performance of, the operations of any of the methods described herein.

[0011] The subject matter described herein is particularly pointed out and distinctly claimed in the concluding portion of this specification. Objectives, features, combinations, and advantages described and implied herein will be more readily understood upon consideration of the following detailed description of the invention, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] 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.

[0013] Figure 2 is a schematic diagram that shows the three zones of Figure 1 with multiple users therein in accordance with some implementations.

[0014] Figure 3 is a table that illustrates the hands-free credit or alert user principle in accordance with some implementations.

[0015] Figure 4 is a flow chart showing the logging received signal strength indicator (RSSI) information in accordance with some implementations.

[0016] 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.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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.

[0023] 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.

[0024] 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.

[0025] 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.

[0026] 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.

[0027] 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.

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

[0029] Figure 12 is a front plan view of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0030] Figure 13 is a back plan view of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0031] Figure 14 is a side view of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0032] 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.

[0033] 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.

[0034] 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.

[0035] 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.

[0036] 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.

[0037] Figure 20 is a block diagram of an adapter module in accordance with some implementations.

[0038] Figure 21 is a block diagram of a mobile device in accordance with some implementations.

[0039] Figure 22 is a block diagram of a server in accordance with some implementations.

[0040] 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.

[0041] 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.

[0042] Figure 24B is a block diagram of an authorization request in accordance with some implementations.

[0043] Figure 24C is a block diagram of an authorization grant token in accordance with some implementations.

[0044] Figure 24D is a block diagram of transaction information generated by the payment module in accordance with some implementations.

[0045] Figure 25A illustrates a schematic flow diagram of a process for providing a representation of a machine event at a mobile device in accordance with some implementations

[0046] Figure 25B is a schematic flow diagram of a process for processing acknowledgment information in the payment processing system in accordance with some implementations.

[0047] Figures 26A-26D illustrate example user interfaces for providing a representation of a machine event at a mobile device in accordance with some implementations.

[0048] Figures 27A-27B illustrate a flowchart diagram of a method of presenting representations of payment accepting unit events in accordance with some implementations.

[0049] Figure 28A illustrates a block diagram of an offline-payment operated machine in accordance with some implementations.

[0050] Figure 28B illustrates signals sampled by the payment module in accordance with some implementations.

[0051] Figures 29A-29B illustrate a flowchart diagram of a method 1600 of retrofitting an offline-payment operated machine to accept electronic payments in accordance with some implementations.

[0052] Figure 30 illustrates a flowchart diagram of a method of enabling a payment operated machine to accept electronic payments in accordance with some implementations.

[0053] Like reference numerals refer to corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0054] 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).

[0055] 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.

[0056] 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).

[0057] 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.

[0058] 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.

[0059] 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.

[0060] 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).

[0061] 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.

[0062] 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

[0063] 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.

[0064] 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.

[0065] 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.

[0066] 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.

[0067] 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.

[0068] 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.

[0069] 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.

[0070] 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.

[0071] 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.

[0072] 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.

[0073] 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."

[0074] 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.

[0075] 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.

[0076] 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.

[0077] 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.

[0078] 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."

[0079] 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

[0080] Figures 5, 6, and 7 together show major components of the mobile-device-to-machine payment system and the interactions there-between.

[0081] 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.

[0082] 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.

[0083] 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).

[0084] 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

[0085] 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).

[0086] 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

[0087] 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.

[0088] 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.

[0089] 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.

[0090] 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.)

[0091] 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.

[0092] 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

[0093] 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.

[0094] 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).

[0095] 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.

[0096] 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).

[0097] 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.

[0098] 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.

[0099] 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.

[00100] 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.

[00101] 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.

[00102] 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).

[00103] 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.

[00104] 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.

[00105] 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.

[00106] 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

[00107] 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.

[00108] 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.

[00109] 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.

[00110] 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.

[00111] 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

[00112] 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.

[00113] 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.

[00114] 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.

[00115] 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.

[00116] 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.

[00117] 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

[00118] 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.

[00119] 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.

[00120] 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).

[00121] 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

[00122] 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.

[00123] 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.

[00124] 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.

[00125] 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.

[00126] 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).

[00127] 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).

[00128] 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).

[00129] 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.

[00130] 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).

[00131] 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.

[00132] 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

[00133] 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.

[00134] 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.

[00135] 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.

[00136] 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.

[00137] 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.

[00138] 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.

[00139] 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).

[00140] 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.

[00141] 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.

[00142] 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.

[00143] 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.

[00144] 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.

[00145] 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. 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). 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.

[00146] 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).

[00147] 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.

[00148] 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.

[00149] 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.

[00150] 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.

[00151] 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.

[00152] 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.

[00153] 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.

[00154] 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.

[00155] 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.

[00156] 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).

[00157] Figure 24D illustrates a block diagram of transaction information 1150 generated by the payment module 100 (e.g., in step 1254 of the process 1250 in Figure 25B) 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.

[00158] 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.

[00159] In some implementations, the module ID 1154 is a unique identifier corresponding to the payment module 100 that performed the respective transaction.

[00160] In some implementations, the user ID 1156 is an identifier associated with the user of the mobile device 150 that initiated the respective transaction.

[00161] 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.

[00162] 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.

[00163] 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.

[00164] 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. 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.

[00165] Figure 25A illustrates a schematic flow diagram of a process 1200 for providing a representation of a machine event at a mobile device 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

(sometimes also herein called the "machine 120") and a respective mobile device 150 in the payment processing system.

[00166] In some implementations, the process 1200 occurs after the mobile device 150 sends the AuthGrant in Figure 8C. In some implementations, the process 1200 occurs after the mobile device 150 sends the authorization grant to the payment module 100 in operation 1012 of process 1000 in Figure 23.

[00167] The payment module 100 obtains (1202) an indication corresponding to an event at 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 an indication from the machine of the completed transaction. In some implementations, the indication 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. In some implementations, the indication includes status information indicating that the transaction was aborted (e.g., via actuation of a coin return mechanism at the machine 120) or that there was an error with the transaction (e.g., a vending jam or other malfunction with the machine 120).

[00168] After obtaining the indication corresponding to completion of the first transaction, the payment module 100 generates (1204) a notification corresponding to the event at the machine 120.

[00169] The payment module 100 sends (1206), via a short-range communication capability (e.g., BLE), the notification to the mobile device 150. In some embodiments, in addition to the notification corresponding to the event at machine 120, the payment module 100 sends a promotion or advertisement to the mobile device 150 that is targeted to the user of the mobile device 150 based on the transaction or the user ID included in the AuthGrant or authorization grant token that initiated the transaction. In some embodiments, in addition to the notification corresponding to the event at machine 120, the payment module 100 sends a pseudo randomly selected promotion or advertisement to the mobile device 150 that is selected from a

set of promotions or advertisements stored by the payment module 100. For example, the promotion is a coupon for a free soda following the purchase of ten sodas from the machine 120 by the user of the mobile device 150. For example, the promotion is a random 50% off coupon or free soda coupon. For example, the transaction corresponds to a vended soda and the advertisement corresponds to a new soda from the same company that produces the vended soda.

[00170] The mobile device 150 provides (1208) a representation of the notification. For example, in Figure 26A, the mobile device 150 displays user interface 1302 on touch screen 152 with a message 1306 that indicates that the first transaction is complete. For example, in Figure 26C, the mobile device 150 displays user interface 1320 on touch screen 152 with a message 1322 that indicates that the transaction was aborted. For example, in Figure 26D, the mobile device 150 displays user interface 1330 on touch screen 152 with a message 1332 that indicates that there was an error with the transaction. For example, the mobile device 150 also displays a representation of the promotion of advertisement on the user interface for the application 140.

[00171] Figure 25B illustrates a schematic flow diagram of a process 1250 for 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 1250 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.

[00172] In some implementations, the process 1250 occurs after the mobile device 150 sends the AuthGrant in Figure 8C. In some implementations, the process 1250 occurs after the mobile device 150 sends the authorization grant to the payment module 100 in operation 1012 of process 1000 in Figure 23.

[00173] The payment module 100 obtains (1252) an indication corresponding to 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 an indication from the machine of the completed transaction. In some implementations, the indication 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.

[00174] After obtaining the indication corresponding to completion of the first transaction, the payment module 100 generates (1254) a first notification with first transaction information based on the indication, and the payment module 100 stores the first transaction information. In some implementations, the first 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 indication. 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.

[00175] The payment module 100 sends (1256), via a short-range communication capability (e.g., BLE), the first notification with first transaction information to the mobile device 150. In some embodiments, in addition to first transaction information corresponding to completion of the first transaction at machine 120, the first notification includes a promotion or advertisement to the mobile device 150 that is targeted to the user of the mobile device 150 based on the transaction or the user ID included in the AuthGrant or authorization grant token that initiated the transaction. In some embodiments, in addition to first transaction information corresponding to completion of the first transaction at machine 120, the first notification includes

a pseudo randomly selected promotion or advertisement to the mobile device 150 that is selected from a set of promotions or advertisements stored by the payment module 100. For example, the promotion is a coupon for a free soda following the purchase of ten sodas from the machine 120 by the user of the mobile device 150. For example, the promotion is a random 50% off coupon or free soda coupon. For example, the transaction corresponds to a vended soda and the advertisement corresponds to a new soda from the same company that produces the vended soda.

[00176] The mobile device 150 provides (1258) a representation of the first notification. For example, in Figure 26A, the mobile device 150 displays user interface 1302 on touch screen 152 with a message 1306 that indicates that the first transaction is complete. For example, the mobile device 150 also displays a representation of the promotion of advertisement on the user interface for the application 140.

[00177] The mobile device 150 sends (1260), via a long-range communication capability (e.g., GSM, CDMA, Wi-Fi, or the like), the first transaction information to the server 130.

[00178] The server 130 processes (1262) 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.

[00179] The server 130 sends (1264), 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).

[00180] After receiving the first acknowledgement information, the mobile device 150 sends (1266), via a short-range communication capability (e.g., BLE), the first acknowledgment information to the payment module 100.

[00181] After receiving the first acknowledgment information, the payment module 100 deletes (1268) the stored first transaction information.

[00182] Attention is now directed towards implementations of user interfaces and associated processes that may be implemented on the mobile device 150 with zero or more speakers, zero or more microphones, and a display. For example, the display is a touch screen (sometimes also herein called a "touch screen display") enabled to receive one or more contacts and display information (e.g., media content, websites and web pages thereof, user interface for the application 140, and/or user interfaces for applications). Figures 26A-26D illustrate example user interfaces for providing a representation of a machine event at a mobile device in accordance with some implementations.

[00183] Figures 26A-26D show user interfaces displayed on mobile device 150 (e.g., a mobile phone); however, one skilled in the art will appreciate that the user interfaces shown in Figures 26A-26D may be implemented on other similar computing devices. The user interfaces in Figures 26A-26D are used to illustrate the processes described herein, including the process described with respect to Figures 25A-25B and 27A-27B.

[00184] For example, a user of the mobile device 150 approaches a machine 120 (e.g., vending machine 78x928 as shown in Figures 10A-10D) and executes application 140 on the mobile device 150 so as to perform an electronic transaction with the machine 120. For example, with reference to Figures 10C-10D, the user of the mobile device 150 initiates a transaction with the machine 120 (e.g., vending machine 78x928) by performing a swipe gesture at a location corresponding to the representation of the dollar bill (e.g., a substantially vertical swipe gesture from a location corresponding to the representation of the dollar bill to the top edge of the mobile device 150).

[00185] Figure 26A illustrates the mobile device 150 displaying a user interface 1302 of the application 140 on touch screen 152 after the user of the mobile device 150 initiates and performs a transaction with the machine 120. In Figure 26A, the user interface 1302 includes prepaid balance 1304 which indicates that $1.00 has been deducted from the prepaid balance after performing a transaction with the machine 120 as compared to the prepaid balance in Figure 10C-10D (i.e., $9.00 in Figures 10C-10D and $8.00 in Figure 26A). In Figure 26A, the user interface 1302 also includes a message 1306 indicating that the transaction with the machine 120 is complete.

[00186] Figure 26B illustrates the mobile device 150 displaying a user interface 1310 of the application 140 on touch screen 152 after the user of the mobile device 150 initiates a transaction with the machine 120 and an error with the transaction occurs or the transaction is aborted. In Figure 26B, the user interface 1310 shows the representation of the dollar bill sliding onto the touch screen 152 (e.g., in a substantially top to bottom manner). In Figure 26B, the interface 1310 includes prepaid balance 1312 which indicates that no money has been deducted from the prepaid balance after performing a transaction with the machine 120 as compared to the prepaid balance in Figure 10C-10D (i.e., $9.00 in Figures 10C-10D and $9.00 in Figure 26B).

[00187] Figure 26C illustrates the mobile device 150 displaying a user interface 1320 of the application 140 on touch screen 152 after the representation of the dollar bill slides onto the touch screen 152 in Figure 26B due to the transaction being aborted. For example, the user aborts the transaction by actuating a coin return mechanism of the machine 120. In another example, the user aborts the transaction by selection an abort affordance on the interface of the application 140 (not shown). In Figure 26C, the user interface 1320 includes a message 1322 indicating that the transaction with the machine 120 was aborted and that the user's account was not debited for the aborted transaction.

[00188] Figure 26D illustrates the mobile device 150 displaying a user interface 1330 of the application 140 on touch screen 152 after the representation of the dollar bill slides onto the touch screen 152 in Figure 26B due to the occurrence of an error with the transaction. For example, a malfunction with the machine 120 (e.g., a vending jam or stuck item) causes the error to occur. In Figure 26D, the user interface 1330 is associated with the application 140 executed on the mobile device 150. In Figure 26D, the user interface 1330 includes a message 1332 indicating that an error occurred during the transaction with the machine 120 and that the user's account was not debited for the transaction.

[00189] Figures 27A-27B illustrate a flowchart diagram of a method 1400 of presenting representations of payment accepting unit events in accordance with some implementations. In some implementations, the method 1400 is performed by a device with one or more processors, memory, one or more output devices, and two or more communication capabilities. For example, in some implementations, the method 1400 is performed by the mobile device 150 (Figures 5 and 21) or a component thereof (e.g., the application 140). In some implementations, the method

1400 is governed by instructions that are stored in a non-transitory computer readable storage medium (e.g., the memory 860, Figure 21) and the instructions are executed by one or more processors (e.g., the processing unit 850, Figure 21) of the device. Optional operations are indicated by dashed lines (e.g., boxes with dashed-line borders).

[00190] After sending a request to a payment module via a first communication capability transaction to initiate a transaction with a payment accepting unit (e.g., an offline-payment operated machine such as a vending machine or kiosk) associated with the payment module, the mobile device obtains (1402) a notification from the payment module via the first communication capability, where the notification indicates an event at the payment accepting unit associated with the payment module. In some implementations, method 1400 occurs after the mobile device 150 sends the AuthGrant in Figure 8C. In some implementations, method 1400 occurs after the mobile device 150 sends the authorization grant to the payment module 100 in operation 1012 of process 1000 in Figure 23. Operation 1206 of Figure 25A, for example, shows the mobile device 150 receiving a notification sent by the payment module 100 (e.g., the adapter module 100, Figures 5 and 20) sent via the first communication capability (e.g., a short-range communication technology/protocol such as BLE). The notification indicates an event at the payment accepting unit (e.g., the payment accepting unit 120, Figures 5 and 19) (sometimes also herein called "machine 120") associated with the payment module 100.

[00191] In some implementations, the first communication capability corresponds (1404) to a short-range communication protocol. As described above, the short-range communication protocols include BLE, NFC, and/or other protocols utilizing non-persistent communication channels.

[00192] In response to obtaining the notification, the mobile device provides (1406) a representation of the notification to a user of the mobile device via the one or more output devices of the mobile device. For example, in Figure 26A, the mobile device 150 displays user interface 1302 on touch screen 152 with a message 1306 that indicates that the first transaction is complete. For example, in Figure 26C, the mobile device 150 displays user interface 1320 on touch screen 152 with a message 1322 that indicates that the transaction was aborted. For example, in Figure 26D, the mobile device 150 displays user interface 1330 on touch screen 152 with a message 1332 that indicates that there was an error with the transaction.

[00193] In some implementations, the one or more output devices of the mobile device include (1408) at least one of: a display, one or more speakers, one or more LEDs, and a vibration mechanism. For example, the mobile device 150 includes one or more of a display (e.g., the touch screen 152, Figures 10A-10D), one or more speakers, one or more LEDs, and a vibration mechanism.

[00194] In some implementations, the representation of the notification is at least one of (1410): a message displayed on the display of the mobile device; a banner notification displayed on a display of the mobile device; a vibration alert from the vibration mechanism of the mobile device; an aural alert from the one or more speakers of the mobile device; and a visual alert from the one or more LEDs of the mobile device. For example, in Figures 26B-26D, the representation of the notification includes messages 1306, 1322, and 1332 displayed on the touch screen 152 of the mobile device 150. In another example, the representation of the notification is a predefined sequence of vibrations provided by the vibration mechanism of the mobile device 150. In another example, the representation of the notification is a predefined sequence of tones provided by the one or more speakers of the mobile device 150. In another example, the representation of the notification is a predefined sequence of blinking LEDs of the mobile device 150.

[00195] In some implementations, the notification indicates (1412) abortion of a transaction initiated by the user of the mobile device. In Figure 26C, for example, the user interface 1320 includes the message 1322 indicating that the transaction has been aborted. For example, the user aborts the transaction by actuating a coin return mechanism of the machine 120. In another example, the user aborts the transaction by selection an abort affordance on the interface of the application 140 (not shown).

[00196] In some implementations, the notification indicates (1414) completion of a transaction between the user of the mobile device and the payment accepting unit. In Figure 26A, for example, the user interface 1302 includes the message 1306 indicating that completion of the transaction with the machine 120 initiated by the user of the mobile device 150.

[00197] In some implementations, the notification indicating completion of the transaction at least includes (1416) an amount of the completed transaction. In Figure 26A, for example, the user interface 1302 includes prepaid balance 1304 which indicates that $1.00 has been deducted

from the prepaid balance after performing a transaction with the machine 120 as compared to the prepaid balance in Figure 10C-10D (i.e., $9.00 in Figures 10C-10D and $8.00 in Figure 26A).

[00198] In some implementations, the mobile device sends (1418) at least a portion of the notification to a server via a second communication capability distinct from the first communication capability. Operation 1260 of Figure 25B, for example, shows the mobile device 150 sending first transaction information to the server 130 for a completed transaction via the second communication capability (e.g., a long-range communication protocols such as Wi-Fi, CDMA, GSM, and/or the like). For example, the first transaction information at least includes the amount of the first completed transaction.

[00199] In some implementations, the first communication capability corresponds (1420) to a short-range communication protocol and the second communication capability corresponds to a long-range communication protocol. For example, the first communication capability of the mobile device 150 is a radio/transceiver means for communicating via one or more short-range communication protocols such as BLE, NFC, and/or the like (i.e., a non-persistent communication channel). For example, the second communication capability of the mobile device 150 is a radio/transceiver means for communicating via one or more long-range communication protocols such as Wi-Fi, CDMA, GSM, and/or the like.

[00200] In some implementations, the notification indicates (1422) failure of a transaction initiated by the user of the mobile device or a malfunction associated with the payment accepting unit. In Figure 26D, for example, the user interface 1330 includes the message 1332 indicating that there was an error with the transaction. For example, the transaction fails due to a vending jam or other malfunction. In another example, the payment accepting unit experiences a malfunction due to an open door or the like. In some implementations, at least a portion of the failure/malfunction notification is sent to the sever 130 and an alert is subsequently sent to the operator of the payment accepting unit (e.g., the machine 120) by the server 130.

[00201] It should be understood that the particular order in which the operations in Figures 27A-27B have been described is merely for example purposes and is not intended to indicate that the described order is 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, it should be noted that details of other processes described herein with respect to

other methods described herein are also applicable in an analogous manner to the method 1400 described above with respect to Figures 27A-27B.

[00202] Figure 28A illustrates a block diagram of an offline-payment operated machine 1500 in accordance with some implementations. For example, the offline-payment operated machine 1500 (e.g., a form of the machine 120) is an electro-mechanical machine capable of accepting currency (e.g., coins), which is not connected to any networks (e.g., telephone, cellular, or Wi-Fi). For example, the offline-payment operated machine 1500 is a washer or dryer at a laundromat, a parking meter, a car wash payment kiosk, or other offline-payment operated machine that dispenses goods and/or services.

[00203] In Figure 28A, the offline-payment operated machine 1500 includes a microswitch 1502, a control unit 1506, a power supply 1508, a transistor 1510, and an operation unit 1512. The components of the offline-payment operated machine 1500 in Figure 28A are examples and one of skill in the art will appreciate that various other components may be included in or excluded from the offline-payment operated machine 1500.

[00204] In Figure 28A, the microswitch 1502 is a leveraged microswitch with lever 1504. For example, the microswitch 1502 is a CHERRY BRAND™ microswitch with a normally open terminal ("NO"), a normally closed terminal ("NC"), and a common terminal. For example, the lever 1504 is incorporated into a coin slot of the offline-payment operated machine 1500 and is depressed whenever a coin slides down the coin slot into a coin reservoir of the offline-payment operated machine 1500 (not shown). For example, when the lever 1504 is depressed and the microswitch 1502 is wired in the NO configuration as shown in Figure 28A, the switch is closed. Continuing with this example, when the switch is closed, control unit 1506 receives a pulse (i.e., a payment acceptance signal) from the common terminal of the microswitch 1502 indicating depression of the lever 1504 from the reception of a US quarter (i.e., $0.25) or coin of another value.

[00205] In some implementations, when the control unit 1506 receives a preset sequence of payment acceptance signals indicative of a preset number of coins being received by the microswitch 1502, the control unit 1506 initiates the operation of the offline-payment operated machine 1500. For example, after receiving the preset sequence of payment acceptance signals (e.g., three pulses indicating reception of three US quarters), the control unit 1506 initiates

operation of the offline-payment operated machine 1500 by applying current to the gate of the transistor 1510 which allows current to flow from the power supply 1508 to operation unit 1512. For example, the operation unit 1512 is a motor of a dryer which begins spinning once current flows from the power supply 1508.

[00206] In Figure 28A, payment module 1520 (e.g., a form of the adapter module 100, Figures 5 and 20) is configured to be installed in the offline-payment operated machine 1500 so as to retrofit the offline-payment operated machine 1500 to be able to accept electronic payments. In some implementations, the payment module 1520 includes all or some of the components included adapter module 100 in Figure 20 such as processing unit 750, memory 760, a security unit 755, and a communications unit 770. In some implementations, the payment module 1520 also includes a first interface module 1522, a second interface module 1524, and a lead 1536 for drawing power from power supply 1508 of the offline-payment operated machine 1500.

[00207] In Figure 28A, the first interface module 1522 is configured to sample payment acceptance signals from the microswitch 1502 (e.g., a coin receiving switch) via lead 1532 of the offline-payment operated machine 1500. For example, the payment acceptance signals are indicative of a coin being received by the microswitch 1502 which depress lever 1504. In Figure 28A, the second interface module 1524 is configured to sample control signals from the control unit 1506 of the offline-payment operated machine 1500 via lead 1534 that initiate an operation of the offline-payment operated machine (e.g., the application of current to the gate of the transistor 1510) in response to receiving a preset sequence of payment acceptance signals from the microswitch 1502 (e.g., the coin receiving switch) indicative of the preset number of coins.

[00208] Figure 28B illustrates signals sampled by the payment module 1520 in accordance with some implementations. In Figure 28B, sample 1550 represents a preset sequence of payment acceptance signals sampled by the first interface module 1522 via lead 1532 that are sent from the microswitch 1502 to the control unit 1506. For example, the preset sequence of payment acceptance signals indicative of the preset number of coins include pulses (i.e., payment acceptance signals) 1552, 1554, 1556, and 1558. For example, the leading edges of pulses 1552, 1554, 1556, and 1558 at times 1582, 1584, 1586, and 1588 indicate reception of a coin by microswitch 1502 which causes the switch to close when wired in the NO configuration as

shown in Figure 28A. In Figure 28B, sample 1570 represents a control signal sampled by the second interface module 1524 via lead 1534 that is sent from the control unit 1506 to transistor 1510. In Figure 28B, the sample 1570 includes a pulse 1572 that is sent from the control unit 1506 to transistor 1510 at time 1590 after receiving the preset sequence of payment acceptance signals from the microswitch 1502 (i.e., pulses 1552, 1554, 1556, and 1558).

[00209] Figures 29A-29B illustrate a flowchart diagram of a method of retrofitting an offline-payment operated machine to accept electronic payments in accordance with some implementations. In some implementations, the method 1600 is performed by a payment module with one or more processors and memory. In some implementations, the payment module also includes a short-range communication capability corresponding to a short-range communication protocol (e.g., a non-persistent communication channel such as BLE, NFC, and/or the like), where the short-range communication capability is configured to communicate with one or more mobile devices, where each of the one or more mobile devices is configured with a complimentary short-range communication capability and a long-range communication capability corresponding to a long-range communication protocol (e.g., Wi-Fi, CDMA, GSM, and/or the like).

[00210] In some implementations, the payment module is coupled with an offline-payment operated machine (e.g., the payment accepting unit 120, Figures 5 and 19 (sometimes also herein called "machine 120"), or the offline-payment operated machine 1500, Figure 28A) such as dryer or washer in a laundromat, a parking meter, a car wash payment kiosk, or the like. In some implementations, the offline-payment operated machine includes a coin receiving switch (e.g., the microswitch 1502, Figure 28A) and a control unit (e.g., the control unit 1506, Figure 28A). In some implementations, the payment module further includes: (A) a first interface module (e.g., the first interface module 1522, Figure 28A) configured to sample payment acceptance signals from the coin receiving switch of the offline-payment operated machine, where the signals are indicative of a coin being received by the coin receiving switch; and (B) a second interface module (e.g., the second interface module 1524, Figure 28A) configured to sample control signals from the control unit of the offline-payment operated machine that initiate an operation of the offline-payment operated machine in response to receiving a preset sequence of payment acceptance signals from the coin receiving switch indicative of the preset number of coins. By sampling and storing these signals, the payment module 1520 is able to simulate

operation of a respective coin receiving switch in response to receiving the correct/preset number of coins so as to trigger operation of the offline-payment operated machine in response to completion of an electronic payment.

[00211] For example, in some implementations, the method 1600 is performed by the adapter module 100 (Figures 5 and 20) or payment module 1520 (Figure 28A). In some implementations, the method 1600 is governed by instructions that are stored in a non-transitory computer readable storage medium (e.g., the memory 760, Figure 20) and the instructions are executed by one or more processors (e.g., the processing unit 750, Figure 20) of the payment module. Optional operations are indicated by dashed lines (e.g., boxes with dashed-line borders).

[00212] In some implementations, the payment module detects (1602), via the first interface module, a preset sequence of payment acceptance signals from the coin receiving switch that causes the control unit to initiate the operation of the offline-payment operated machine, where the preset sequence of payment acceptance signals are indicative of a preset number of coins received by the coin receiving switch. For example, with reference to Figures 28A-28B, the first interface module 1522 of the payment module 1520 samples payment acceptance signals via lead 1532 from the microswitch 1502 to the control unit 1506. For example, each of the payment acceptance signals is indicative of reception of a coin by the microswitch 1502. Continuing with this example, the second interface module 1524 of the payment module 1520 samples control signals via lead 1534 from the control unit 1506 to the transistor 1510. The payment module 1520 detects a preset sequence of payment acceptance signals from the microswitch 1502 that causes the control unit 1506 to apply a current to the gate of the transistor 1510 (e.g., the control signals). For example, the preset sequence of payment acceptance signals is indicative of a preset number of coins received by the microswitch 1502 to cause operation of the offline-payment operated machine 1500. For example, the application of current to the gate of the transistor 1510 allows current to flow from the power supply 1508 to the operation unit 1512 so that the operation. For example, the operation unit 1512 is a motor of a dryer which begins spinning once current flows from the power supply 1508.

[00213] In some implementations, the payment module determines (1604) the predefined signal sequence to emulate the preset sequence of payment acceptance signals from the coin receiving switch. In some implementations, after detecting the preset sequence of payment

acceptance signals that causes the control unit 1506 to initiate the operation of the offline-payment operated machine 1500, the payment module 1520 determines a predefined signal sequence to emulate the preset sequence of payment acceptance signals. In some implementations, the money value associated with each pulse in the preset sequence of payment acceptance signals from the microswitch 1502, indicative of the preset number of coins to initiate the operation of the offline-payment operated machine 1500, is a default currency (e.g., USD) and amount (e.g., $0.25) set in the firmware of the payment module 1520. In some implementations, the money value associated with the each pulse in the preset sequence of payment acceptance signals from the microswitch 1502, indicative of the preset number of coins to initiate the operation of the offline-payment operated machine 1500, is set by the server 130 and can be changed remotely by using the mobile device 150 as a communications bridge to send information indicating the value of a pulse from the server 130 to the mobile device 150 via the second communication capability (e.g., GSM, CDMA, or Wi-Fi) and forwarding the information from the mobile device to the payment module 1520 via the first communication capability (e.g., BLE). For instance, in most cases, each pulse is US $0.25.

[00214] In some implementations, determining the predefined signal sequence includes (1606) at least one of: identifying a count of pulses in the present sequence of payment acceptance signals; identifying amplitude of pulses in the present sequence of payment acceptance signals; identifying shape of pulses in the present sequence of payment acceptance signals; and identifying an interval between pulses. In some implementations, after detecting the preset sequence of payment acceptance signals (e.g., the sample 1550, Figure 28B), the payment module 1520 determines a predefined signal sequence to emulate the preset sequence of payment acceptance signals by identifying a count of pulses in the preset sequence of payment acceptance signals, an interval between pulses in the preset sequence of payment acceptance signals, the shape of pulses in the preset sequence of payment acceptance signals, and an amplitude of pulses in the preset sequence of payment acceptance signals.

[00215] The payment module receives (1608) a request via the short-range communication capability from a respective mobile device to perform an operation of the offline-payment operated machine. For example, with reference to Figure 8C, the payment module 1520 (Figure 28A) receives the AuthGrant from the mobile device 150 via the short-range communication capability (e.g., BLE) indicating that the user of the mobile device 150 wishes to perform the

operation of the offline-payment operated machine 1500 (Figure 28A). For example with reference to operation 1012 in Figure 23, the payment module 1520 (Figure 28A) receives an authorization grant token from the mobile device 150 via the short-range communication capability (e.g., BLE) indicating that the user of the mobile device 150 wishes to perform the operation of the offline-payment operated machine 1500 (Figure 28A).

[00216] The payment module validates (1610) the request. Validation of the request indicates (1612) that the respective mobile device is authorized to initiate payment for the operation by a remote server via the long-range communication capability. In some implementations, the payment module 1520 validates the request from the mobile device 150 by determining whether the AuthGrant or the authorization grant token includes a valid authorization code.

[00217] In accordance with a determination that the request is valid, the payment module causes (1614) the payment operated machine to perform the operation by issuing a predefined signal sequence to the control unit, where the predefined signal sequence emulates a signal sequence that would be issued by the coin receiving switch in response to receiving a preset number of coins. For example, with reference to Figure 28B, the payment module 1520 issues a predefined signal sequence with first interface module 1522 to the control unit 1506 that emulates sample 1550 in Figure 28B. Continuing with this example, in response to receiving the predefined signal sequence from the payment module 1520 control unit 1506 causes initiation of the operation of the offline-payment operated machine 1500 by applying current to the gate of the transistor 1510 which allows current to flow from the power supply 1508 to operation unit 1512. In some implementations, the control unit 1506 causes initiation of the operation by setting a timer to an amount of time corresponding to the preset number of coins whereby current flows to the gate of the transistor 1510 for the set amount of time. For example, the preset number of coins is a number of a coins required to run the offline-payment operated machine 1500 by for a default amount of time and subsequent coins may be added to extend the amount of time that the offline-payment operated machine 1500 by will run. In some implementations, the preset number of coins is a number of a coins required to cause the offline-payment operated machine 1500 to dispense a purchased item, such as laundry detergent.

[00218] Alternatively, in some implementations, in accordance with a determination that the request is valid, the offline-payment operated machine 1500 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 offline-payment operated machine 1500 120 (e.g., via the buttons 126 or a touch screen display 124 shown in Figure 19) to perform the operation of the machine. For example, if the offline-payment operated machine 1500 is a dryer, the user of the mobile device 150 selects the appropriate spin cycle via input mechanisms of the dryer, and when the user of the mobile device 150 selects a start/run input mechanism of the dryer, control unit 1506 of the dryer causes initiation of the operation of the dryer (e.g., starting a motor that corresponds to operation unit 1512 in Figure 28A).

[00219] In some implementations, prior to sending the operation information and after causing the offline-payment operated machine to perform the operation by issuing the predefined signal sequence to the control unit, the payment module obtains (1616) a notification from the offline-payment operated machine indicating initiation of the operation of the offline-payment operated machine and the preset number of coins. For example, after issuing the preset signal sequence to control unit 1506, the payment module 1520 (Figure 28A) obtains a notification indicating that the control unit 1506 sent control signals to initiate operation of the offline-payment operated machine 1500 in response to receiving the predefined signal sequence. For example, the notification is obtained by the second interface module 1524 (e.g., the sample 1570, Figure 28B) sampling controls signals sent by control unit 1506 (e.g., application of current to the gate of the transistor 1510 which allows current to flow from the power supply 1508 to operation unit 1512).

[00220] In response to receiving the notification, the payment module (1618): generates the operation information based at least in part on the notification; and stores the generated operation information in the memory. For example, after obtaining the notification, the payment module 1520 (Figure 28A) generates operation information corresponding to performance of the operation and the preset number of coins associated with the predefined signal sequence (e.g., the amount required to initiate operation of the offline-payment operated machine 1500) and stores the operation information in memory local to the payment module 1520 (e.g., the memory 760, Figure 20).

[00221] In some implementations, the payment module sends (1620) operation information corresponding to the operation to the respective mobile device via the short-range communication capability. For example, after operation 1618, the payment module 1520 (Figure 28A) sends the operation information to the mobile device 150 via the first communication capability of the mobile device 150 such as a radio/transceiver means for communicating via one or more short-range communication protocols such as BLE, NFC, and/or the like (i.e., a non-persistent communication channel)

[00222] It should be understood that the particular order in which the operations in Figures 29A-29B have been described is merely for example purposes and is not intended to indicate that the described order is 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, it should be noted that details of other processes described herein with respect to other methods described herein (e.g., the method 1700 in Figure 30) are also applicable in an analogous manner to the method 1600 described above with respect to Figures 29A-29B.

[00223] Figure 30 illustrates a flowchart diagram of a method 1700 of enabling a payment operated machine to accept electronic payments in accordance with some implementations. In some implementations, the method 1700 is performed by an offline-payment operated machine (e.g., the payment accepting unit 120, Figures 5 and 19 (sometimes also herein called "machine 120"), or the offline-payment operated machine 1500, Figure 28A) such as dryer or washer in a laundromat, a parking meter, a car wash payment kiosk, or the like.

[00224] In some implementations, the offline-payment operated machine includes a control unit (e.g., the control unit 1506, Figure 28A), memory, and a coin receiving switch (e.g., the microswitch 1502, Figure 28A). In some implementations, the offline-payment operated machine also includes a short-range communication capability corresponding to a short-range communication protocol (e.g., a non-persistent communication channel such as BLE, NFC, and/or the like), where the short-range communication capability is configured to communicate with one or more mobile devices, where each of the one or more mobile devices is configured with a complimentary short-range communication capability and a long-range communication capability corresponding to a long-range communication protocol (e.g., Wi-Fi, CDMA, GSM, and/or the like). For example, in some implementations, the method 1700 is performed by the

machine 120, (Figures 5 and 19). In some implementations, the method 1700 is governed by instructions that are stored in a non-transitory computer readable storage medium and the instructions are executed by the control unit of the offline-payment operated machine.

[00225] The offline-payment operated machine receives (1702) a request via a short-range communication capability from a respective mobile device to perform an operation of the offline-payment operated machine. For example, with reference to Figure 8C, the payment module 1520 (Figure 28A) receives the AuthGrant from the mobile device 150 via the short-range communication capability (e.g., BLE) indicating that the user of the mobile device 150 wishes to perform the operation of the offline-payment operated machine 1500 (Figure 28A). For example with reference to operation 1012 in Figure 23, the payment module 1520 (Figure 28A) receives an authorization grant token from the mobile device 150 via the short-range communication capability (e.g., BLE) indicating that the user of the mobile device 150 wishes to perform the operation of the offline-payment operated machine 1500 (Figure 28A).

[00226] The offline-payment operated machine validates (1704) the request. Validation of the request indicates (1706) that the respective mobile device is authorized to initiate payment for the operation by a remote server via the long-range communication capability. In some implementations, the payment module 1520 validates the request from the mobile device 150 by determining whether the AuthGrant or the authorization grant token includes a valid authorization code.

[00227] In accordance with a determination that the request is valid, the offline-payment operated machine performs (1708) the operation by issuing a predefined signal sequence to the control unit, where the predefined signal sequence emulates a preset number of coins received by the coin receiving switch. For example, in accordance with a determination that the request is valid, the offline-payment operated machine or a component thereof issues a predefined signal sequence to the control unit 1506 that emulates sample 1550 in Figure 28B. Continuing with this example, in response to receiving the predefined signal sequence from the payment module 1520, control unit 1506 causes initiation of the operation of the offline-payment operated machine 1500 by applying current to the gate of the transistor 1510 which allows current to flow from the power supply 1508 to operation unit 1512. In another example, in accordance with a determination that the request is valid, the control unit 1506 causes initiation of the operation of

the offline-payment operated machine 1500 by applying current to the gate of the transistor 1510 which allows current to flow from the power supply 1508 to operation unit 1512.

[00228] It should be understood that the particular order in which the operations in Figure 30 have been described is merely for example purposes and is not intended to indicate that the described order is 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, it should be noted that details of other processes described herein with respect to other methods described herein (e.g., the method 1600 in Figures 29A-29B) are also applicable in an analogous manner to the method 1700 described above with respect to Figure 30.

MISCELLANEOUS

[00229] It should be noted that relative terms are meant to help in the understanding of the technology and are not meant to limit the scope of the invention. Similarly, unless specifically stated otherwise, the terms used for labels (e.g., "first," "second," and "third") are meant solely for purposes of designation and not for order or limitation. The term "short" in the phrase "short-range" (in addition to having technology specific meanings) is relative to the term "long" in the phrase "long-range."

[00230] The terms "may," "might," "can," and "could" are used to indicate alternatives and optional features and only should be construed as a limitation if specifically included in the claims.

[00231] It should be noted that, unless otherwise specified, the term "or" is used in its nonexclusive form (e.g., "A or B" includes A, B, A and B, or any combination thereof, but it would not have to include all of these possibilities). It should be noted that, unless otherwise specified, "and/or" is used similarly (e.g., "A and/or B" includes A, B, A and B, or any combination thereof, but it would not have to include all of these possibilities). It should be noted that, unless otherwise specified, the terms "includes" and "has" mean "comprises" (e.g., a device that includes, has, or comprises A and B contains A and B, but optionally may contain C or additional components other than A and B). It should be noted that, unless otherwise specified, the singular forms "a," "an," and "the" refer to one or more than one, unless the context clearly dictates otherwise.

[00232] It is to be understood that the inventions, examples, and implementations described herein are not limited to particularly exemplified materials, methods, and/or structures. It is to be understood that the inventions, examples, and implementations described herein are to be considered preferred inventions, examples, and implementations whether specifically identified as such or not.

[00233] The terms and expressions that have been employed in the foregoing specification are used as terms of description and not of limitation, and are not intended to exclude equivalents of the features shown and described. While the above is a complete description of selected implementations of the present invention, it is possible to practice the invention using various alternatives, modifications, adaptations, variations, and/or combinations and their equivalents. It will be appreciated by those of ordinary skill in the art that any arrangement that is calculated to achieve the same purpose may be substituted for the specific embodiment shown. It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention that, as a matter of language, might be said to fall therebetween.

CLAIMS

1. A method of presenting representations of payment accepting unit events, comprising:

at a mobile device with one or more processors, memory, one or more output devices including a display, and one or more radio transceivers:

identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing on the mobile device, the identifying based at least in part on an identifier corresponding to the one or more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services;

displaying a user interface of the mobile payment application on the display of the mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units;

establishing via the one or more radio transceivers a wireless communication path including the mobile device and the available payment accepting unit of the one or more payment accepting units;

after establishing the wireless communication path, enabling user interaction with the user interface of the mobile payment application to complete a transaction with the available payment accepting unit;

exchanging information with the available payment accepting unit via the one or more radio transceivers, in conjunction with the transaction; and

after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device.

2. The method of claim 1, wherein the updated user interface of the mobile payment application includes at least one of:

a message displayed on the display of the mobile device;

a banner notification displayed on a display of the mobile device; and/or

a visual alert from one or more LEDs of the mobile device.

3. The method of claim 1, wherein the information indicates completion of the transaction between the user of the mobile device and the available payment accepting unit.

4. The method of claim 3, wherein the mobile device includes a long-range transceiver and the information at least includes an amount of the completed transaction, and the method further comprises:

sending at least the amount of the completed transaction to a server via the long-range transceiver.

5. The method of claim 1, wherein the information indicates abortion of the transaction initiated by the user of the mobile device.

6. The method of claim 1, wherein the information indicates failure of the transaction initiated by the user of the mobile device or a malfunction associated with the available payment accepting unit.

7. The method of claim 1, wherein the mobile device includes an accelerometer and the method further comprises:

based on data from the accelerometer, determining whether the user is walking away from the available payment accepting unit; and

in accordance with a determination that the user is walking away from the available payment accepting unit, canceling the wireless communication path.

8. The method of claim 1, wherein the information reflects availability of the available payment accepting unit to conduct a transaction.

9. The method of claim 1, further comprising:

in addition to exchanging the information, receiving, via the one or more radio transceivers, a coupon that is targeted to the user of the mobile device based on the transaction.

10. The method of claim 1, wherein the user interface of the mobile payment application, after establishing the wireless communication path, indicates that the wireless communication path has been established with the available payment accepting unit.

11. The method of claim 1, wherein the user interface of the mobile payment application, after establishing the wireless communication path, includes:

a visual representation of the available payment accepting unit;

an indication of a prepaid balance; and

an affordance that when slid, indicates the initiation of the transaction;

wherein the affordance is slid in response to receiving a user input of swipe on the affordance displayed on the display of the mobile device.

12. The method of claim 1, wherein the payment operated machines include a payment activated washer, a payment activated dryer, a vending machine, a parking meter, a toll booth, an arcade game, a kiosk, a photo booth, or a ticket dispensing machine.

13. A mobile device, comprising:

one or more radio transceivers;

one or more output devices including a display;

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:

identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing on the mobile device, the identifying based at least in part on an identifier corresponding to the one or more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services;

displaying a user interface of the mobile payment application on the display of the mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units;

establishing via the one or more radio transceivers a wireless communication path including the mobile device and the available payment accepting unit of the one or more payment accepting units;

after establishing the wireless communication path, enabling user interaction with the user interface of the mobile payment application to complete a transaction with the available payment accepting unit;

exchanging information with the available payment accepting unit via the one or more radio transceivers, in conjunction with the transaction; and

after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device.

14. The mobile device of claim 13, wherein identifying the one or more payment accepting units includes identifying a payment activated washer, a payment activated dryer, a vending machine, a parking meter, a toll booth, an arcade game, a kiosk, a photo booth, or a ticket dispensing machine.

15. A non-transitory computer readable storage medium storing one or more programs, the one or more programs comprising instructions, which, when executed by a mobile device with one or more processors, one or more output devices including a display, and one or more radio transceivers, cause the mobile device to perform operations comprising:

identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing on the mobile device, the identifying based at least in part on an identifier corresponding to the one or more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services;

displaying a user interface of the mobile payment application on the display of the mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units;

establishing via the one or more radio transceivers a wireless communication path including the mobile device and the available payment accepting unit of the one or more payment accepting units;

after establishing the wireless communication path, enabling user interaction with the user interface of the mobile payment application to complete a transaction with the available payment accepting unit;

exchanging information with the available payment accepting unit via the one or more radio transceivers, in conjunction with the transaction; and

after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device.

16. The non-transitory computer readable storage medium of claim 15, wherein the updated user interface of the mobile payment application includes at least one of:

a message displayed on the display of the mobile device;

a banner notification displayed on a display of the mobile device; and/or

a visual alert from one or more LEDs of the mobile device.

17. The non-transitory computer readable storage medium of claim 15, wherein:

the information indicates completion of the transaction between the user of the mobile device and the available payment accepting unit;

the information at least includes an amount of the completed transaction; and

the instructions further cause the mobile device to send at least the amount of the completed transaction to a server.

18. The non-transitory computer readable storage medium of claim 15, wherein the information indicates abortion of the transaction initiated by the user of the mobile device.

19. The non-transitory computer readable storage medium of claim 15, wherein the information indicates failure of the transaction initiated by the user of the mobile device or a malfunction associated with the available payment accepting unit.

20. The non-transitory computer readable storage medium of claim 15, wherein identifying the one or more payment accepting units includes identifying a payment activated washer, a payment activated dryer, a vending machine, a parking meter, a toll booth, an arcade game, a kiosk, a photo booth, or a ticket dispensing machine.

ABSTRACT

A mobile device presents representations of payment accepting unit events on a display, by identifying a payment accepting unit that is available to accept payment, displaying a visual indication of the payment accepting unit, and accepting user input to receive selection of the payment accepting unit and trigger payment, establishing a wireless communication path including the mobile device and the payment accepting unit, enabling user interaction with the user interface to complete the transaction, exchanging information with the available payment accepting unit via the one or more radio transceivers in conjunction with the transaction, and displaying an updated user interface of the mobile payment application.

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

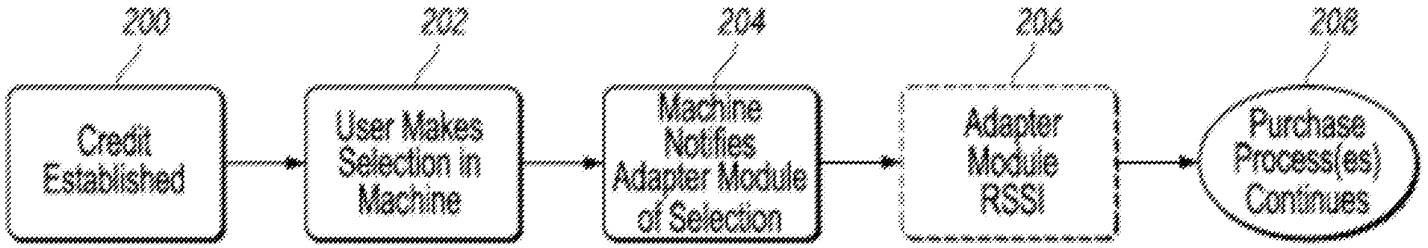


Figure 4

Petitioner Exhibit 1002-0092

Operators' Server
170
Wired Internet
System Management Server
130
Wired Internet
Funding Source Server
160
Handheld computer sync or cellular
Wifi or Cellular
Wifi or Cellular
140 App
Mobile Device
150
Bluetooth
Adapter Module
100
Wired Serial
Machine
120

Figure 5

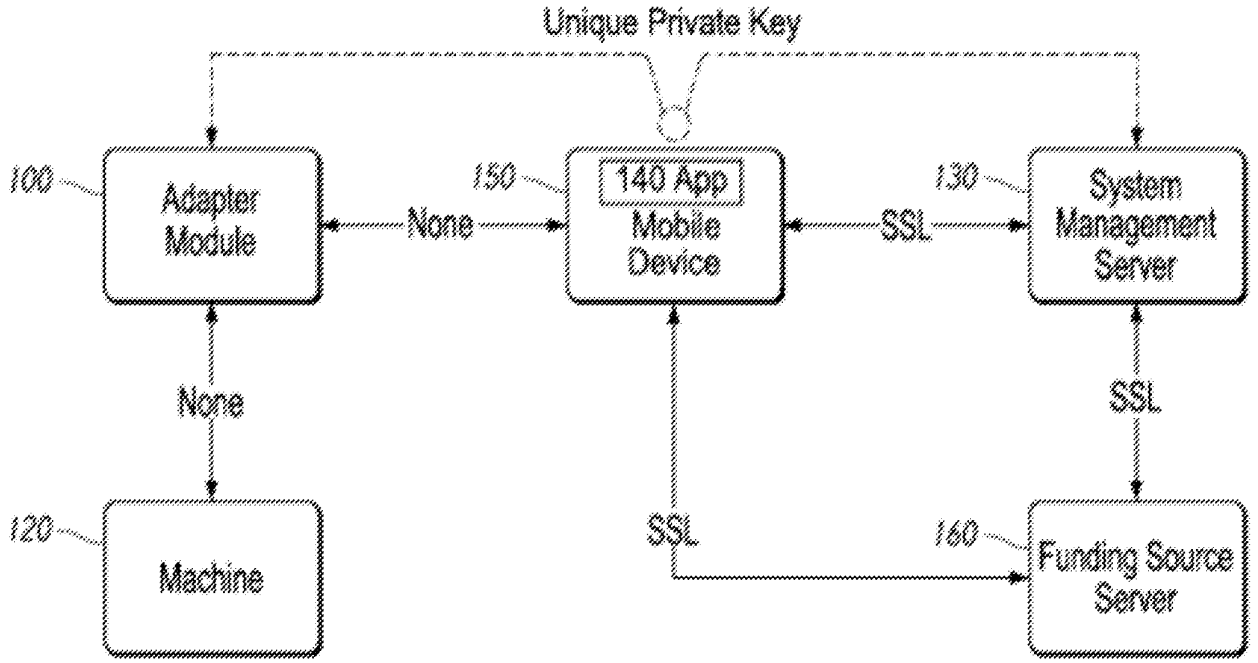


Figure 6

Petitioner Exhibit 1002-0094

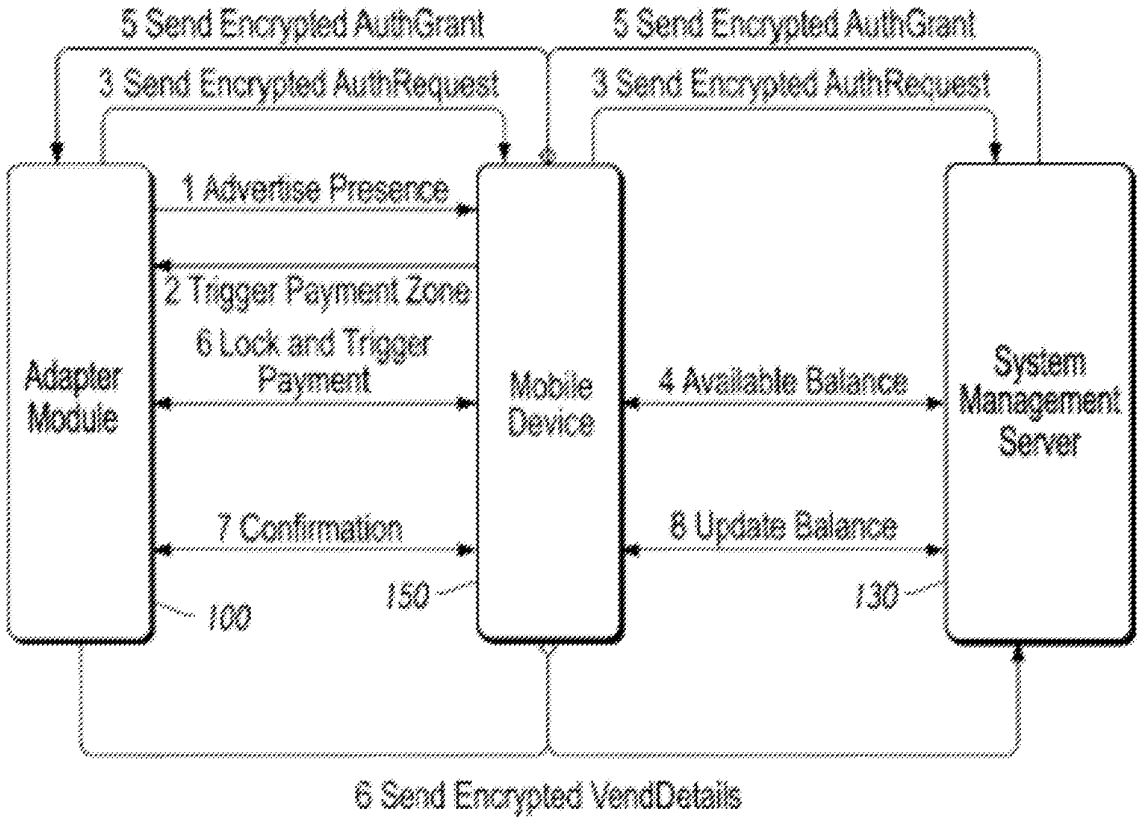


Figure 7

Petitioner Exhibit 1002-0095

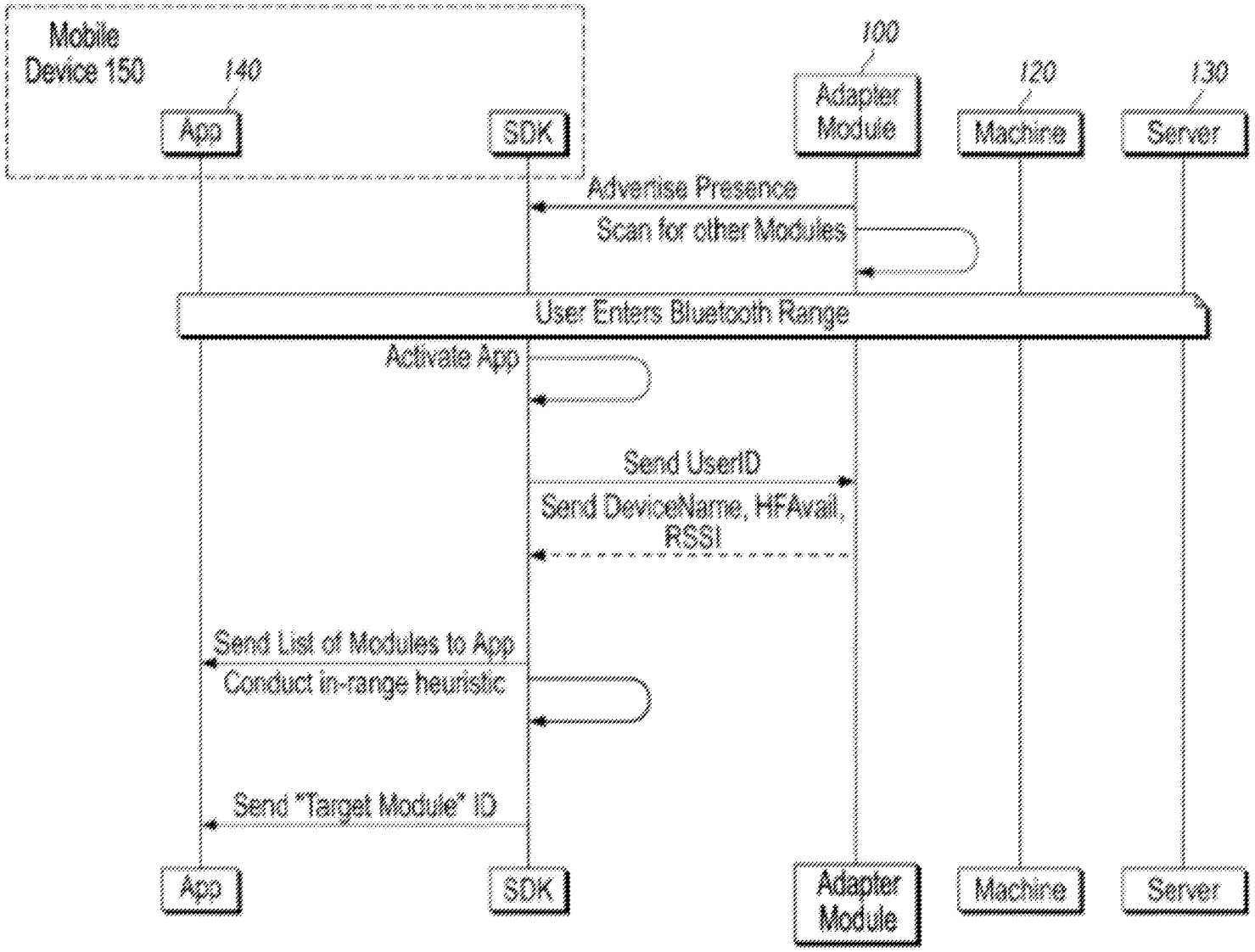


Figure 8A

Petitioner Exhibit 1002-0096

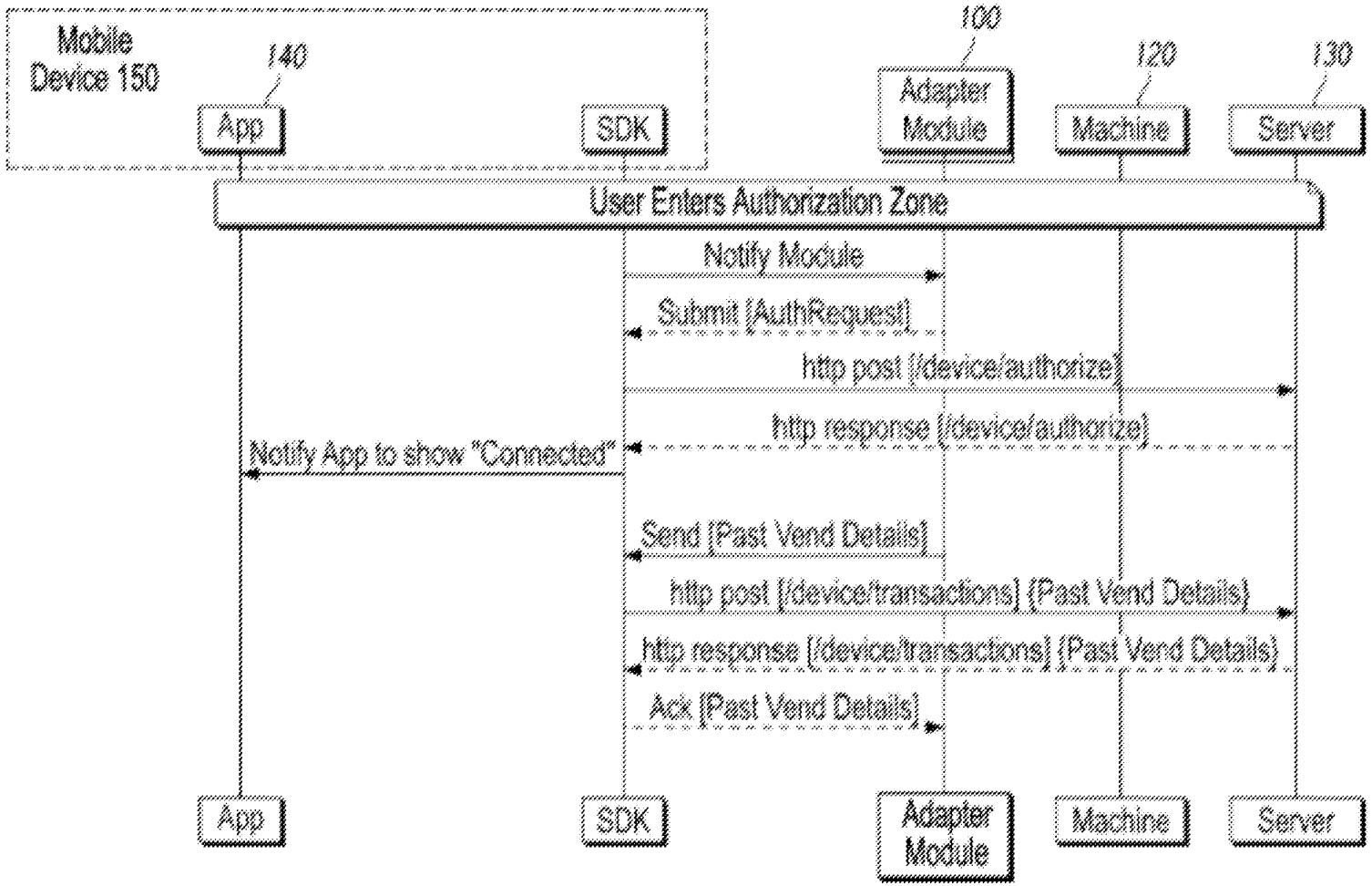


Figure 8B

Petitioner Exhibit 1002-0097

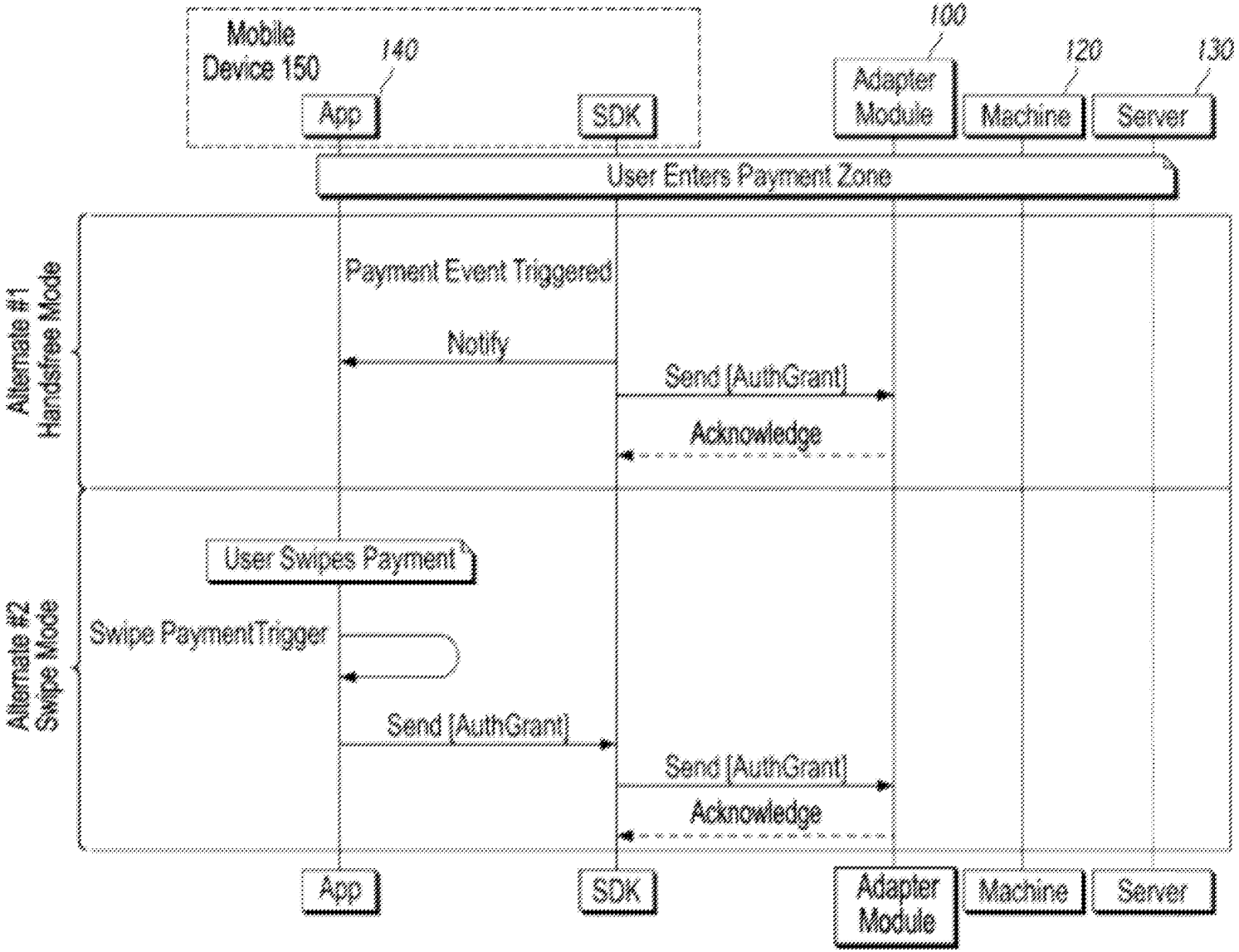


Figure 8C

Petitioner Exhibit 1002-0098

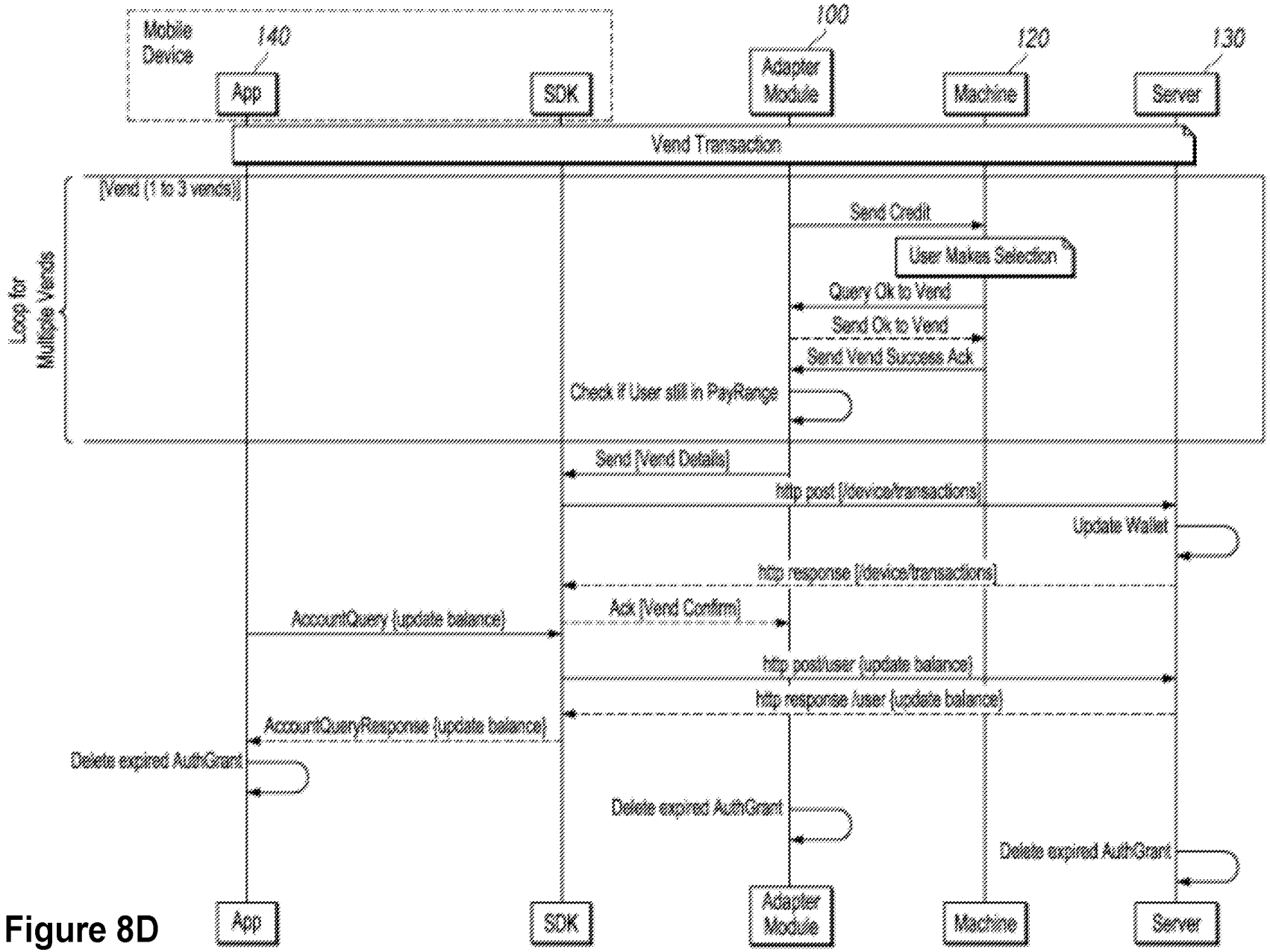


Figure 8D

Petitioner Exhibit 1002-0099

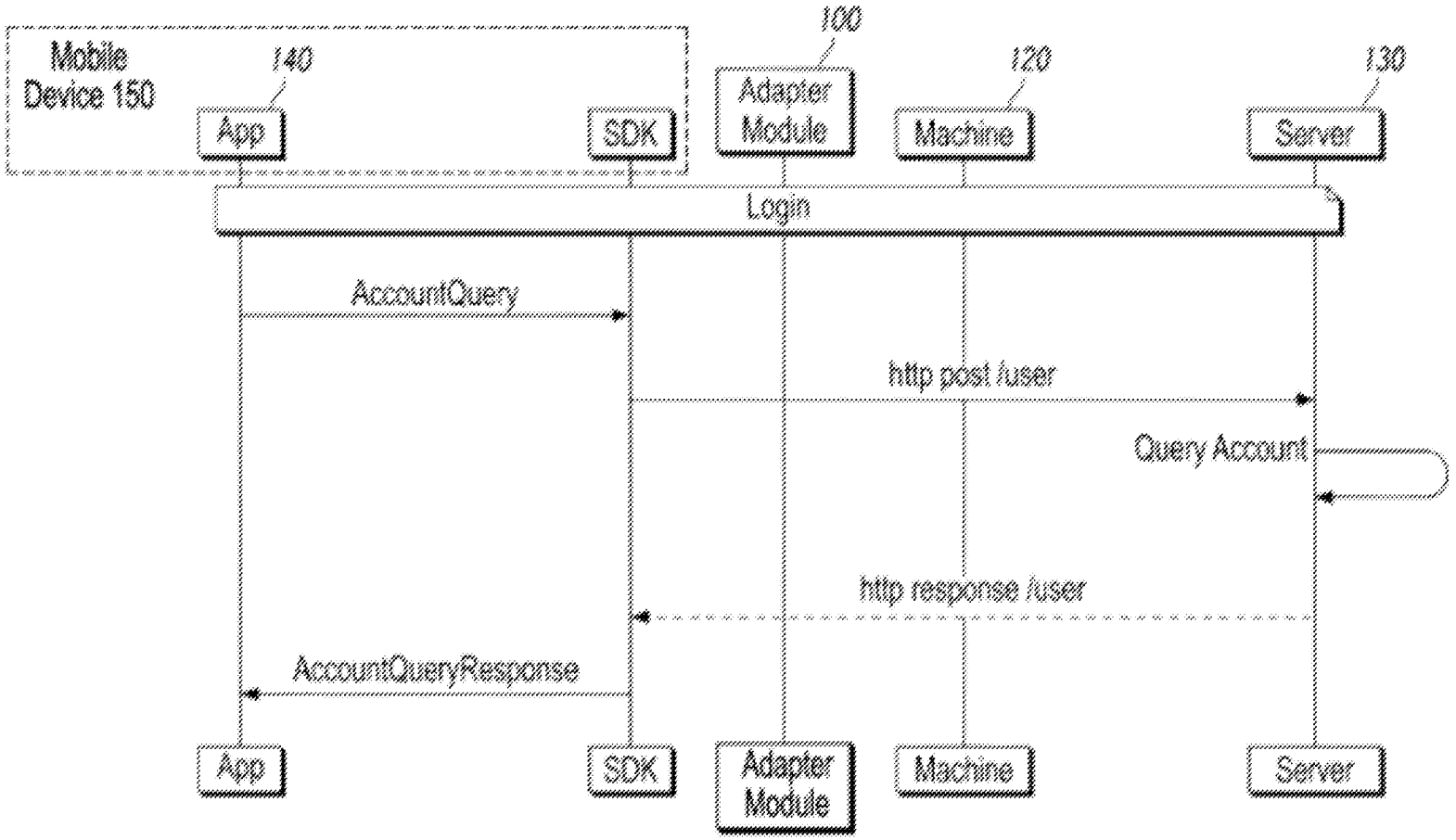


Figure 8E

Petitioner Exhibit 1002-0100

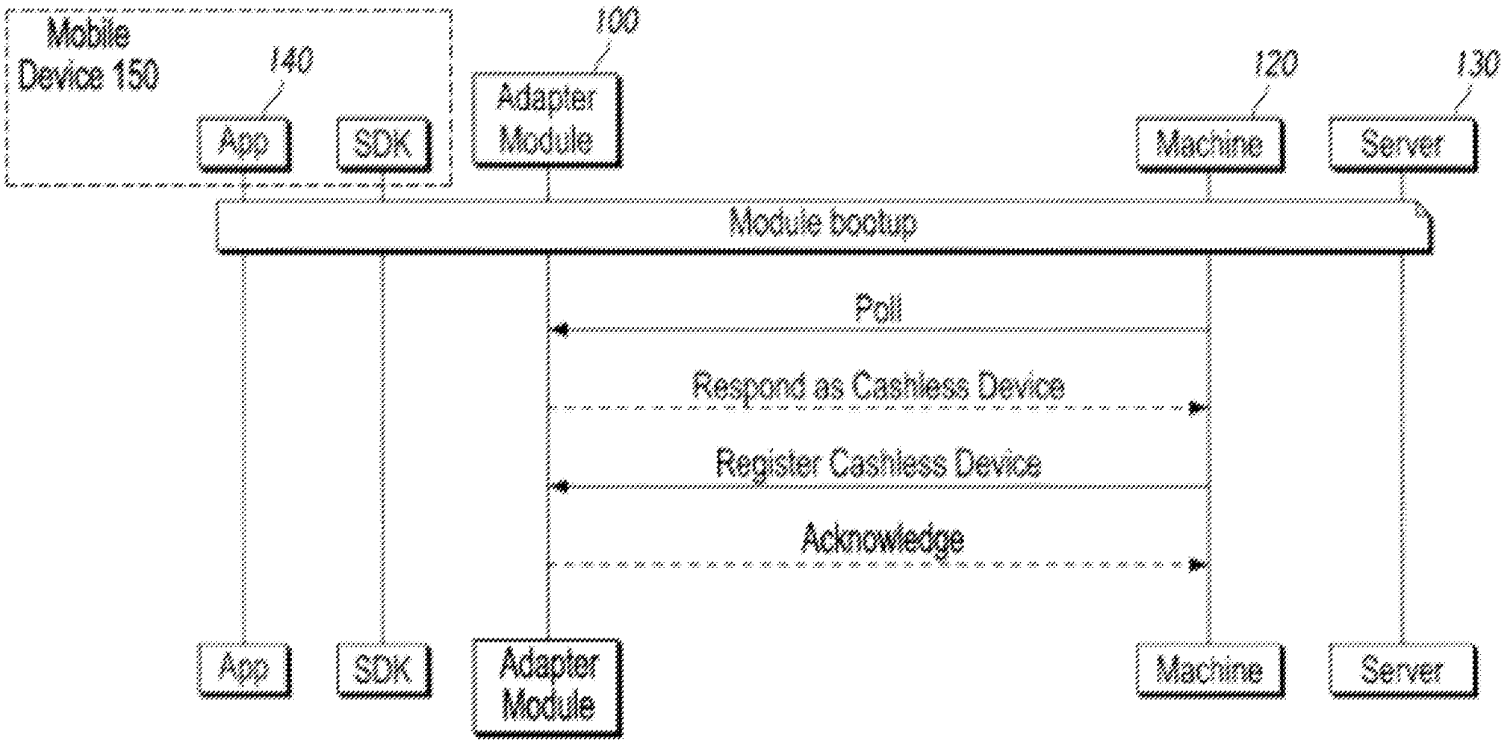


Figure 8F

Petitioner Exhibit 1002-0101

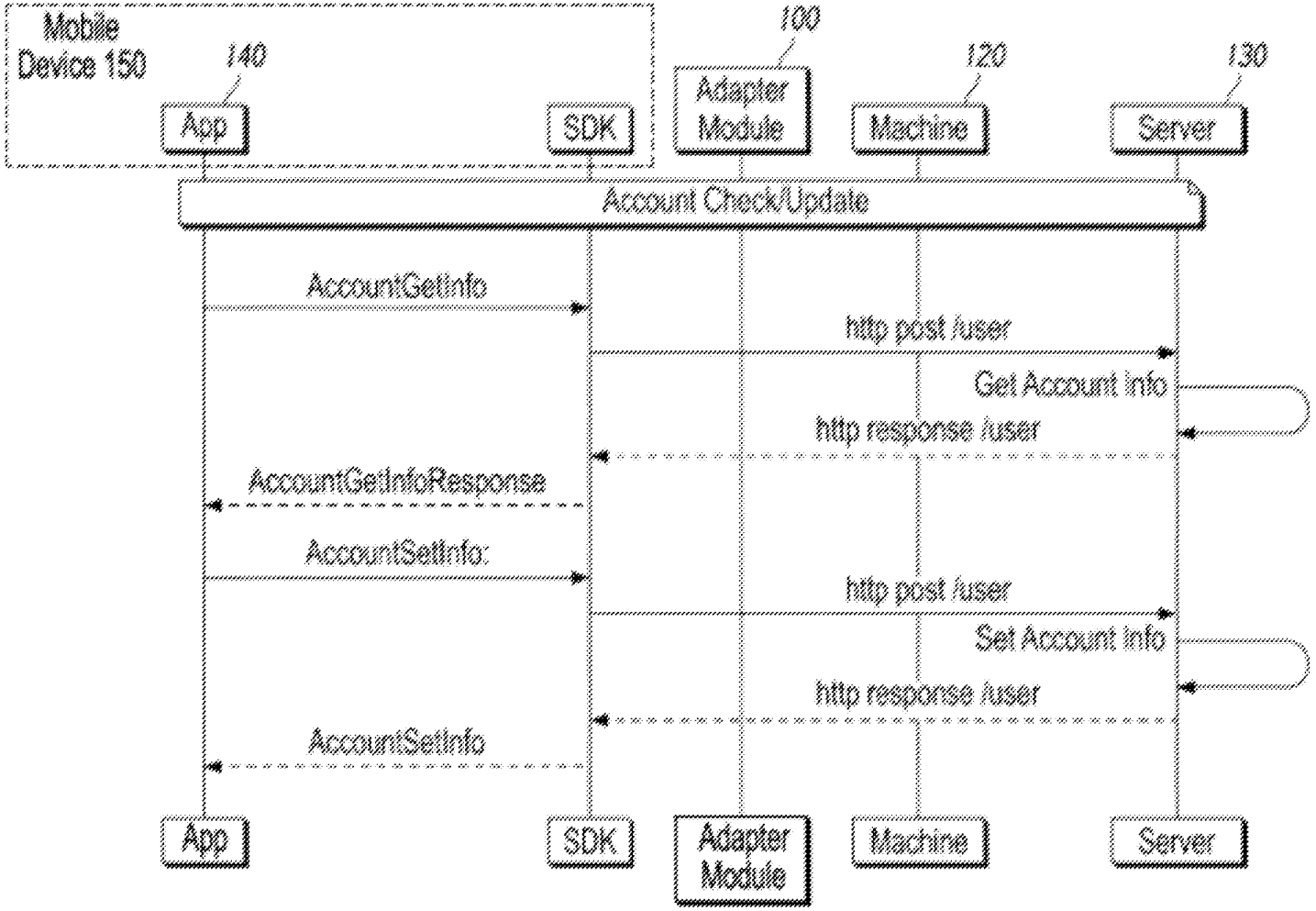


Figure 8G

Petitioner Exhibit 1002-0102

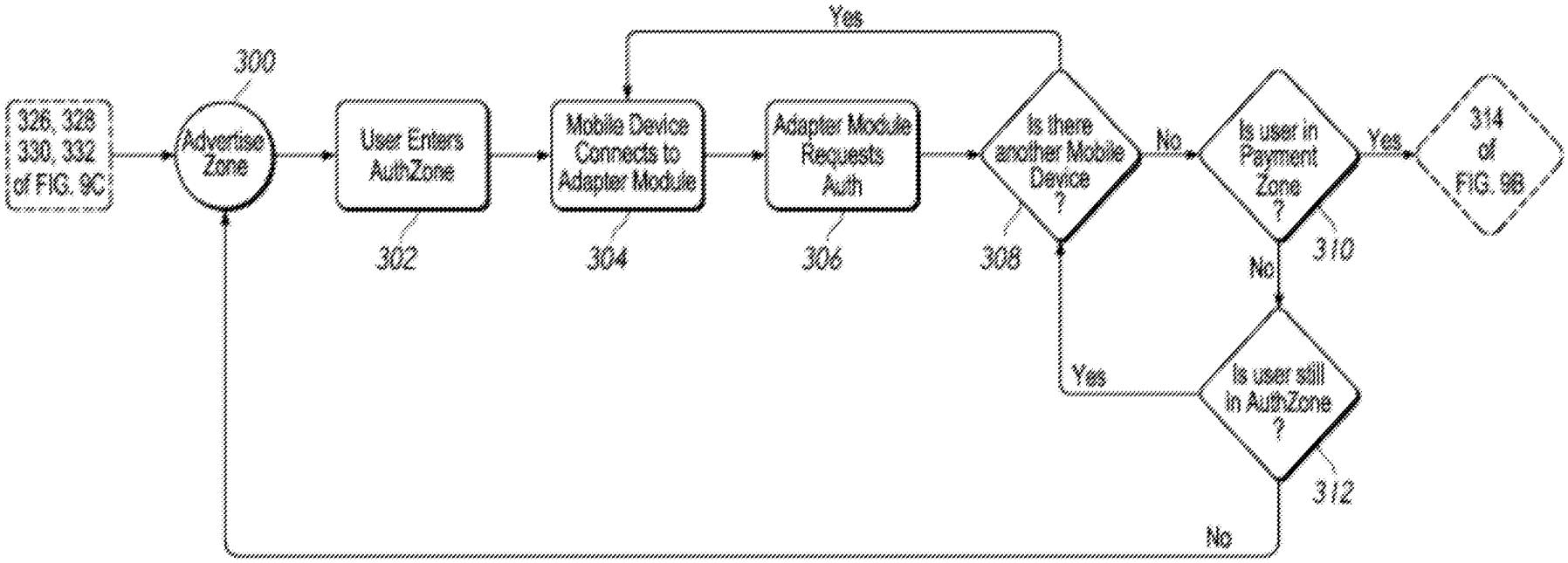


Figure 9A

Petitioner Exhibit 1002-0103

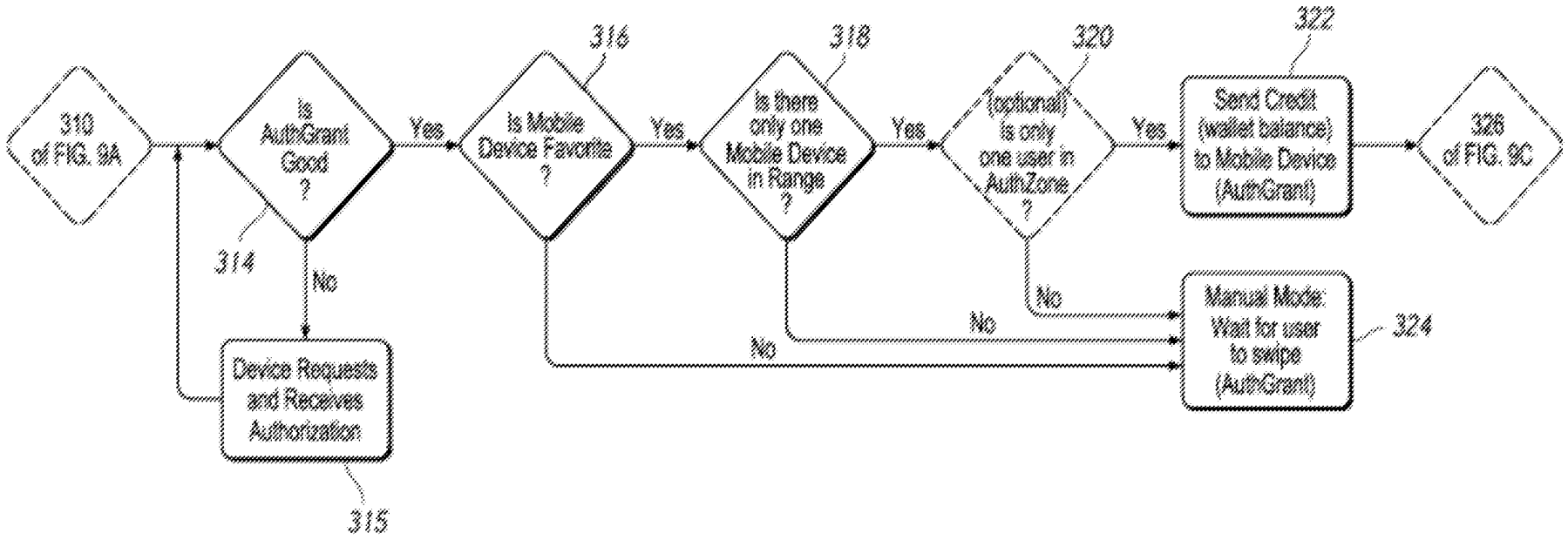
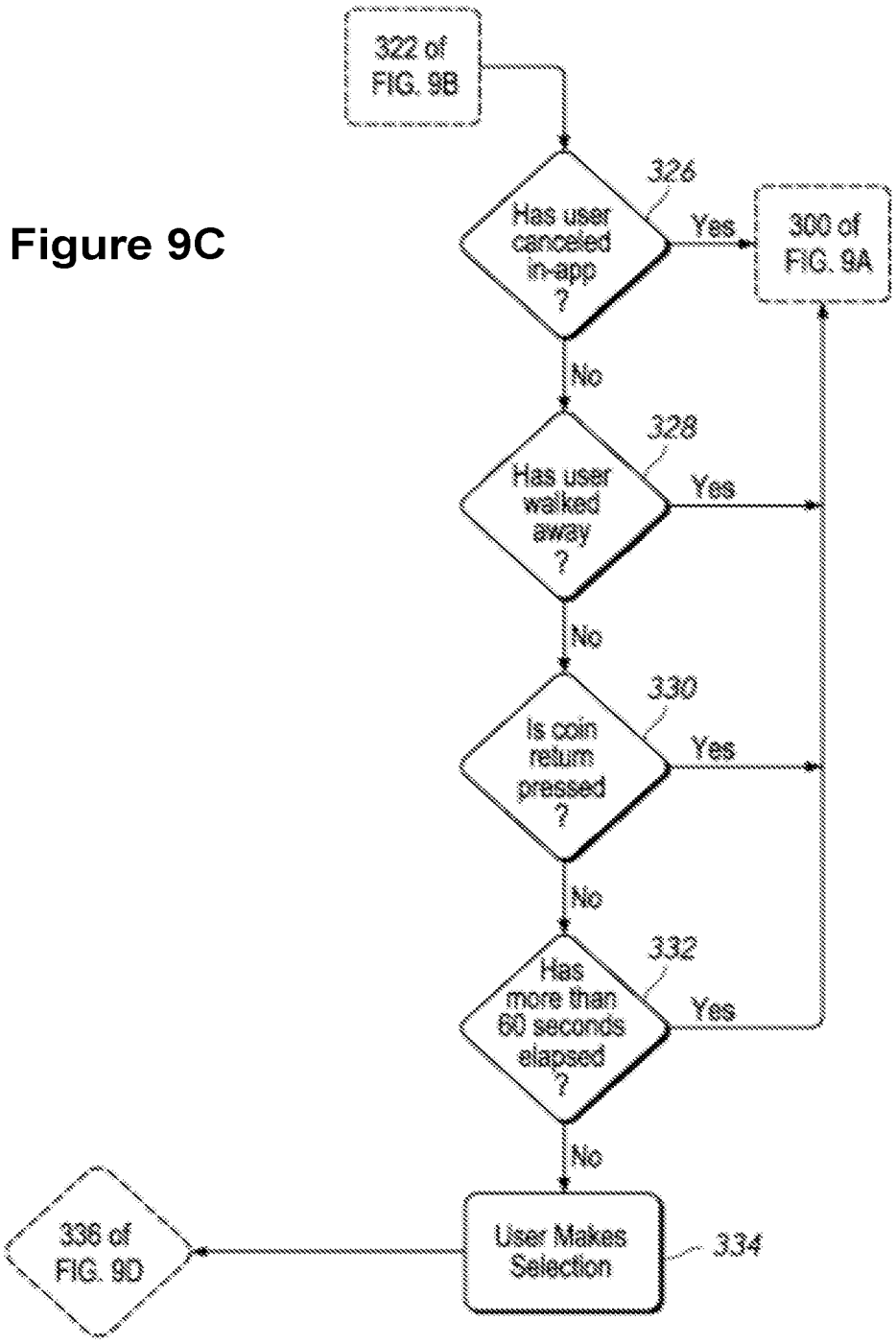


Figure 9B

Petitioner Exhibit 1002-0104

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

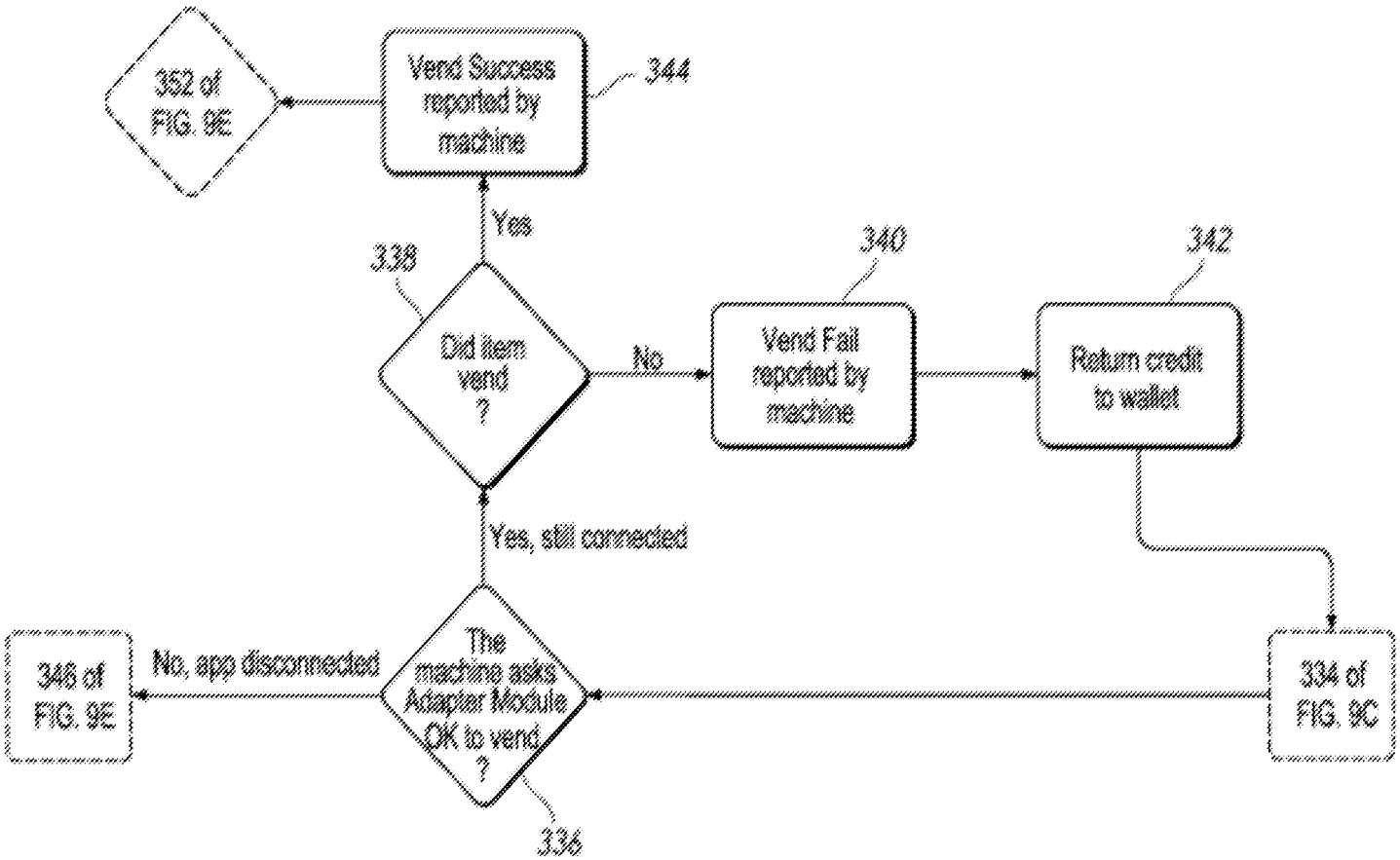


Figure 9D

Petitioner Exhibit 1002-0106

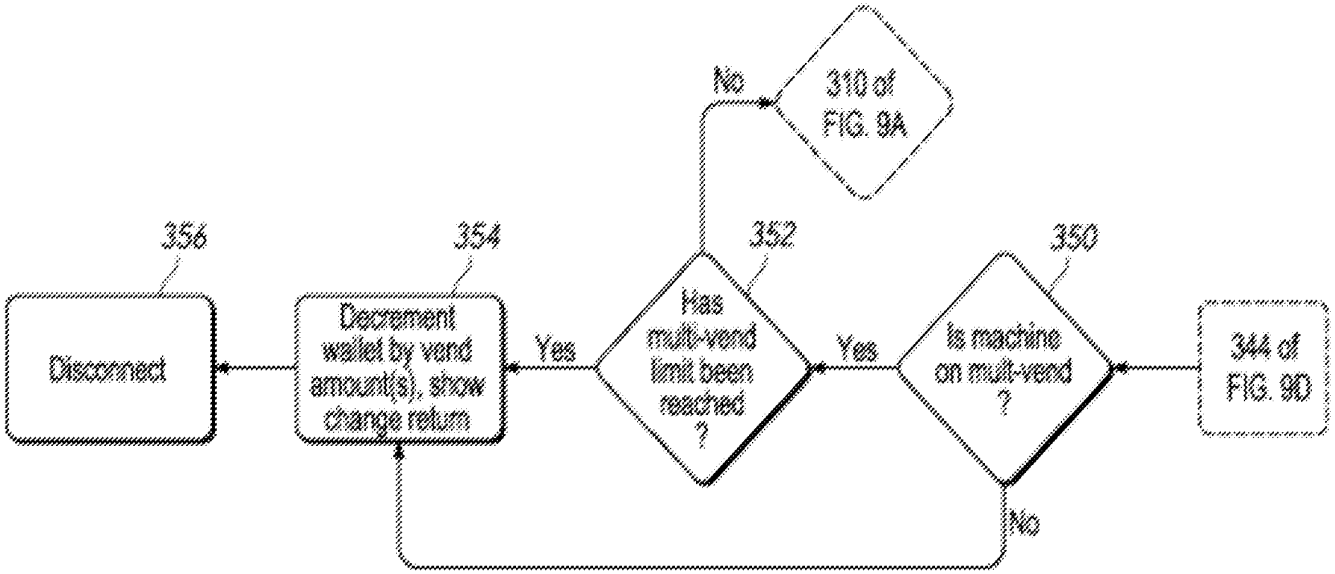


Figure 9E

Petitioner Exhibit 1002-0107

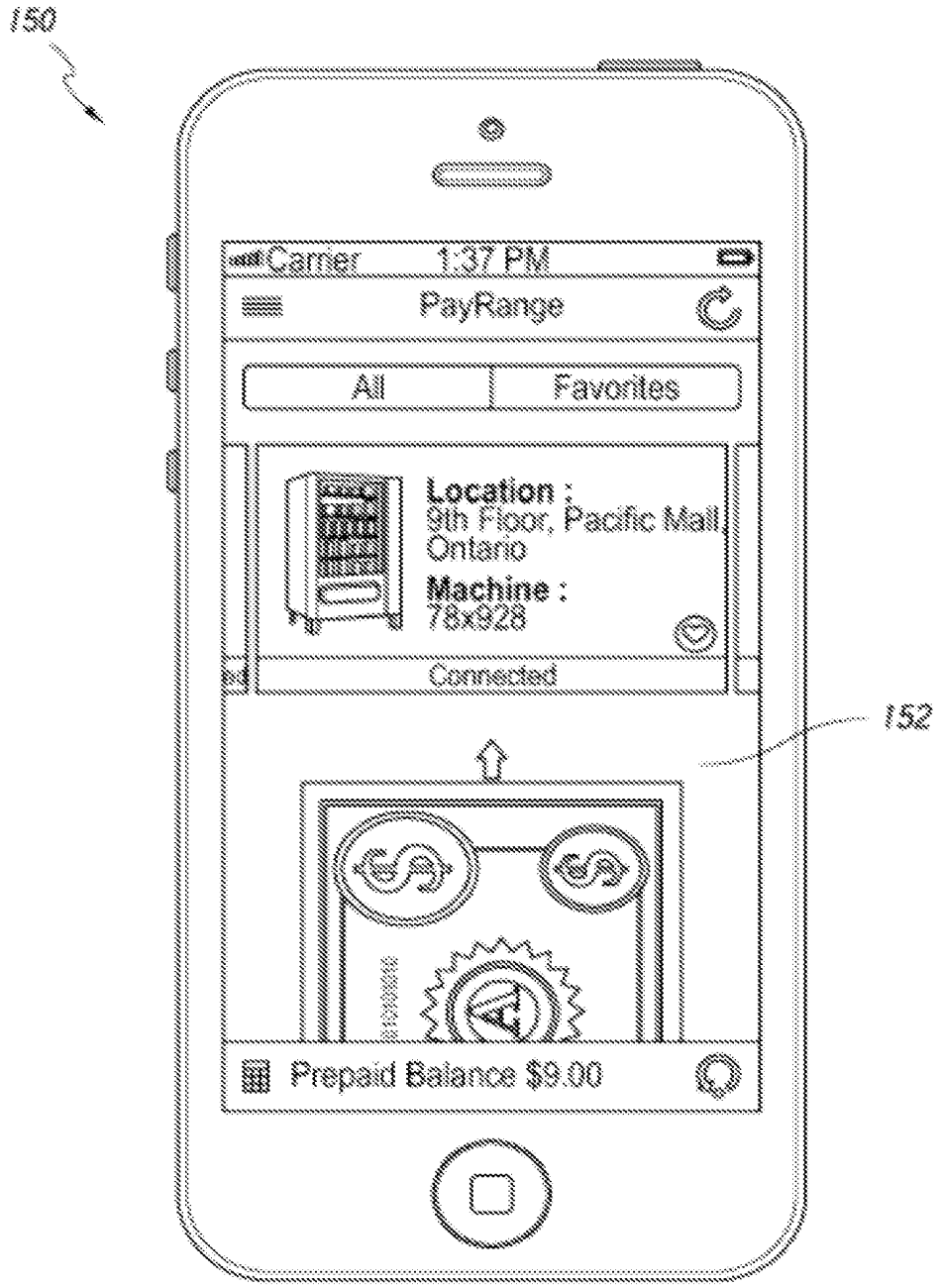

150
Carrier 1:37 PM
PayRange
All
Favorites
Location :
9th Floor, Pacific Mall
Ontario
Machine :
78x928
Connected
152
Prepaid Balance $9.00

Figure 10A

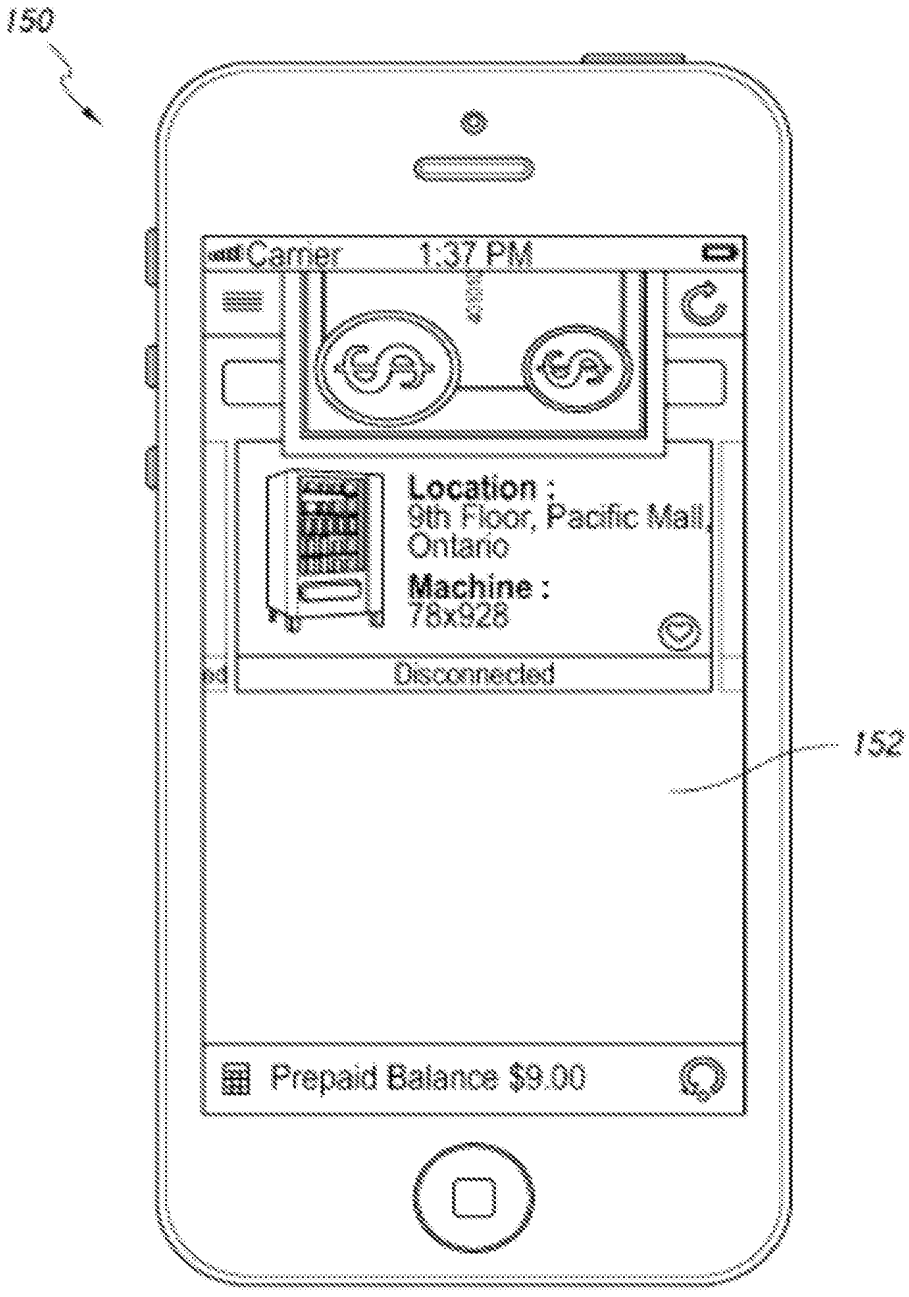

150
Carrier
1:37 PM
Location :
9th Floor, Pacific Mall,
Ontario
Machine :
78x928
Disconnected
152
Prepaid Balance $9.00

Figure 10B

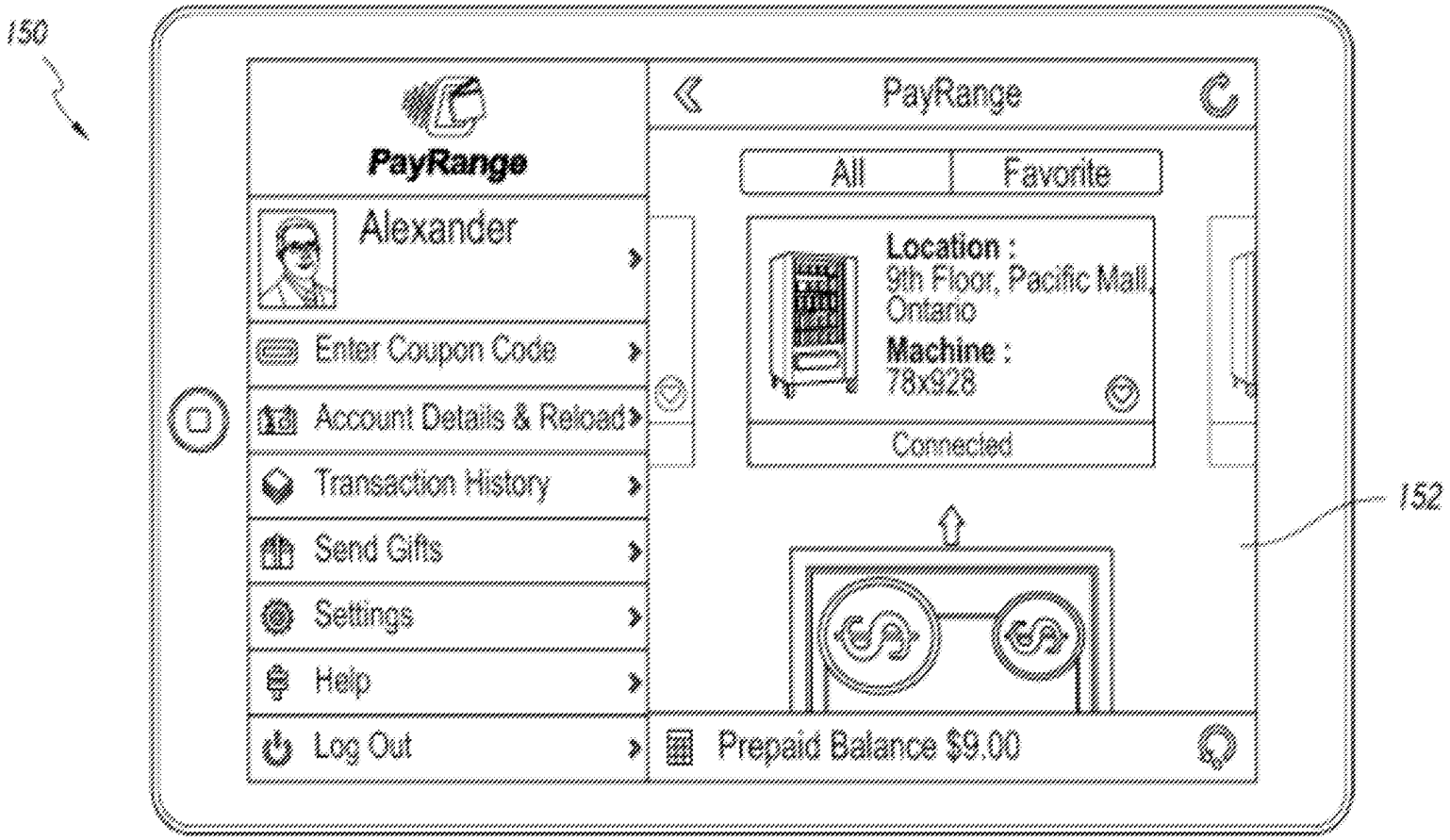


Figure 10C

Petitioner Exhibit 1002-0110

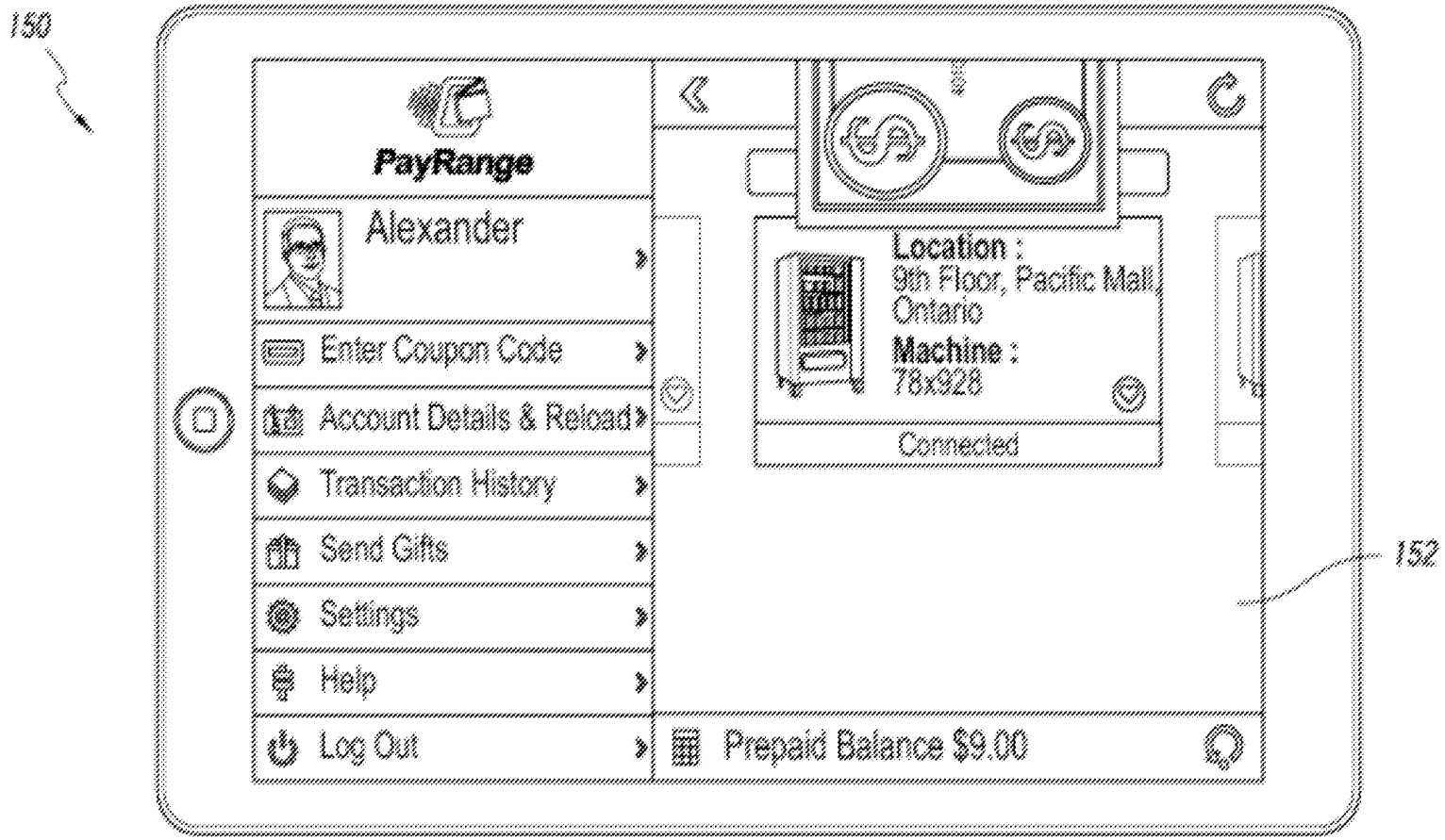


Figure 10D

Petitioner Exhibit 1002-0111

Figure 12

Figure 13

Figure 11

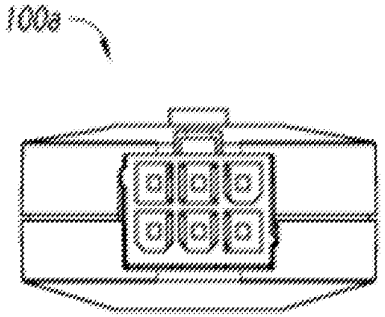


Figure 15

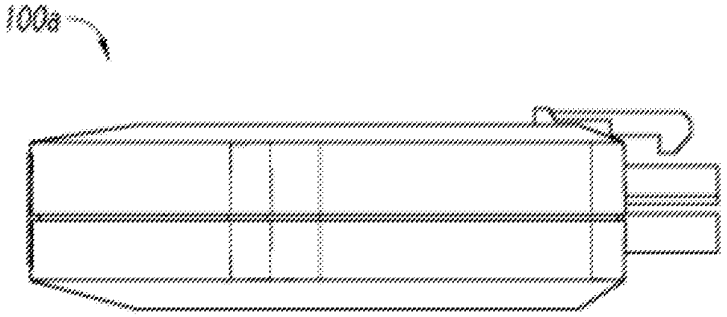


Figure 14

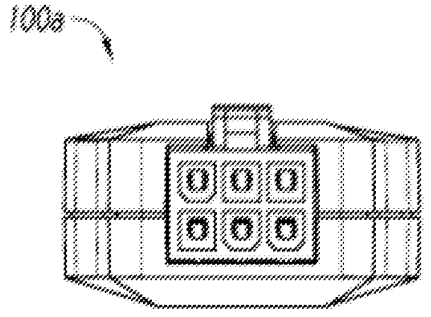


Figure 16

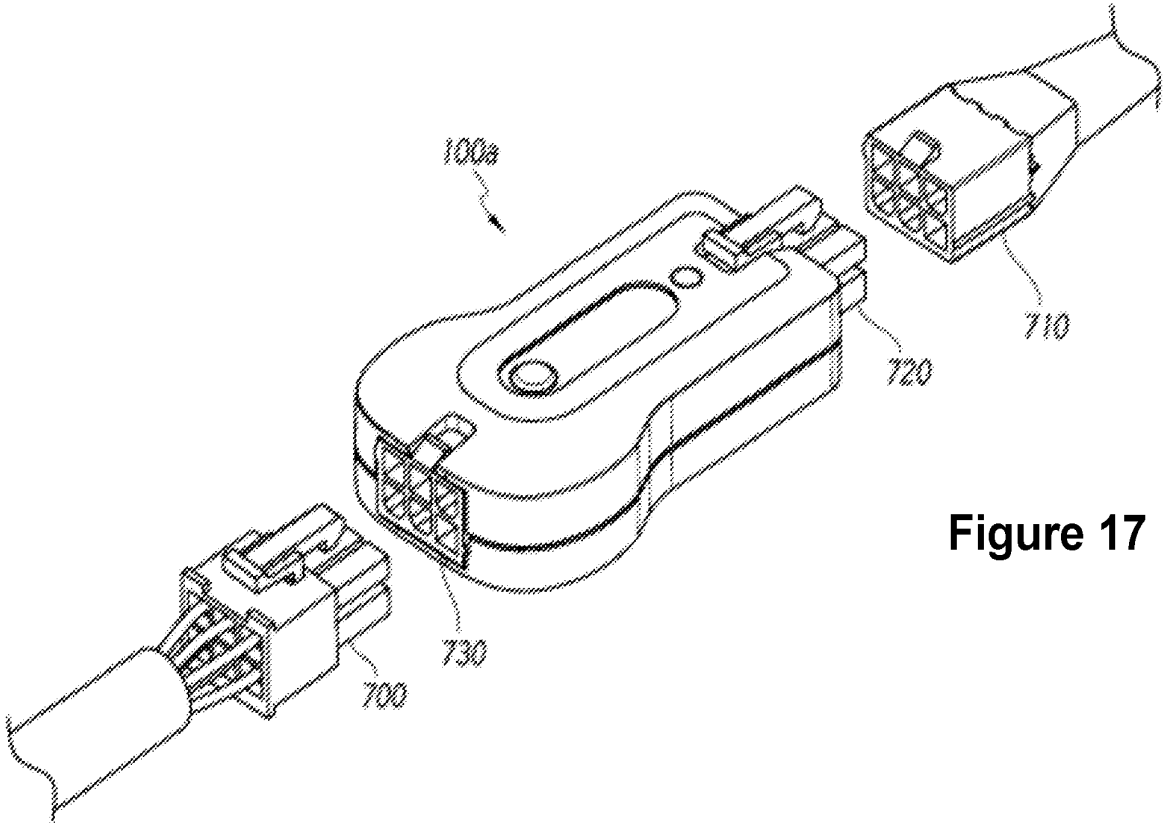


Figure 17

Petitioner Exhibit 1002-0113

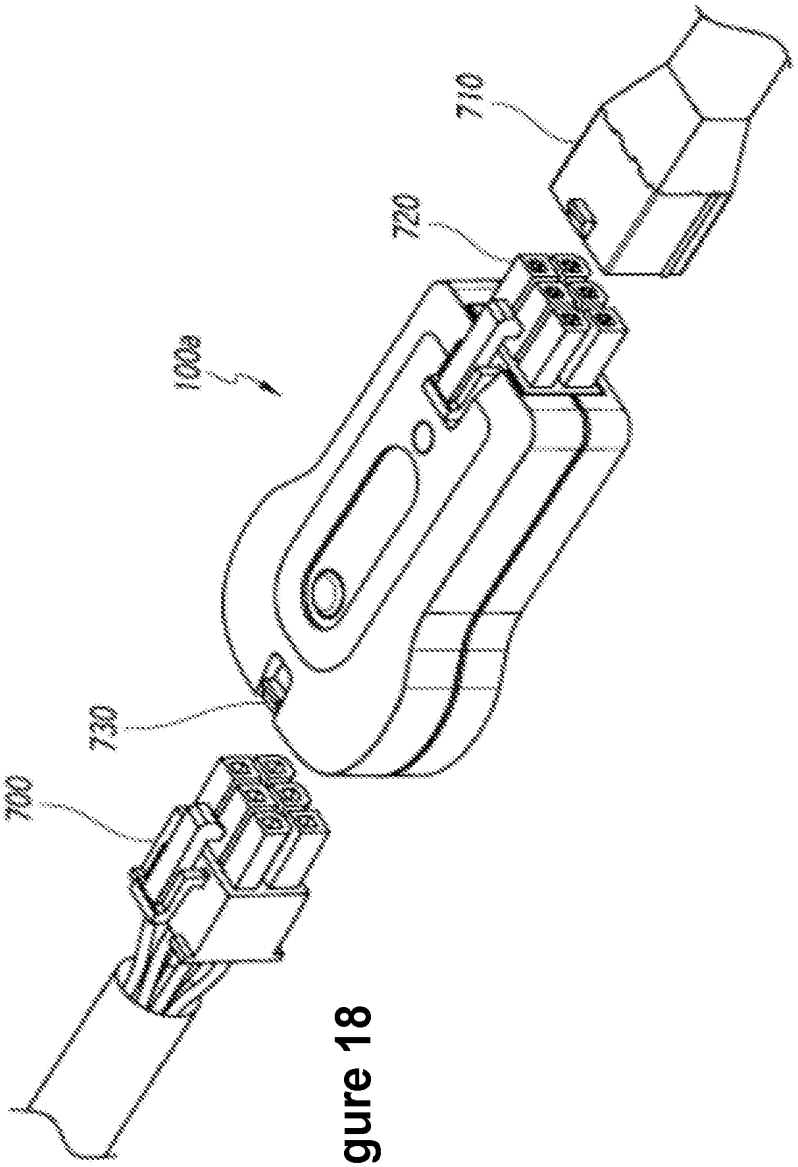


Figure 18

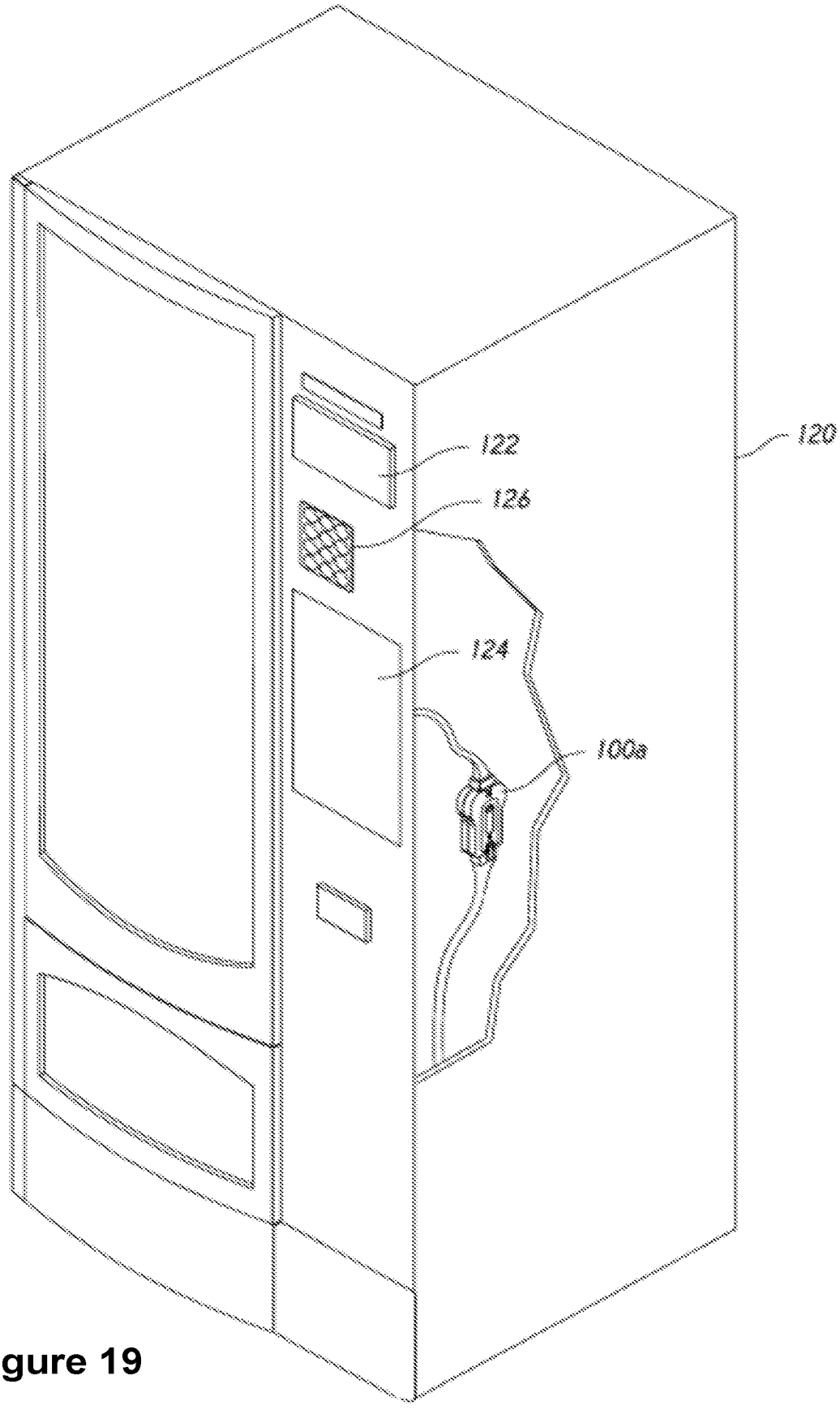


Figure 19

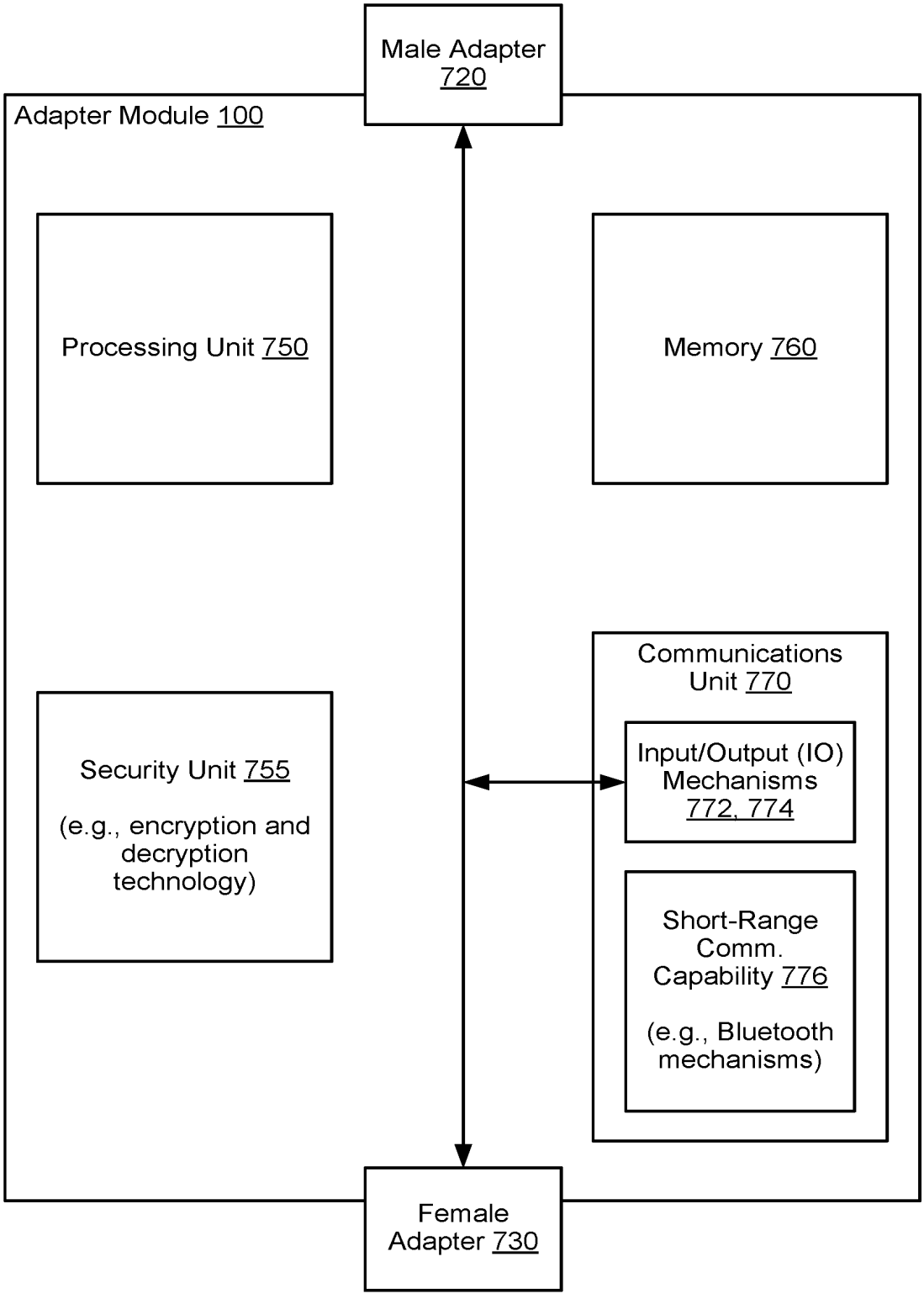

Male Adapter
720
Adapter Module 100
Processing Unit 750
Memory 760
Communications
Unit 770
Input/Output (IO)
Mechanisms
772, 774
Security Unit 755
(e.g., encryption and
decryption
technology)
Short-Range
Comm.
Capability 776
(e.g., Bluetooth
mechanisms)
Female
Adapter 730

Figure 20

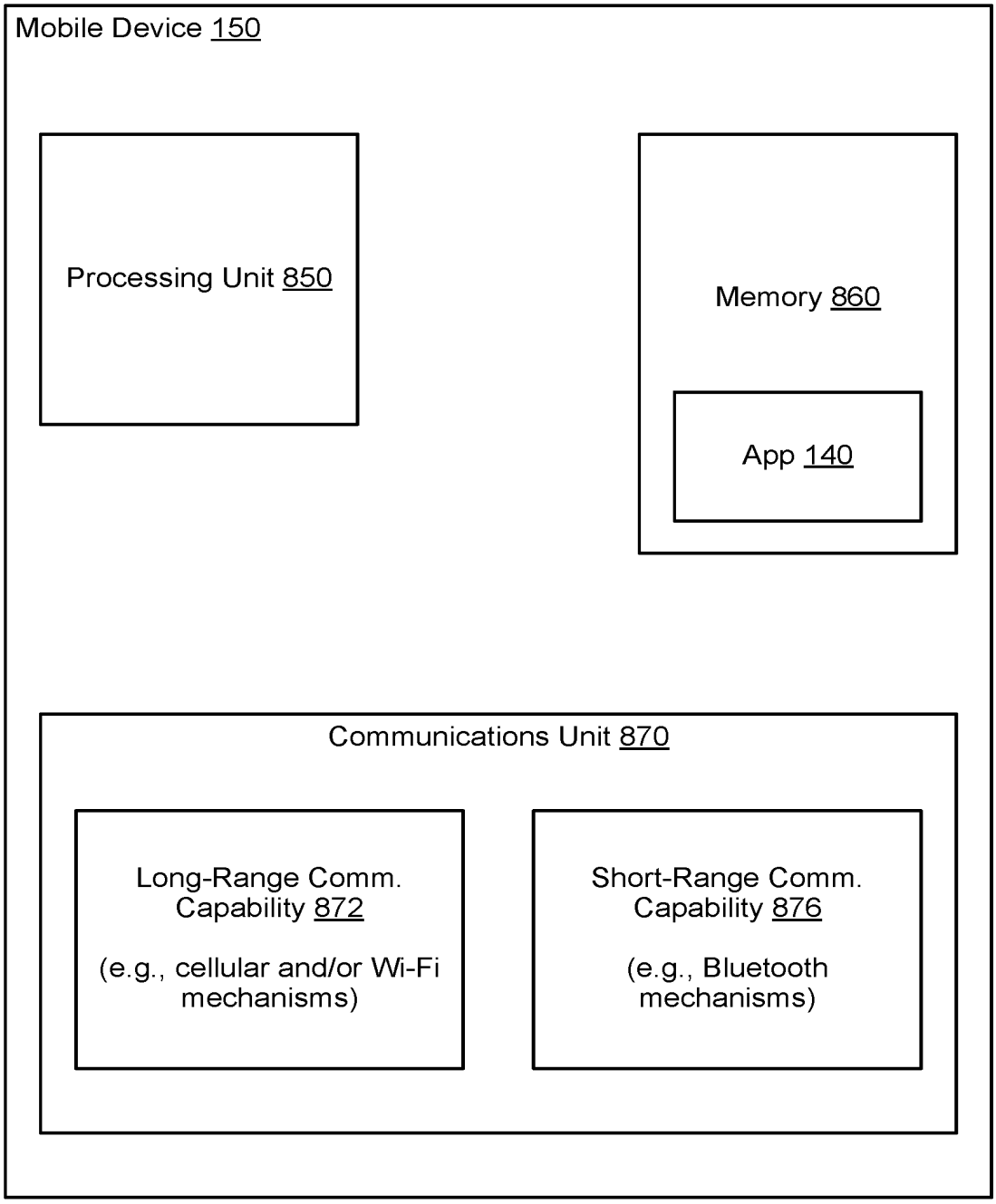

Mobile Device 150
Processing Unit 850
Memory 860
App 140
Communications Unit 870
Long-Range Comm. Capability 872
(e.g., cellular and/or Wi-Fi mechanisms)
Short-Range Comm. Capability 876
(e.g., Bluetooth mechanisms)

Figure 21

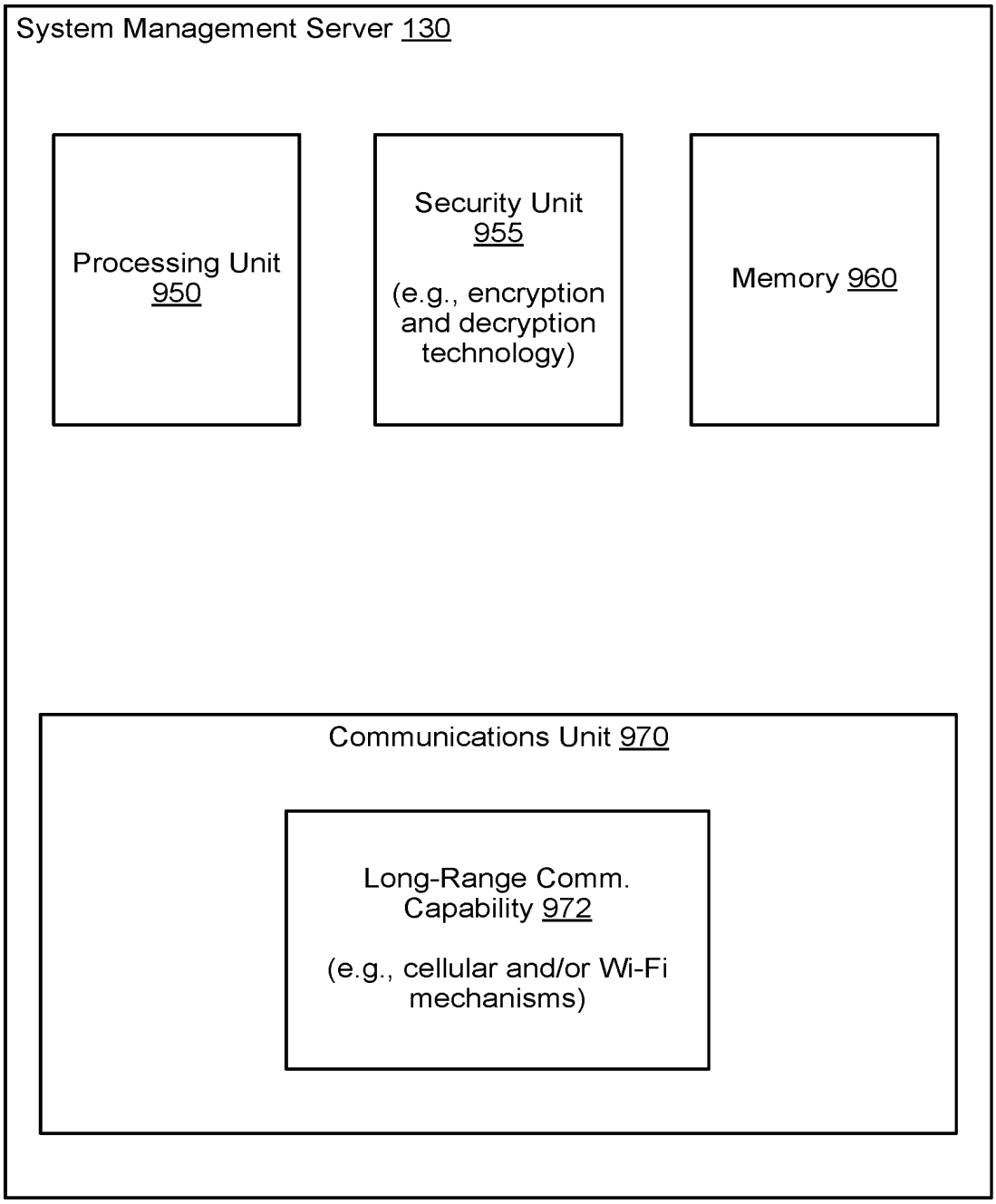

System Management Server 130
Processing Unit 950
Security Unit 955
(e.g., encryption and decryption technology)
Memory 960
Communications Unit 970
Long-Range Comm. Capability 972
(e.g., cellular and/or Wi-Fi mechanisms)

Figure 22

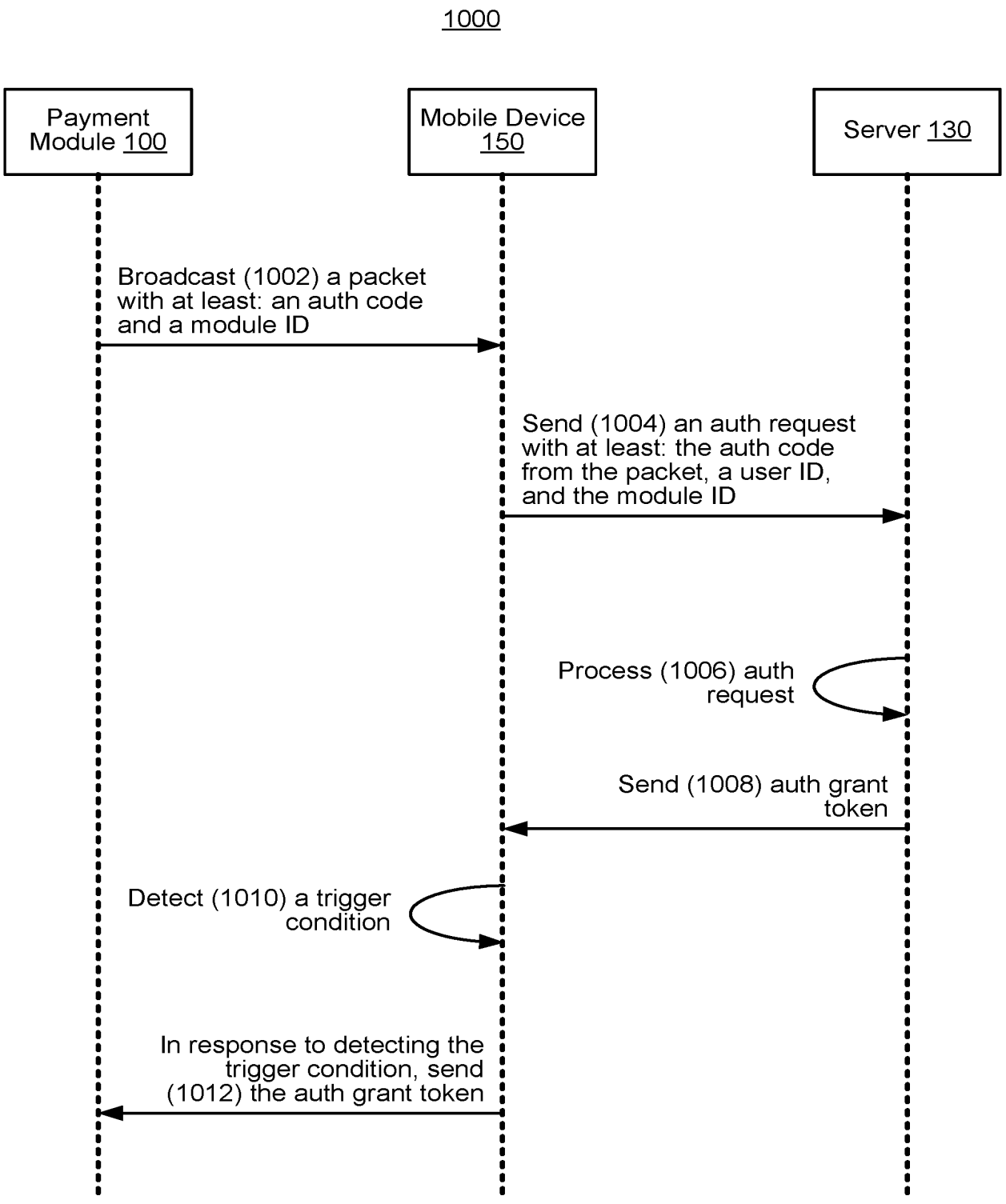

1000
Payment Module 100
Mobile Device 150
Server 130
Broadcast (1002) a packet with at least: an auth code and a module ID
Send (1004) an auth request with at least: the auth code from the packet, a user ID, and the module ID
Process (1006) auth request
Send (1008) auth grant token
Detect (1010) a trigger condition
In response to detecting the trigger condition, send (1012) the auth grant token

Figure 23

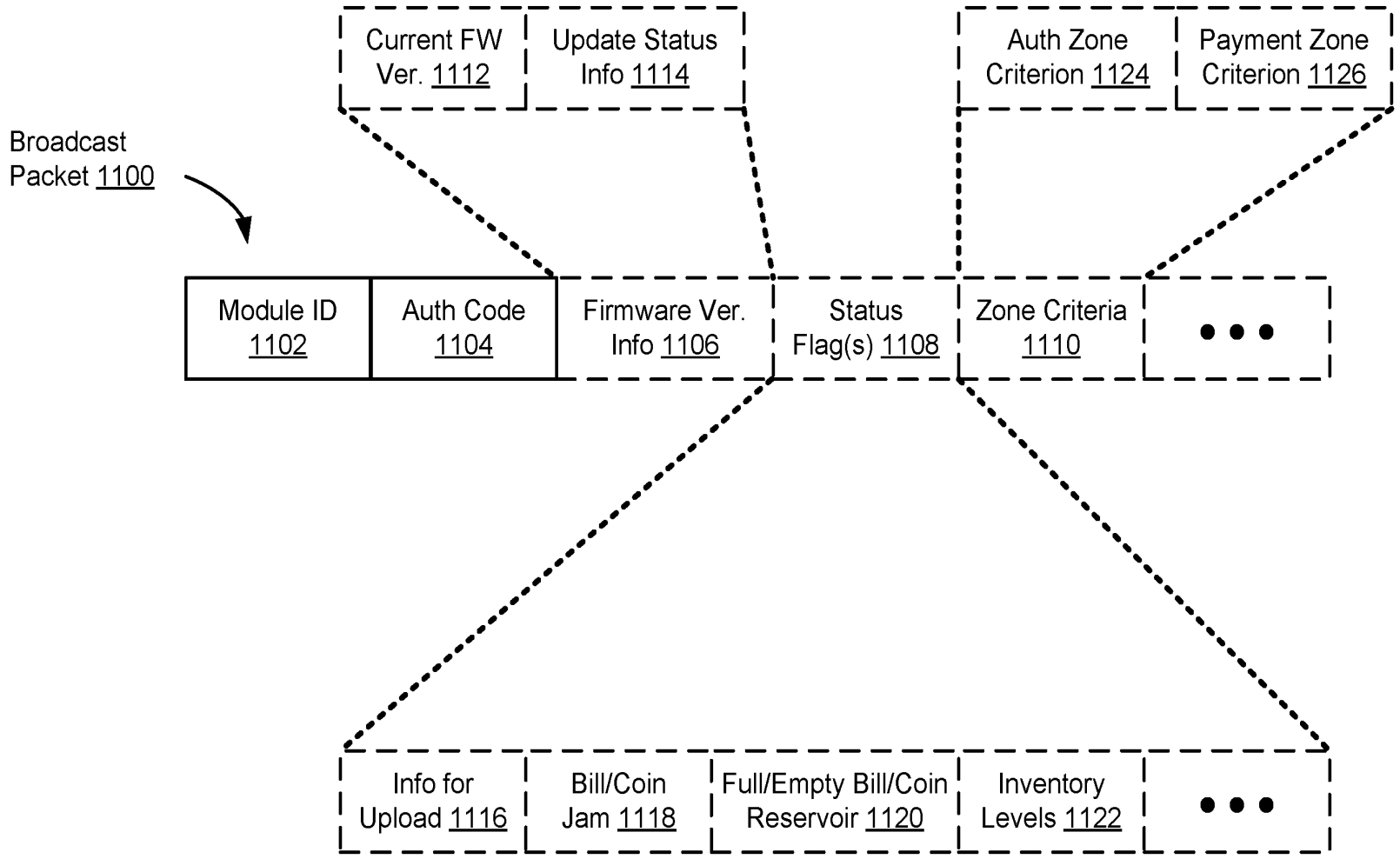


Figure 24A

Petitioner Exhibit 1002-0120

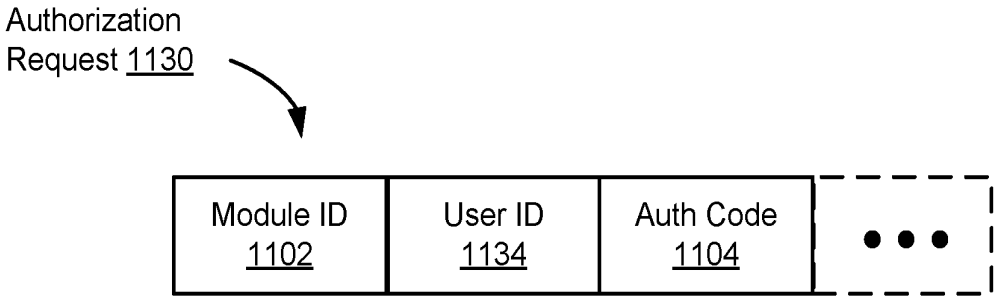


Figure 24B

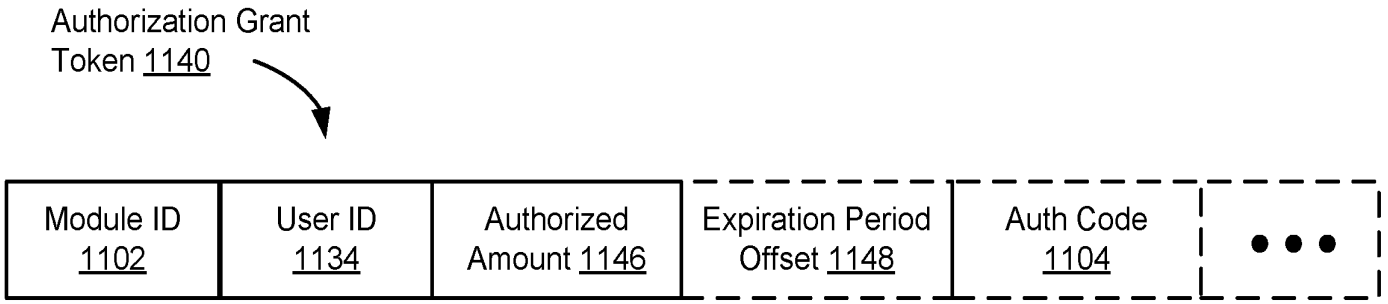


Figure 24C

Petitioner Exhibit 1002-0121

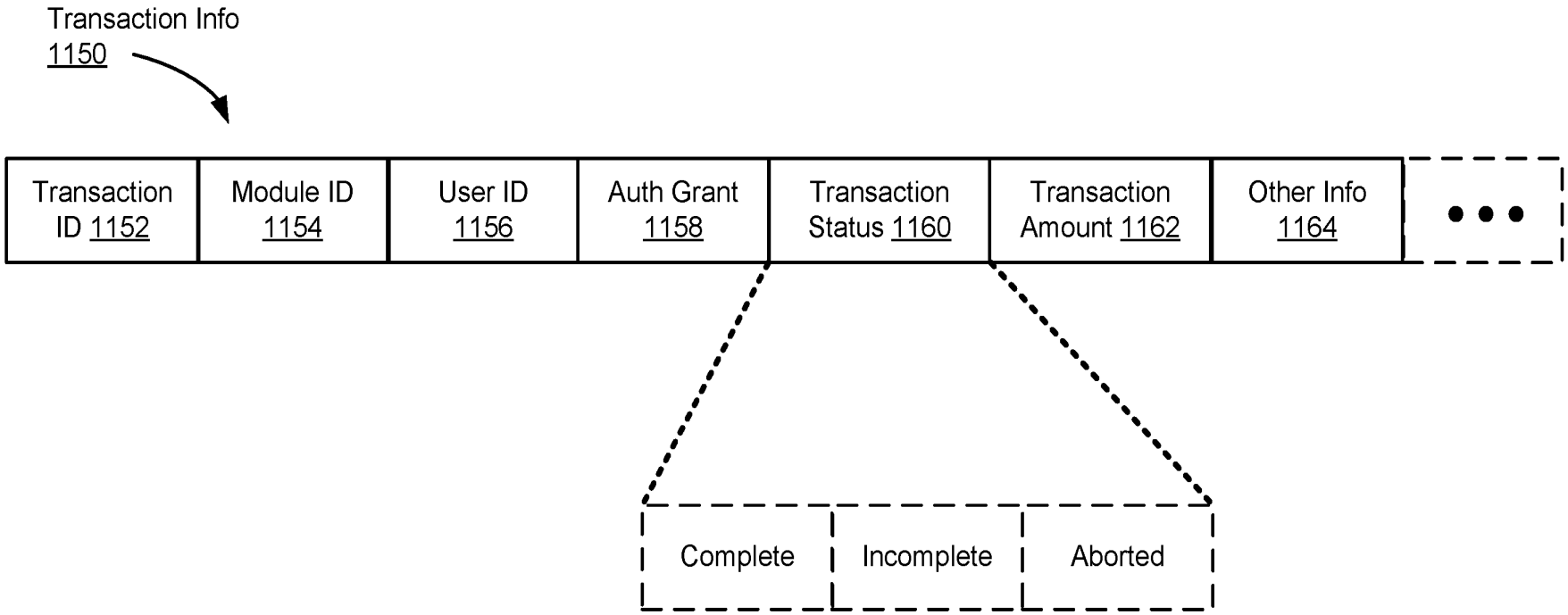


Figure 24D

Petitioner Exhibit 1002-0122

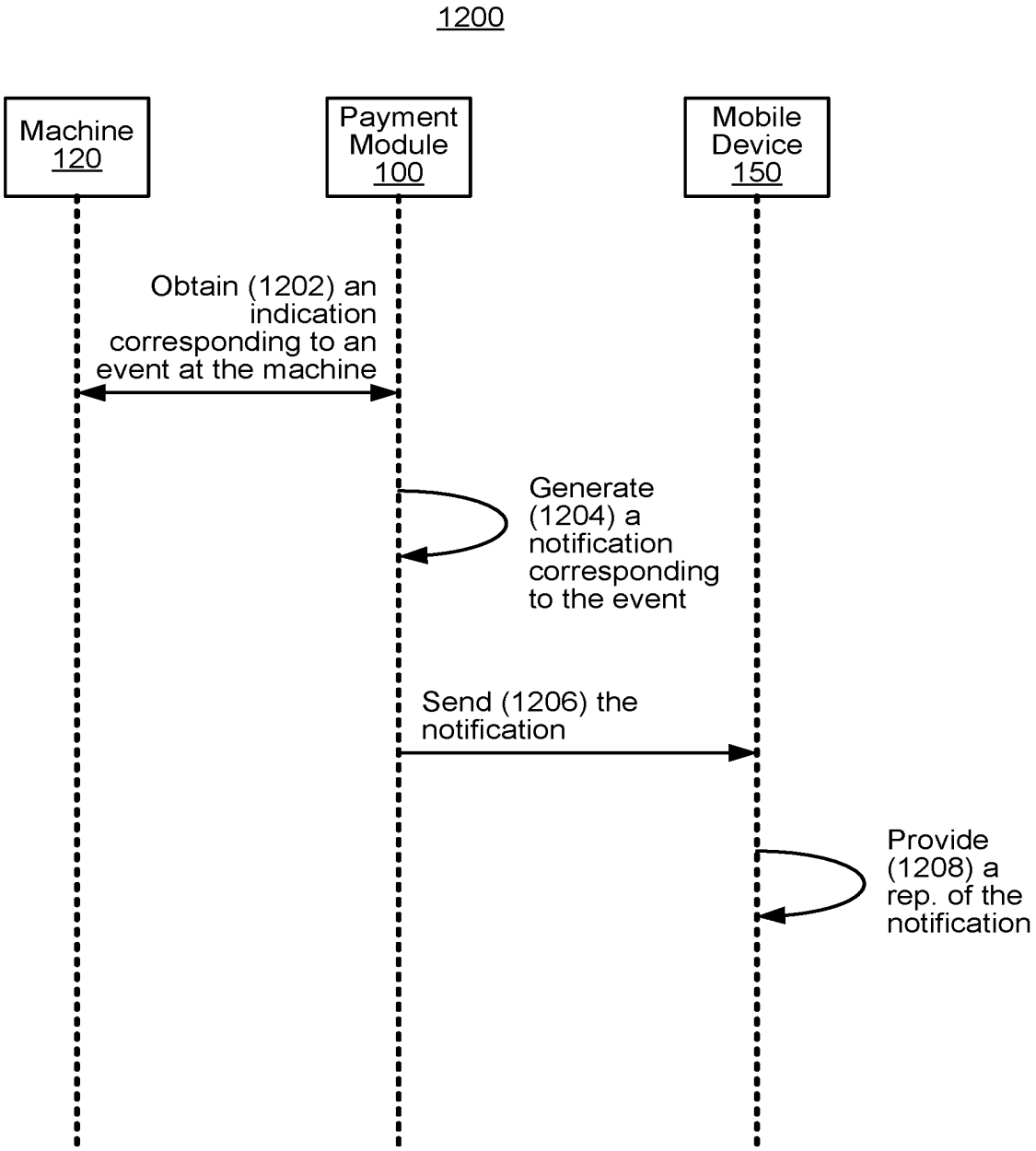


Figure 25A Petitioner Exhibit 1002-0123

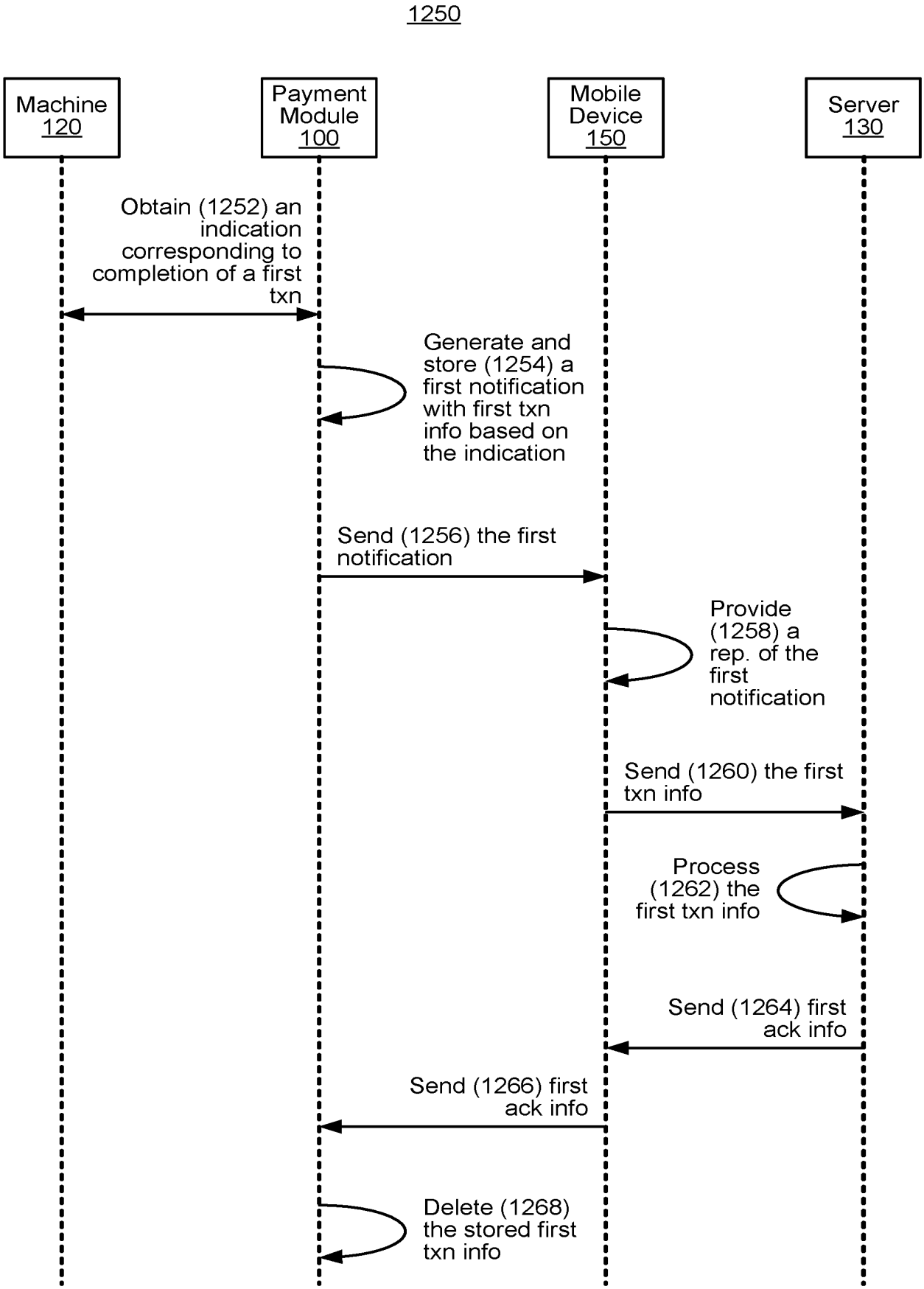


Figure 25B Petitioner Exhibit 1002-0124

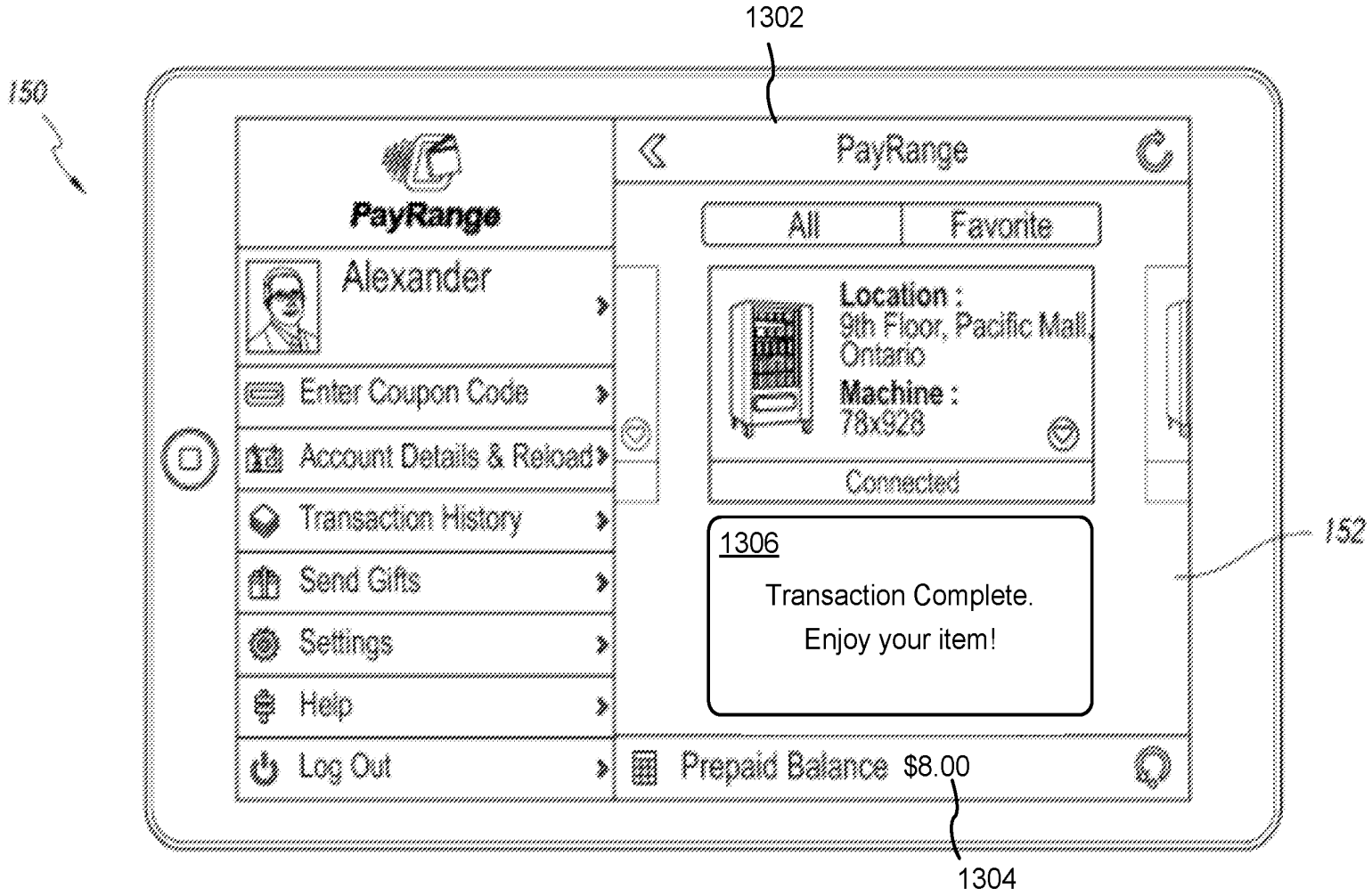


Figure 26A

Petitioner Exhibit 1002-0125

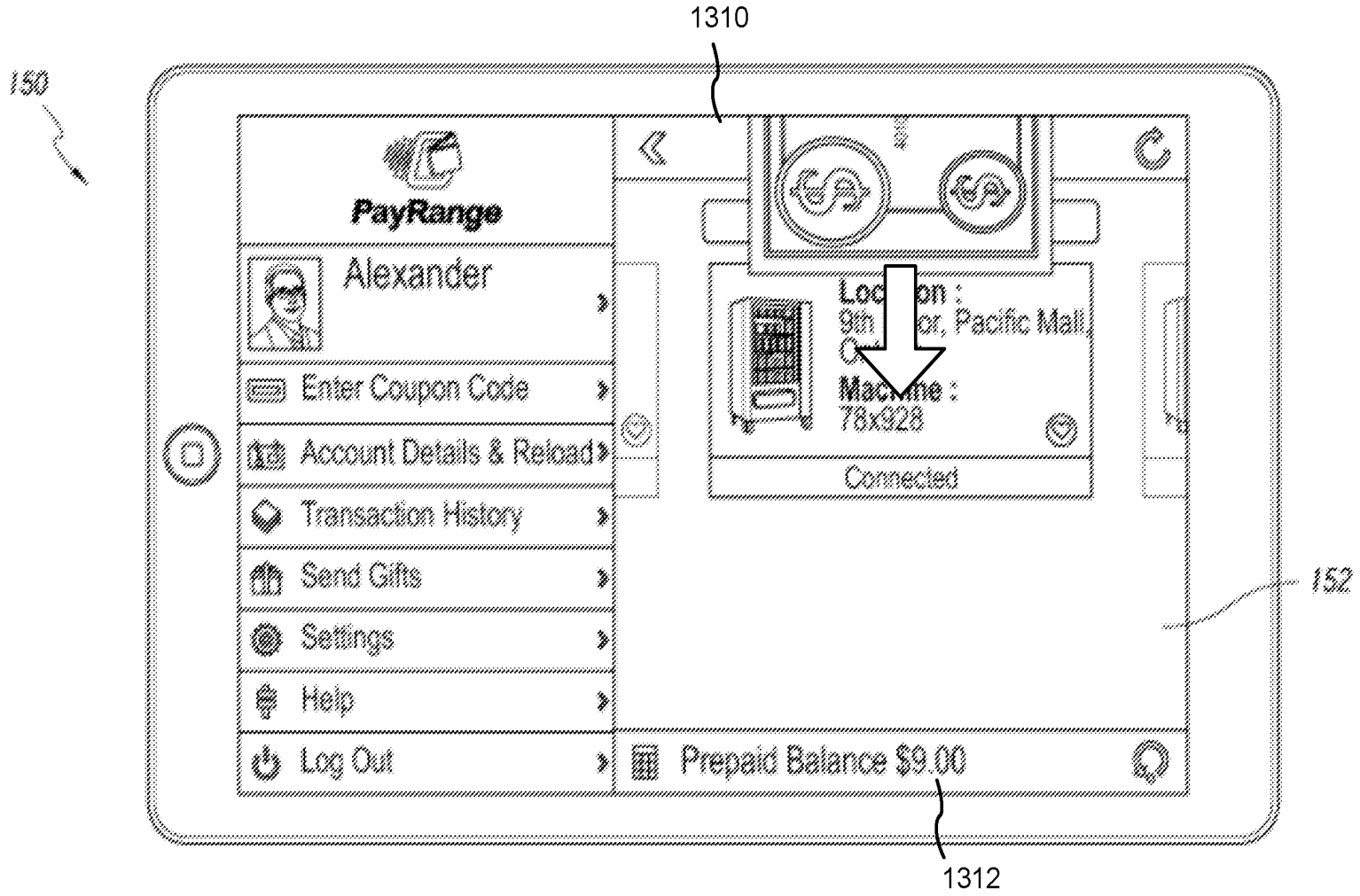


Figure 26B

Petitioner Exhibit 1002-0126

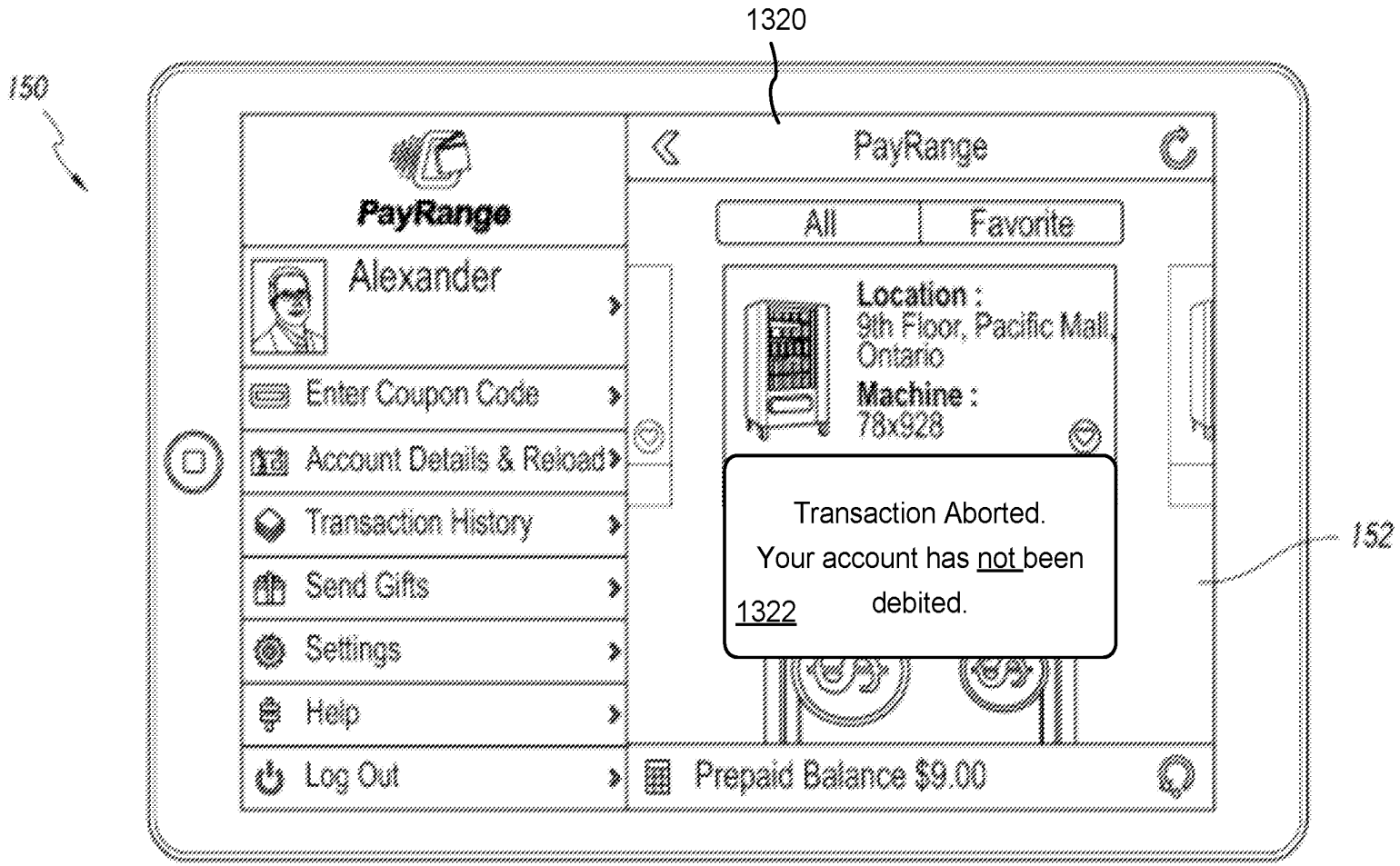


Figure 26C

Petitioner Exhibit 1002-0127

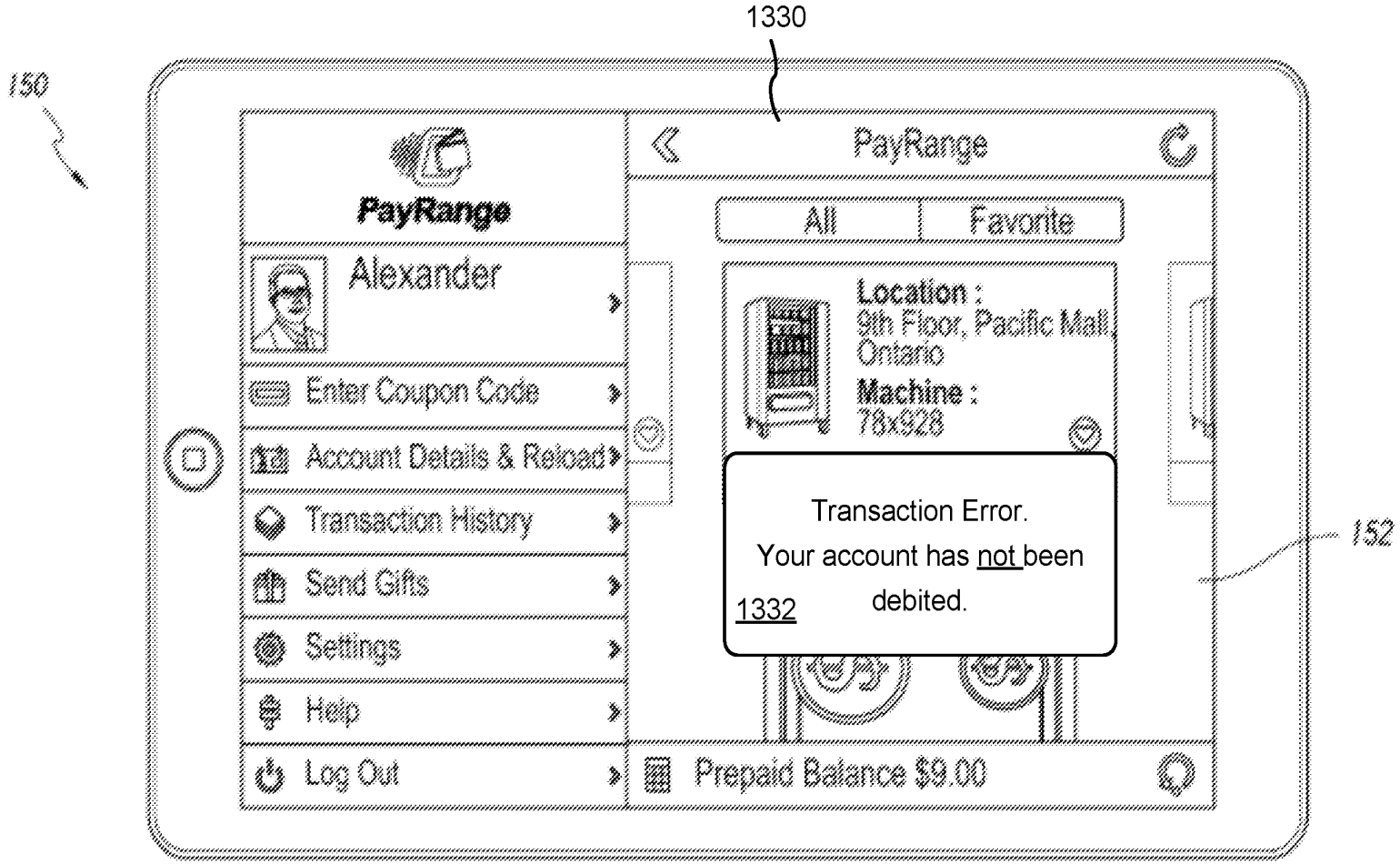


Figure 26D

Petitioner Exhibit 1002-0128

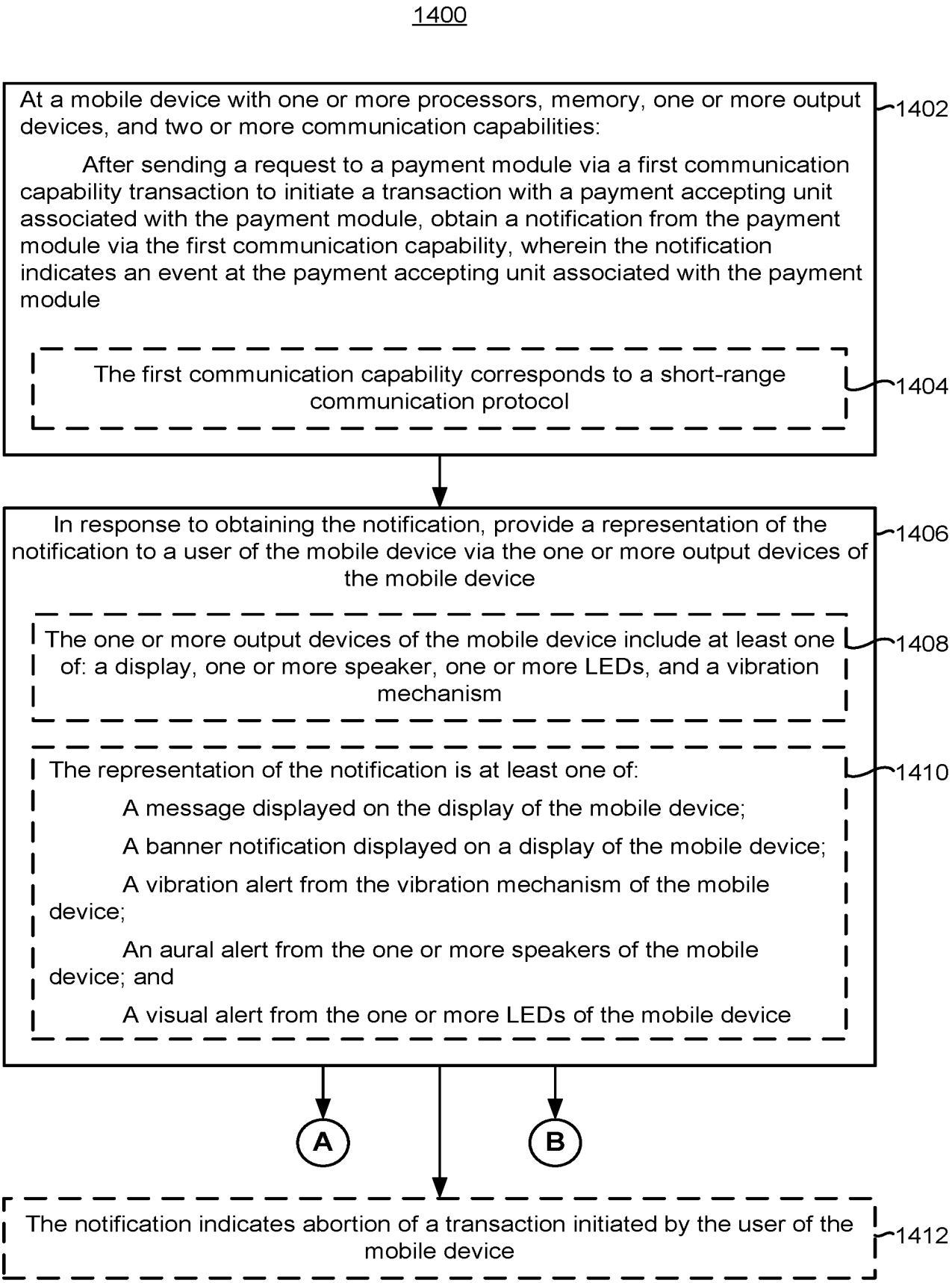

1400
At a mobile device with one or more processors, memory, one or more output devices, and two or more communication capabilities:
After sending a request to a payment module via a first communication capability transaction to initiate a transaction with a payment accepting unit associated with the payment module, obtain a notification from the payment module via the first communication capability, wherein the notification indicates an event at the payment accepting unit associated with the payment module
1402
The first communication capability corresponds to a short-range communication protocol
1404
In response to obtaining the notification, provide a representation of the notification to a user of the mobile device via the one or more output devices of the mobile device
1406
The one or more output devices of the mobile device include at least one of: a display, one or more speaker, one or more LEDs, and a vibration mechanism
1408
The representation of the notification is at least one of:
A message displayed on the display of the mobile device;
A banner notification displayed on a display of the mobile device;
A vibration alert from the vibration mechanism of the mobile device;
An aural alert from the one or more speakers of the mobile device; and
A visual alert from the one or more LEDs of the mobile device
1410
A
B
The notification indicates abortion of a transaction initiated by the user of the mobile device
1412

Figure 27A

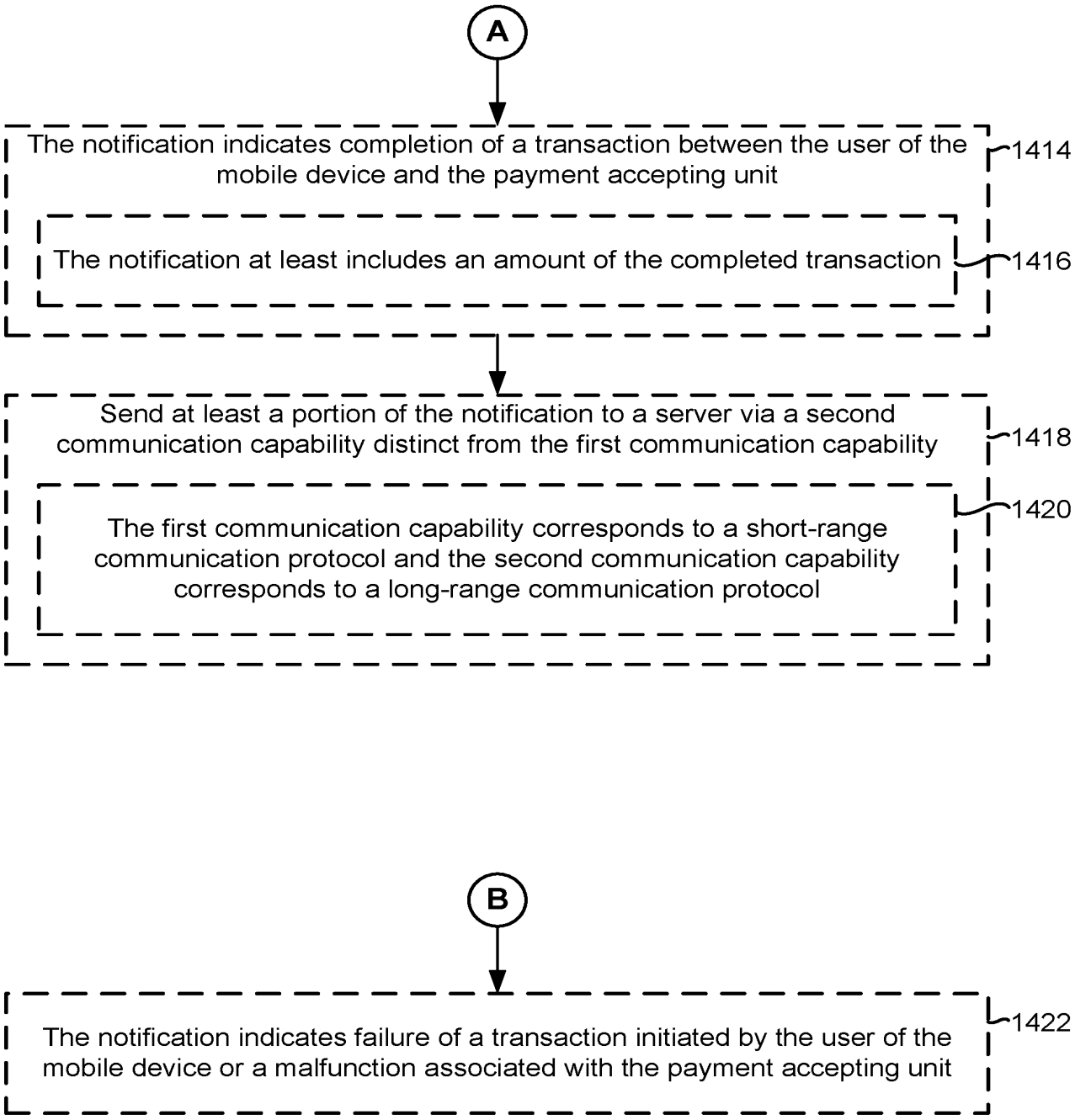

A
The notification indicates completion of a transaction between the user of the mobile device and the payment accepting unit
1414
The notification at least includes an amount of the completed transaction
1416
Send at least a portion of the notification to a server via a second communication capability distinct from the first communication capability
1418
The first communication capability corresponds to a short-range communication protocol and the second communication capability corresponds to a long-range communication protocol
1420
B
The notification indicates failure of a transaction initiated by the user of the mobile device or a malfunction associated with the payment accepting unit
1422

Figure 27B

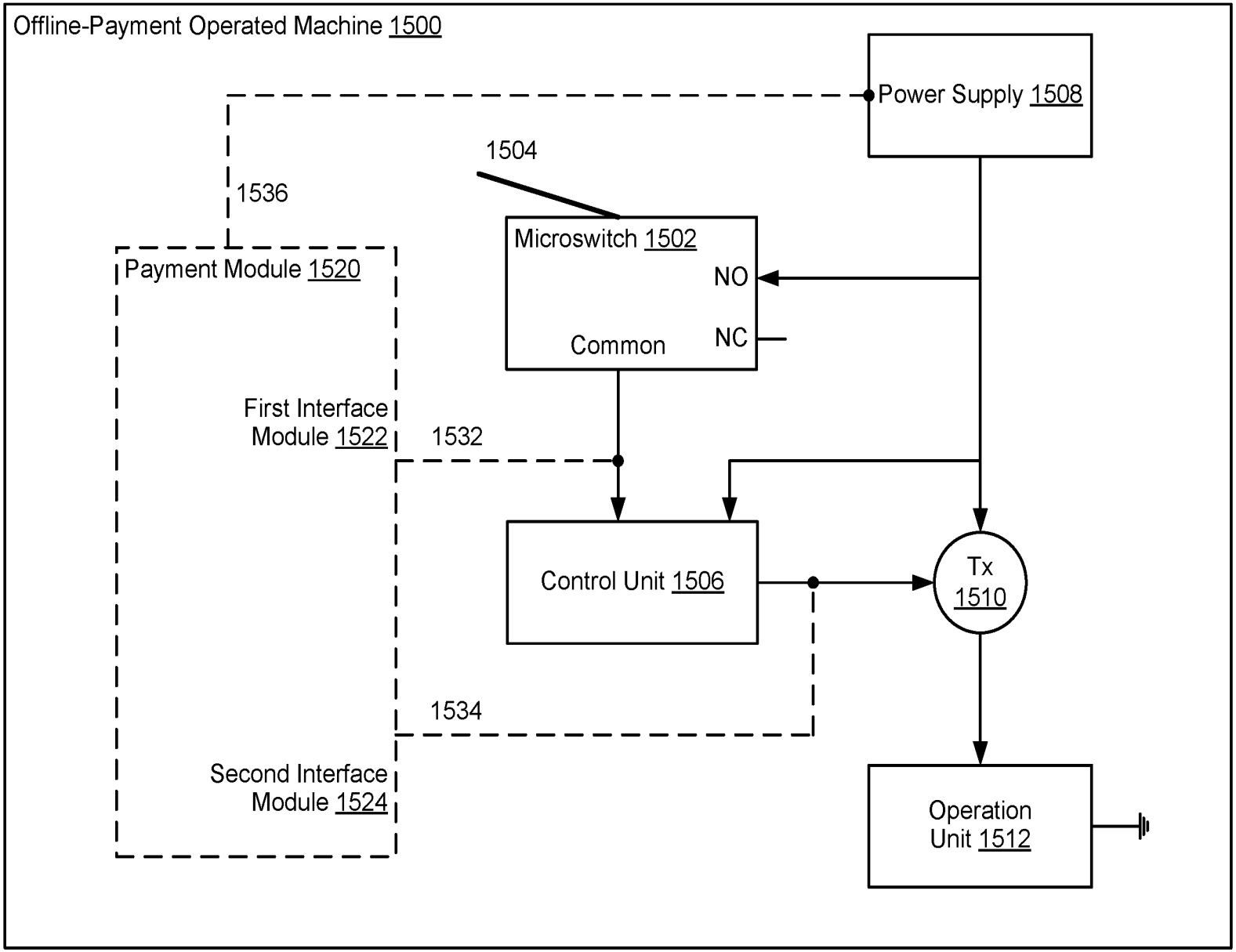


Figure 28A

Petitioner Exhibit 1002-0131

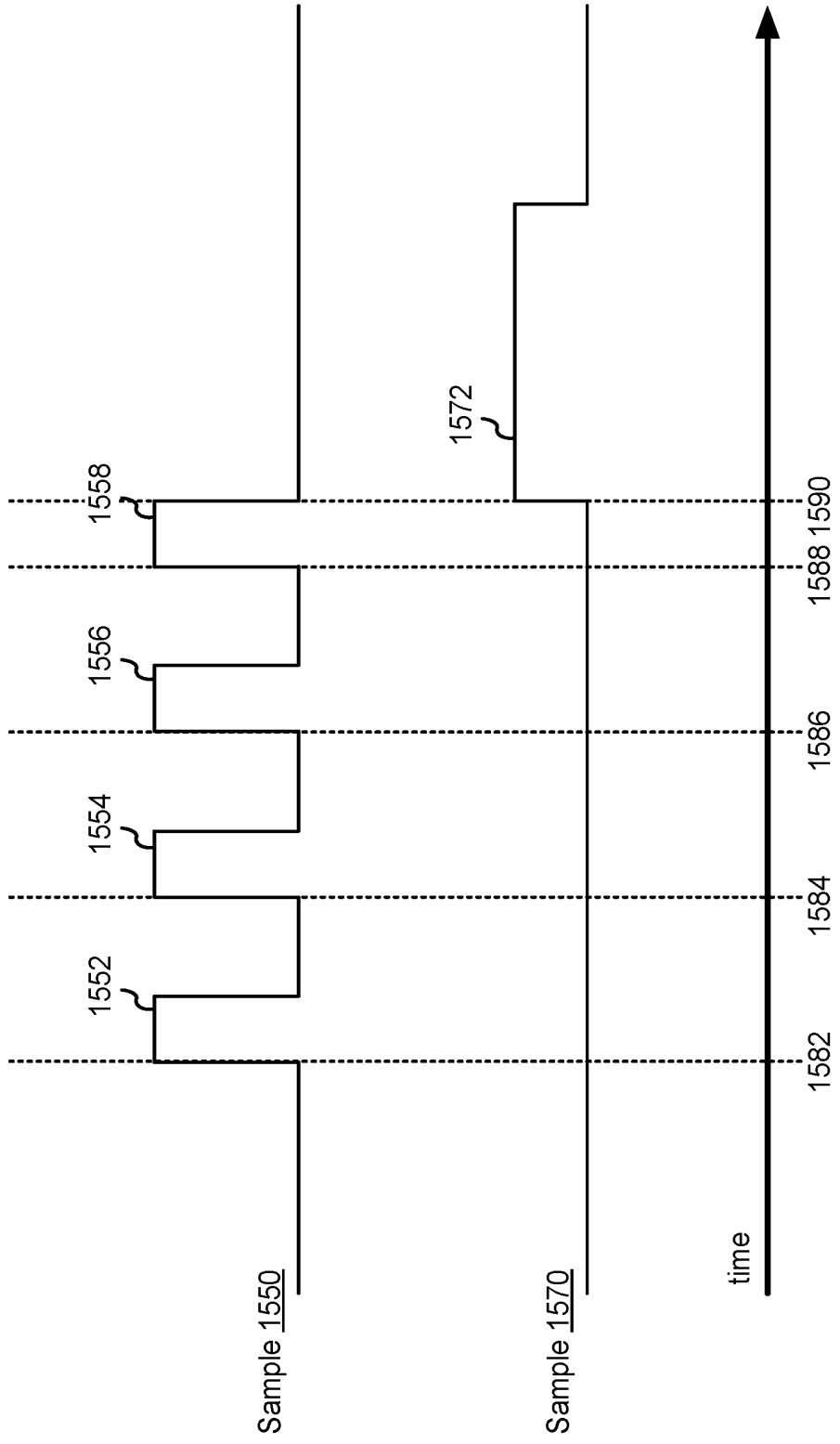

Sample 1550
Sample 1570
time
1552
1554
1556
1558
1572
1582
1584
1586
1588
1590

Figure 28B

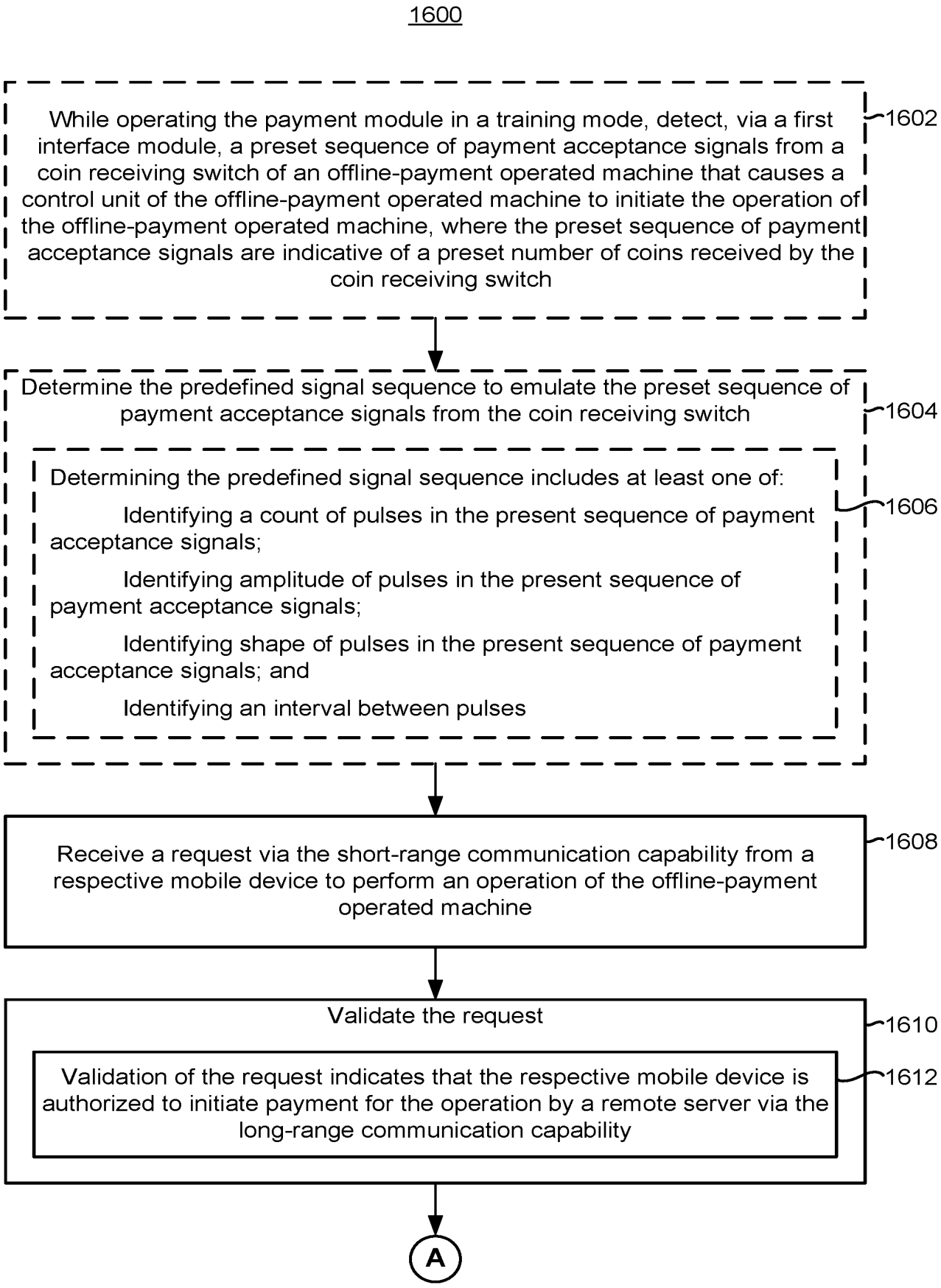


Figure 29A

Petitioner Exhibit 1002-0133

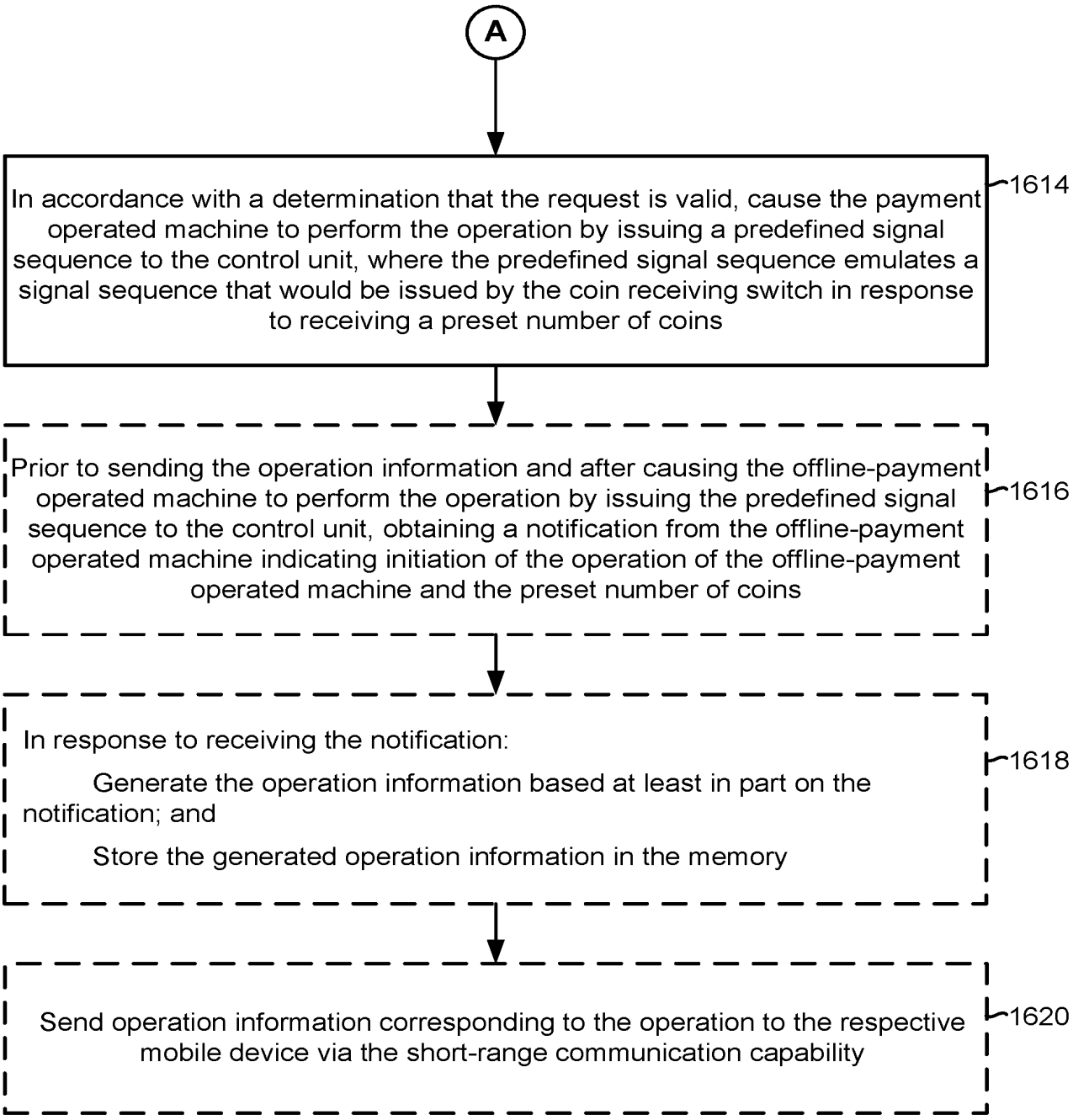

A
In accordance with a determination that the request is valid, cause the payment operated machine to perform the operation by issuing a predefined signal sequence to the control unit, where the predefined signal sequence emulates a signal sequence that would be issued by the coin receiving switch in response to receiving a preset number of coins
1614
Prior to sending the operation information and after causing the offline-payment operated machine to perform the operation by issuing the predefined signal sequence to the control unit, obtaining a notification from the offline-payment operated machine indicating initiation of the operation of the offline-payment operated machine and the preset number of coins
1616
In response to receiving the notification:
Generate the operation information based at least in part on the notification; and
Store the generated operation information in the memory
1618
Send operation information corresponding to the operation to the respective mobile device via the short-range communication capability
1620

Figure 29B

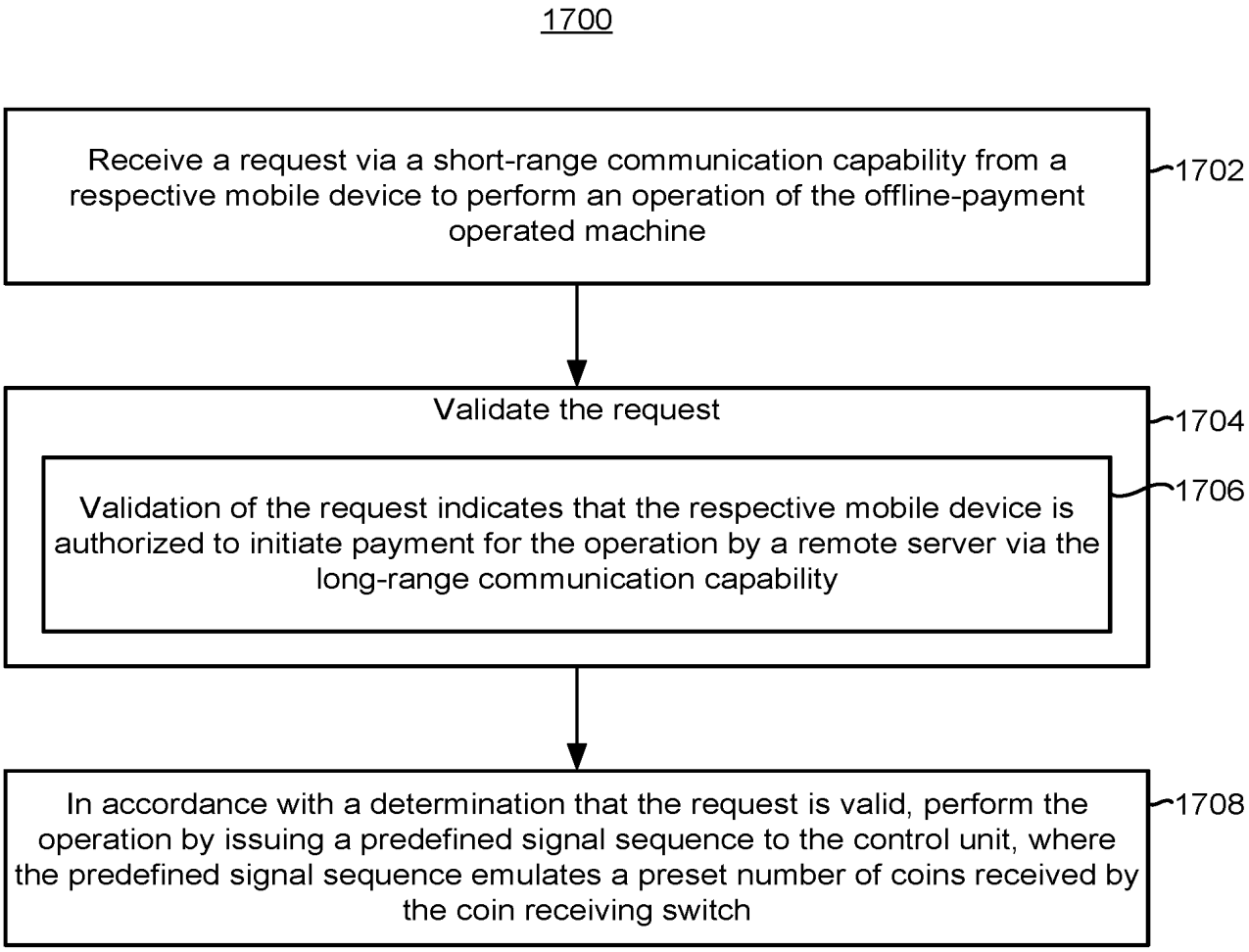

1700
Receive a request via a short-range communication capability from a respective mobile device to perform an operation of the offline-payment operated machine
1702
Validate the request
1704
Validation of the request indicates that the respective mobile device is authorized to initiate payment for the operation by a remote server via the long-range communication capability
1706
In accordance with a determination that the request is valid, perform the operation by issuing a predefined signal sequence to the control unit, where the predefined signal sequence emulates a preset number of coins received by the coin receiving switch
1708

Figure 30

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS**

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 14/458,199 filed on August 12, 2014

The above-identified application was made or authorized to be made by me.

I believe that I am the original 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.

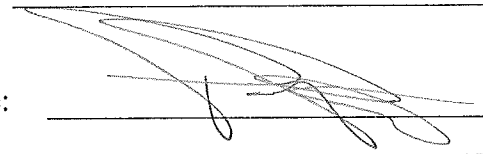
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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: **Dr. Paresh K. Patel** Date: 10/16/2014

Signature: 

Electronically filed via Patent Center

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:	May 14, 2023	Examiner:	To be assigned
Title:	*METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS*	Attorney Docket No.:	104402-5074-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 inventors of the parent of the patent application identified above.

The assignment was recorded in the United States Patent and Trademark Office on November 21, 2014 at Reel 034236, Frame 0376, or for which a copy thereof is attached.

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

Date: May 14, 2023

/Benjamin Pezzner/ 70711
Benjamin Pezzner (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 NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
18/197,070	05/14/2023		664	104402-5074-US	20	3

CONFIRMATION NO. 5568

FILING RECEIPT

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

OC000000057693905

Date Mailed: 06/02/2023

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 CON of 17/973,507 10/25/2022
which is a CON of 17/654,732 03/14/2022 PAT 11,481,772
which is a CON of 17/147,305 01/12/2021 PAT 11,501,296
which is a CON of 15/603,400 05/23/2017 PAT 10,891,614
which is a CON of 14/458,199 08/12/2014 PAT 9,659,296
which is a CIP of 14/456,683 08/11/2014 PAT 9,256,873
which is a CON of 14/335,762 07/18/2014 PAT 9,547,859
which is a CON of 14/214,644 03/14/2014 PAT 8,856,045
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.

Petitioner Exhibit 1002-0138

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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: 05/31/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/197,070**

Projected Publication Date: 09/07/2023

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Preliminary Class

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.

Petitioner Exhibit 1002-0141

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 18/197,070

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	64		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	280		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	320		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	* 0	x =	0	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x =	0			
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			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	664		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($)	ADDITIONAL FEE($)	OR	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.

TO: padocketingdepartment@morganlewis.com,donald.mixon@morganlewis.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 24341

Fri Jun 02 05:02:19 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

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

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 24341, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

Disclaimer:
The list of documents shown below are provided as a courtesy and is not part of the official file wrapper. The content of the images shown in the Image File Wrapper is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
18197070	APP.FILE.REC	06/02/2023	104402-5074-US

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,070	05/14/2023	Paresh K. Patel	104402-5074-US	5568

24341 7590 06/27/2023

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

EXAMINER	

ART UNIT	PAPER NUMBER
3698	

NOTIFICATION DATE	DELIVERY MODE
06/27/2023	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):

donald.mixon@morganlewis.com
padocketingdepartment@morganlewis.com

Petitioner Exhibit 1002-0144

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 18/197,070	**Applicant(s)** Patel, Paresh K.	
	Examiner FIKIRTE A GEREMEW	**Art Unit** OMBL	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 14 May 2023 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 FIKIRTE GEREMEW at (703) 756-1930. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/FIKIRTE A GEREMEW/ PROGRAM SUPPORT ASSISTANT, OMBL	

TO: padocketingdepartment@morganlewis.com,donald.mixon@morganlewis.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 24341

Wed Jun 28 08:32:19 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

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

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Application	Document	Mailroom Date	Attorney Docket No.
18197070	TRACK1.GRANT	06/27/2023	104402-5074-US

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If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

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Sincerely,

The Patent Center Team

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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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
18/197,070	05/14/2023	Paresh K. Patel	104402-5074-US

CONFIRMATION NO. 5568

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

PUBLICATION NOTICE



Date Mailed: 09/07/2023

Title:METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Publication No.US-2023-0281622-A1
Publication Date:09/07/2023

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

TO: padocketingdepartment@morganlewis.com,donald.mixon@morganlewis.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 24341

Thu Sep 07 05:08:39 EDT 2023

Dear Patent Center Customer:

Correspondence Address:

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

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Application	Document	Mailroom Date	Attorney Docket No.
18197070	NTC.PUB	09/07/2023	104402-5074-US

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

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Sincerely,

The Patent Center Team

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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,070	05/14/2023	Paresh K. Patel	104402-5074-US	5568

24341 7590 09/27/2023

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

EXAMINER	
POINVIL, FRANTZY	

ART UNIT	PAPER NUMBER
3698	

NOTIFICATION DATE	DELIVERY MODE
09/27/2023	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):

donald.mixon@morganlewis.com
padocketingdepartment@morganlewis.com

Petitioner Exhibit 1002-0149

Office Action Summary	Application No. 18/197,070	Applicant(s) Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	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 5/14/2023.

☐ 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) 1-20 is/are rejected.

8) ☐ Claim(s) _____ 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 5/14/2023 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: _____.

Petitioner Exhibit 1002-0150

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.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Patent No. 10,891,614. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-20 of the instant application are directed to a similar subject matter contained in claims 1-25 of

the '614 patent. The only difference between the instant application and the '614 patent is merely a labeling difference. It is noted that all the features of claims 1-20 are contained in claims 1-25 of the '614 patent.

Claims 1-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent No. 11,501,296. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-20 of the instant application are directed to a similar subject matter contained in claims 1-28 of the '296 patent. The only difference between the instant application and the '296 patent is merely a labeling difference. It is noted that all the features of claims 1-20 are contained in claims 1-28 of the '296 patent.

Claims 1-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 11,481,772. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-20 of the instant application are directed to a similar subject matter contained in claims 1-20 of the '772 patent. The only difference between the instant application and the '772 patent is merely a labeling difference. It is noted that all the features of claims 1-20 are contained in claims 1-20 of the '772 patent.

3. Claims 1-20 are provisionally rejected under the Judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of Copending Application No. 17/973,507. Although the conflicting claims are not patentably distinct from each other because claims 1-20 of the instant application are directed to a similar subject matter contained in claims 1-20 of the '507 application. Both inventions are obvious variations of each other achieving the same end result. It would have been obvious to one of ordinary skill in the art to note that the features of claims 1-20 of the instant application are contained in claims 1-20 of the '507 application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. The prior art taken alone or in combination failed to teach or suggest:

"identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing or mobile device, the identifying based at least in part on an identifier corresponding to the one more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services, displaying a user interface of the mobile payment application on the display mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units, and after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device", as recited in independent claims 1, 13 and 15

Bondessen et al (US Pub. No. 20150302411-A1) disclose a system and associated method of authenticating a transaction based at least partially on the location of a mobile device. The system typically includes a processor, a memory, and a transaction authentication module stored in the memory. The module is typically configured for: receiving a request from a user to complete a transaction; receiving geographic location information for a point-of-transaction associated with the transaction; receiving geographic location information for the mobile device associated with the user; determining whether the geographic location of the point-of-transaction is geographically proximate to the geographic location of the mobile device; and based at least partially on the geographic location of the point-of-transaction being geographically proximate to the geographic location of the mobile device, enabling the user to complete the transaction.

Cicoretti et al (US Pub. No. 20140279537 A1) dis close a method and system for employing a mobile application and hardware of a mobile device, such as a smart phone, to recognize a merchant code, such as uniquely identifiable two-dimensional images, to identify a select merchant or vendor. Each merchant code is associated with a particular mechanical device, goods or service available for purchase or payment. Upon recognition of the merchant code, a secure transmission is initiated and created by the consumer/user with a remote server, given that the consumer confirms a secure identity. The remote server also determines credit/funds availability in a transaction account created by the consumer. The transaction account is linked to a funding account. As directed by the consumer/user using the mobile device, a portion or all of the credit/funds are then transferred by the remote server to the vendor/merchant. Upon receipt, the mechanical device or vendor authorizes the delivery of select goods or service to the consumer.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANTZY POINVIL whose telephone number is (571)272-6797. The examiner can normally be reached M-Th 7:00AM to 5:30PM.

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, Michael Anderson can be reached on 571-270-0508. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/fp/

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

August 18, 2023

Notice of References Cited	Application/Control No. 18/197,070	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	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-11308462-B2	04-2022	Berman; Lawrence	G06Q20/367	1/1
*	B	US-20210158309-A1	05-2021	McGinlay; James	G06N3/02	1/1
*	C	US-11010759-B1	05-2021	Maeng; Joon	G06Q20/401	1/1
*	D	US-20150302411-A1	10-2015	Bondesen; Laura Corinne	G06Q20/3224	705/72
*	E	US-20140279537-A1	09-2014	Cicoretti; Dean L.	G06Q20/40	705/44
*	F	US-20120158528-A1	06-2012	Hsu; Wesley	G06Q20/322	705/16
	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					
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	R					
	S					
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
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	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
	18/197,070	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

✓	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	08/17/2023								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

CPC - Searched*		
Symbol	Date	Examiner
(G06Q20/40 or G06Q20/18 or G06Q20/322 or G06Q20/3226 or G06Q20/327 or G06Q20/3278 or G07F7/0893 or G07F9/023).cpc.	08/17/2023	FP

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
705	3-44	08/17/2023	FP

* 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
See the attached DAV and Proquest searches.	09/05/2023	FP
CBM2020-00026 Reviewed EX2004 – Tushie Disclosure.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. EX2002 – US Pat. No. 8,489,140 issued to Weiner.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. EX2001 – US Pub. No. 20130166448A1 issued to Narayanan.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1008 – Plaintiff – Claim Charts of U.S. Patent No. 9,659,296.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1007 – Declaration of David R. Tushie.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1006 - US Patent No. 9,659,296, Patent Prosecution history,	09/05/2023	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	Petitioner Exhibit 1002-0158

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

CBM2020-0026 Reviewed Document Id. 1004 - US Patent No. 9,898,884 issued to Arora,	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1003 - US Pub. No. 2012/0029691 to Mockus.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1001 – U.S. Patent No. 9,659,296.	09/05/2023	FP
CBM2020-0026 Reviewed Decision of Trial Instituted Document.	09/05/2023	FP
CBM2020-0026 Reviewed Patent Owner's Preliminary Response, Paper No. 7.	09/05/2023	FP
CBM2020-0026 Reviewed Petitioners' Updated Mandatory Notices, Paper No. 6.	09/05/2023	FP
IPR2021-00086 Reviewed Document Id. EX2008 Docket Entry Listings.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2004 Tushie Disclosure	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2003 – Defendants' Second Supplemental Disclosure.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2002 – US Pat. No. 8,489,140 issued to Weiner.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2001 US Pub. No. 20130166448A1 issued to Narayanan.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1013 of Defendants' KioSoft Technologies LLC and TechTres, Inc. on 9/6/2023	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1009 US Patent No. 9,898,884 issued to Arora.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1008 - Plaintiff Claim Charts of U.S. Patent No. 9,659,296 on 9/6/2023	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1007 – Declaration of David R. Tushie.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1006 - US Patent No. 9,659,296, Patent Prosecution history.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1004 U.S. Patent No. 8,903,737 issued to Cameron.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1003 U.S. Pub. No. 20030130892A1 by Athwal.	09/06/2023	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	Petitioner Exhibit 1002-0159

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

IPR2021-00086 Reviewed Document Id. EX1001 U.S. Patent No. 9,659,296 issued to Patel.	09/06/2023	FP
IPR2023-01186 Reviewed All filed Documents	09/05/2023	
PGR2021-00093 Reviewed all Filed Documents.	09/05/2023	
PGR2023-00042 Reviewed All filed Documents.	09/05/2023	
PGR2023-00050 Reviewed All filed Document.	09/05/2023	

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

Petitioner Exhibit 1002-0160

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Petitioner Exhibit 1002-0161
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Search Strategy

Databases: ABI/INFORM® Professional Advanced, Abstracts in New Technology & Engineering, AdisInsight: Drugs, AdisInsight: Trials, Adis Pharmacoeconomics & Outcomes News, AGRICOLA, AGRIS, Allied & Complementary Medicine™, Analytical Abstracts, APA PsycInfo®, Aqualine, Aquatic Science & Fisheries Abstracts (ASFA), Australian Education Index, BIOSIS® Toxicology, BIOSIS Previews®, British Library Inside Conferences, British Nursing Index, Business & Industry, CAB ABSTRACTS, Chemical Business Newsbase, Chemical Engineering & Biotechnology Abstracts, Chemical Safety Newsbase, Civil Engineering Abstracts, ClinicalTrials.gov, Current Contents® Search, Derwent Drug File, Derwent Drug Registry, DH-DATA: Health Administration, Medical Toxicology & Environmental Health, DIOGENES® FDA Regulatory Updates, Drug Information Fulltext, Earthquake Engineering Abstracts, EconLit, Ei Compendex®, Ei EnCompassLIT, Embase®, Embase® French Local Literature, EMCare®, ERIC, ESPICOM Pharmaceutical & Medical Device News, FDAnews, FLUIDEX (Fluid Engineering Abstracts), Foodline®: MARKET, Foodline®: PRODUCT, Foodline®: SCIENCE, FSTA®, Gale Group Computer Database™, Gale Group Health Periodicals Database, Gale Group New Product Announcements / Plus®, Gale Group Newsletter Database™, Gale Group PharmaBiomed Business Journals, Gale Group PROMT®, Gale Group Trade & Industry Database™, GEOBASE, GeoRef, Global Health, HSELINE: Health and Safety, ICONDA - International Construction Database, IMS Company Profiles, IMS New Product Focus, IMS Pharma Trademarks, IMS R&D Focus, IMS R&D Focus Drug News, Inspec®, International Pharmaceutical Abstracts, Jane's Defense & Aerospace News, King's Fund, KOSMET: Cosmetic Science, Lancet Titles, Mechanical & Transportation Engineering Abstracts, MEDLINE®, Meteorological & Geoastrophysical Abstracts, Morressier Life Science Conference Abstracts and Posters, New England Journal of Medicine, Northern Light Life Sciences Conference Abstracts, NTIS: National Technical Information Service, Oceanic Abstracts, PAIS International, Paperbase, PAPERCHEM, ProQuest Advanced Tech & Aerospace Professional, ProQuest Biological & Health Science Professional, ProQuest Dissertations and Theses Professional, ProQuest Environmental Science Professional, ProQuest Materials Research Professional, ProQuest Newsstand Professional, ProQuest Technology Research Professional, Prous Science Daily Essentials, Prous Science Drug Data Report, Prous Science Drugs Of The Future™, Publicly Available Content, Registry of Toxic Effects of Chemical Substances (RTECS®), SciSearch®: a Cited Reference Science Database, Social SciSearch®, ToxFile®, Transport Research International Documentation, TULSA™ (Petroleum Abstracts), UBM Computer Full Text, Weldasearch®, Zoological Record

Set#	Searched for	Results
S1	((vending pre/5 machine[*1]) or kiosk[*1]) pre/15 (mobile* or phone[*1] or transceiv*)	46363
S2	S1 and ((payment[*1] or paying) pre/8 (trigg* or transaction[*1]))	2135
S3	(((Select* or chos* or choos* or accept*) or pre/15 or (payee* or seller[*1])) or pre/15 or (terminal[*1] or computer[*1] or mobile or phone or device[*1]))	279553905
S4	S2 and S3	2135
S5	S4 and mobile and accelerat*	798
S6	S1 and S3	46303
S7	S5 and S6	753°
S8	((((Select* or chos* or choos* or accept*) near/40 (payee* or vendor[*1] or seller[*1])) near/40 (terminal[*1] or computer[*1] or kiosk[*1])) near/40 (mobile or phone or device[*1])) near/40 (pay* or card[*1])	10061*

S9	s7 and s8	0°
S10	s3 and s8	10061*
S11	s6 and s10	42°

* Duplicates are removed from the search, but included in the result count.

° Duplicates are removed from the search and from the result count.

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 06:47 AM
L2	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 06:50 AM
L3	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:01 AM
L4	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:06 AM
L5	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:16 AM
L6	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:34 AM
L7	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:44 AM
L8	16188	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:04 AM
L9	1358296	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:05 AM
L10	379486	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:09 AM
L11	38322	L9 AND l10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:13 AM

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L12	4573	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:14 AM
L13	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:42 AM
L14	4858	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:42 AM
L15	101	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:43 AM
L16	146744	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 10:34 AM
L17	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/08/17 10:35 AM
L18	134	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/17 10:36 AM
L19	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 10:39 AM
L20	1548	(payee$ OR vendor$1 OR seller$1) SAME	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/08/17 12:52 PM

Petitioner Exhibit 1002-0166

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L21	18	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 12:52 PM
L22	392	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 12:56 PM
L23	141	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 01:47 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

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18197070	892	09/27/2023	104402-5074-US

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/197,070	**11/15/2023 03:51:24 AM Z ET**	**104402-5074-US**

Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5568	FILED BY	Benjamin Pezzner
PATENT CENTER #	63251587	AUTHORIZED BY	-
CUSTOMER #	24341	FILING DATE	05/14/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Paresh K. Patel

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 8177	**E2023AE451375000**	**Benjamin Pezzner**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2814	STATUTORY DISCLAIMER, INCLUDING TERMINAL DISCLAIMER	170.00	1	170.00
			TOTAL AMOUNT:	**$170.00**

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 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.

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APPROVAL LETTER

APPLICATION #	FILING DATE	APPLICANT/PATENT UNDER REEXAMINATION
18/197,070	05/14/2023	Paresh Patel

Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Electronic terminal disclaimer filed on 11/15/2023

☑ Approved

This patent is subject to a Terminal Disclaimer

Approved / Disapproved by: Electronic Terminal Disclaimer automatically approved

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/197,070	**11/15/2023 03:51:24 AM Z ET**	**104402-5074-US**

Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5568	FILED BY	Benjamin Pezzner
PATENT CENTER #	63251587	FILING DATE	05/14/2023
CUSTOMER #	24341	FIRST NAMED INVENTOR	Paresh K. Patel
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
petition-request.pdf	3	Terminal Disclaimer-Filed (Electronic)	50 KB
grantLetter.pdf	1	Terminal Disclaimer-Electronic-Approved	19 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
petition-request.pdf	6F85D9F544D1644197D10C0203FB755B1FC56ABA75FA111F5 BB29F244CBFFF8ADFEEBDDD6104426D7EBEC32CDD40F4CC

03F64858126E56D1AAFF4FC9A260E526

grantLetter.pdf 21D298882B1419FFE83AE2D9F3EF7BBD2139D1B3705FC83AE
D73EACF050E1F7093DD776DDCA0432EE843B330991AB90769
9AE272BF761F770ED07B7D2A9AA6C8

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TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION

APPLICATION #	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET #
18197070	05/14/2023	Paresh Patel	104402-5074-US

Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

☑ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☑ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent interest
PAYRANGE INC.	100%
Total	100%

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application Number(s)

Application #	Filing Date
17973507	10/25/2022

as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application. The owner hereby agrees that any patent so

granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.
In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that any such patent granted on the pending reference application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)

Patent #
10891614
11501296
11481772

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.
In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Terminal disclaimer fee under 37 CFR 1.20(d) included with Electronic Terminal Disclaimer request.

☑

Applicant claims the following entity status:
Small

I hereby declare that all statements made herein of my own knowledge are true and that all statemnts made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I certify, in accordance with 37 CFR 1.4(d)(4) that I am: An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Signature	Name	Registration #
/Benjamin Pezzner/	Benjamin Pezzner	70711

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* Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner). Form PTO/SB/96 may be used for making this certification. See MPEP 324.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Paresh K. Patel	Confirmation No.:	5568
Serial No.:	18/197,070	Art Unit:	3698
Filed:	May 14, 2023	Examiner:	Poinvil, Frantzy
For:	*Method And System For Presenting Representations Of Payment Accepting Unit Events*	Atty. Docket No.:	104402-5074-US

AMENDMENT AND INTERVIEW SUMMARY

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The enclosed Amendment is in response to the **Track 1** Office Action dated September 27, 2023 for the above identified patent application.

The Commissioner is hereby authorized to charge any required fee(s) to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 104402-5074-US).

Petitioner Exhibit 1002-0177

IN THE CLAIMS:

Rewrite the pending claims and add new claims as follows:

1. (Original) A method of presenting representations of payment accepting unit events, comprising:

at a mobile device with one or more processors, memory, one or more output devices including a display, and one or more radio transceivers:

identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing on the mobile device, the identifying based at least in part on an identifier corresponding to the one or more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services;

displaying a user interface of the mobile payment application on the display of the mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units;

establishing via the one or more radio transceivers a wireless communication path including the mobile device and the available payment accepting unit of the one or more payment accepting units;

after establishing the wireless communication path, enabling user interaction with the user interface of the mobile payment application to complete a transaction with the available payment accepting unit;

exchanging information with the available payment accepting unit via the one or more radio transceivers, in conjunction with the transaction; and

after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device.

2. (Original) The method of claim 1, wherein the updated user interface of the mobile payment application includes at least one of:

a message displayed on the display of the mobile device;

a banner notification displayed on a display of the mobile device; and/or

a visual alert from one or more LEDs of the mobile device.

Petitioner Exhibit 1002-0178

3. (Original) The method of claim 1, wherein the information indicates completion of the transaction between the user of the mobile device and the available payment accepting unit.

4. (Original) The method of claim 3, wherein the mobile device includes a long-range transceiver and the information at least includes an amount of the completed transaction, and the method further comprises:

sending at least the amount of the completed transaction to a server via the long-range transceiver.

5. (Original) The method of claim 1, wherein the information indicates abortion of the transaction initiated by the user of the mobile device.

6. (Original) The method of claim 1, wherein the information indicates failure of the transaction initiated by the user of the mobile device or a malfunction associated with the available payment accepting unit.

7. (Original) The method of claim 1, wherein the mobile device includes an accelerometer and the method further comprises:

based on data from the accelerometer, determining whether the user is walking away from the available payment accepting unit; and

in accordance with a determination that the user is walking away from the available payment accepting unit, canceling the wireless communication path.

8. (Original) The method of claim 1, wherein the information reflects availability of the available payment accepting unit to conduct a transaction.

9. (Original) The method of claim 1, further comprising:

in addition to exchanging the information, receiving, via the one or more radio transceivers, a coupon that is targeted to the user of the mobile device based on the transaction.

10. (Original) The method of claim 1, wherein the user interface of the mobile payment application, after establishing the wireless communication path, indicates that the wireless communication path has been established with the available payment accepting unit.

Petitioner Exhibit 1002-0179

11. (Original) The method of claim 1, wherein the user interface of the mobile payment application, after establishing the wireless communication path, includes:

a visual representation of the available payment accepting unit;

an indication of a prepaid balance; and

an affordance that when slid, indicates the initiation of the transaction;

wherein the affordance is slid in response to receiving a user input of swipe on the affordance displayed on the display of the mobile device.

12. (Original) The method of claim 1, wherein the payment operated machines include a payment activated washer, a payment activated dryer, a vending machine, a parking meter, a toll booth, an arcade game, a kiosk, a photo booth, or a ticket dispensing machine.

13. (Original) A mobile device, comprising:

one or more radio transceivers;

one or more output devices including a display;

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:

identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing on the mobile device, the identifying based at least in part on an identifier corresponding to the one or more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services;

displaying a user interface of the mobile payment application on the display of the mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units;

establishing via the one or more radio transceivers a wireless communication path including the mobile device and the available payment accepting unit of the one or more payment accepting units;

after establishing the wireless communication path, enabling user interaction with the user interface of the mobile payment application to complete a transaction with the available payment accepting unit;

Petitioner Exhibit 1002-0180

exchanging information with the available payment accepting unit via the one or more radio transceivers, in conjunction with the transaction; and

after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device.

14. (Original) The mobile device of claim 13, wherein identifying the one or more payment accepting units includes identifying a payment activated washer, a payment activated dryer, a vending machine, a parking meter, a toll booth, an arcade game, a kiosk, a photo booth, or a ticket dispensing machine.

15. (Original) A non-transitory computer readable storage medium storing one or more programs, the one or more programs comprising instructions, which, when executed by a mobile device with one or more processors, one or more output devices including a display, and one or more radio transceivers, cause the mobile device to perform operations comprising:

identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing on the mobile device, the identifying based at least in part on an identifier corresponding to the one or more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services;

displaying a user interface of the mobile payment application on the display of the mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units;

establishing via the one or more radio transceivers a wireless communication path including the mobile device and the available payment accepting unit of the one or more payment accepting units;

after establishing the wireless communication path, enabling user interaction with the user interface of the mobile payment application to complete a transaction with the available payment accepting unit;

exchanging information with the available payment accepting unit via the one or more radio transceivers, in conjunction with the transaction; and

after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device.

Petitioner Exhibit 1002-0181

16. (Original) The non-transitory computer readable storage medium of claim 15, wherein the updated user interface of the mobile payment application includes at least one of:

a message displayed on the display of the mobile device;

a banner notification displayed on a display of the mobile device; and/or

a visual alert from one or more LEDs of the mobile device.

17. (Original) The non-transitory computer readable storage medium of claim 15, wherein:

the information indicates completion of the transaction between the user of the mobile device and the available payment accepting unit;

the information at least includes an amount of the completed transaction; and

the instructions further cause the mobile device to send at least the amount of the completed transaction to a server.

18. (Original) The non-transitory computer readable storage medium of claim 15, wherein the information indicates abortion of the transaction initiated by the user of the mobile device.

19. (Original) The non-transitory computer readable storage medium of claim 15, wherein the information indicates failure of the transaction initiated by the user of the mobile device or a malfunction associated with the available payment accepting unit.

20. (Original) The non-transitory computer readable storage medium of claim 15, wherein identifying the one or more payment accepting units includes identifying a payment activated washer, a payment activated dryer, a vending machine, a parking meter, a toll booth, an arcade game, a kiosk, a photo booth, or a ticket dispensing machine.

Petitioner Exhibit 1002-0182

REMARKS

This amendment responds to the Track 1 office action mailed September 27, 2023. In the Track 1 office action, claims 1-20 were rejected under obviousness-type double patenting.

After entry of this response, claims 1-20 are pending.

McKesson Statement

In view of *McKesson Information Solutions v. Bridge Medical* (Fed. Cir. 2007), the Applicant wishes to inform the Examiner that the prosecution history of the following US Patent Applications may contain information relevant to the pending application:

14/214644*, 14/320534, 14/335762, 14/611065, 14/641236, 14/321717, 14/321724, 14/321733, 14/456683, 14/968703*, 14/614336, 14/458192, 14/458199*, 15/893514, 15/435228, 15/878352*, 15/603400*, 15/406492*, 16/029483, 15/956741, 16/681673, 16/748727, 16/750477, 16/934933*, 17/529111, 17/147305, 16/934392, 17/216399, 17/973506, 17/968672, 17/973505, 17/443802, 17983311, 17/985832, 17/654732*, 17/978894, 17/963170, 17/973507, 18/197070, 18/197071

The Examiner is encouraged to review the art made of record, office actions, and notices of allowance, if any, in the above-mentioned applications.

In addition, applications marked with an asterisk (*) have been or are currently being challenged at the PTAB. The Examiner is encouraged to review the record of each of these proceedings in the Patent Trial and Appeal Case Tracking System (P-TACTS).

Double Patenting

A terminal disclaimer is being filed concurrently with this response to address this non-statutory double patenting rejection. The Applicant respectfully requests that these rejections be withdrawn.

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

Petitioner Exhibit 1002-0183

is invited to call the undersigned attorney at (650) 843-4000, if a telephone call could help resolve any remaining items.

Respectfully submitted,

Date: November 15, 2023

/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

Petitioner Exhibit 1002-0184

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/197,070	**11/15/2023 07:20:53 PM Z ET**	**104402-5074-US**

Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5568	FILED BY	Benjamin Pezzner
PATENT CENTER #	63251635	FILING DATE	05/14/2023
CUSTOMER #	24341	FIRST NAMED INVENTOR	Paresh K. Patel
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 3

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
104402-5074-US Response to OA.pdf		8	-	165 KB
104402-5074-US Response to OA-A....pdf	(1-1)	1	Amendment/Request for Reconsideration-After Non-Final Rejection	114 KB
104402-5074-US Response to OA-CLM.pdf	(2-6)	5	Claims	115 KB
104402-5074-US Response to OA-REM.pdf	(7-8)	2	Applicant Arguments/Remarks Made in an Amendment	117 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
104402-5074-US Response to OA.pdf	A2693203F2666D040D2A67CCBD433352AEC32E0F11DFDE785DC60D73B24AC79788BCB38DD9FCED1AE4679021231243BCE08DEDA9218C6958A5D3E3F5A31B95CE
104402-5074-US Response to OA-A....pdf	468559A6EF157A1976786F99F50CD43434CFA38509C10B95AF9AE1CEAA4CD526BF1341C9F3B6549209524592A7A77909DC2BBBBA9BD8F74610BE12A3F9866B50
104402-5074-US Response to OA-CLM.pdf	48EFB589001981C1ACDD82F55C11748C67348638EC7F54FF3C27CA39D32F798BFA338B18853174B0C312619B50B5066DF87260B9D7B524EA9978F3E3FB75F7B0
104402-5074-US Response to OA-REM.pdf	321D2C1214755E0D697FFC50AD10625E14624F8292CD57EF244103389F6D215AA306F0CE0E1F572C97CB8085844363AE9173BBF217808504DD5E10B6C2152D31

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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
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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 18/197,070	Filing Date 05/14/2023	☐ 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 $40 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $ 192 =	
☐ 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	11/15/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $ 192 =	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".	/MONICA D FRANCIS/
*** 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
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NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 12/20/2023

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

EXAMINER
POINVIL, FRANTZY

ART UNIT	PAPER NUMBER
3698	

DATE MAILED: 12/20/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,070	05/14/2023	Paresh K. Patel	104402-5074-US	5568

TITLE OF INVENTION: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	03/20/2024

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 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted 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. 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.

Petitioner Exhibit 1002-0188

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

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 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. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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

24341 7590 12/20/2023
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 the USPTO patent electronic filing system 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.
18/197,070	05/14/2023	Paresh K. Patel	104402-5074-US	5568

TITLE OF INVENTION: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	03/20/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
POINVIL, FRANTZY	3698	705-044000

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/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 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)

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

❑ Electronic Payment via the USPTO patent electronic filing system ❑ 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

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.

❑ 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 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. _____

Petitioner Exhibit 1002-0189

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.
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POINVIL, FRANTZY	
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3698	

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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.

Petitioner Exhibit 1002-0190

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. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) 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));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/197,070	Applicant(s) Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	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 the remarks filed 11/15/2023.
   ☐ 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 1-20 . 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 _____.

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

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.

Allowable Subject Matter

2. The following is an examiner's statement of reasons for allowance:

Claims 1-20 are allowable over the art of record.

Particularly, the prior art taken alone or in combination failed to teach or suggest :

"identifying one or more payment accepting units in proximity to the mobile device that are available to accept payment from a mobile payment application executing or mobile device, the identifying based at least in part on an identifier corresponding to the one more payment accepting units, wherein the one or more payment accepting units are payment operated machines that accept payment for dispensing of products and/or services, displaying a user interface of the mobile payment application on the display mobile device, the user interface being configured to display a visual indication of the one or more payment accepting units and accept user input selecting an available payment accepting unit of the one or more payment accepting units, and after exchanging the information, displaying, on the display, an updated user interface of the mobile payment application to the user of the mobile device", as recited in independent claims 1, 13 and 15.

The above recited limitations provide meaningful limitations that transforms the abstract idea into patent eligible. The claims as a whole effect an improvement to another technology or

technical field. These limitations in combination provide meaningful limitations beyond generally linking the use of the abstract idea to a practical application.

3. The following prior art is deemed relevant but failed to teach or suggest the above noted limitations.

Maeng (US Patent No. 11010759 B1) discloses a system, computer-readable storage medium and method provide a secure transaction by receiving, from a mobile wallet a request to assign a vendor specific payment account identifier (VSPAI) to a payment account identifier (PAI) associated with a user of the mobile wallet. Identifying information is verified of: (i) an issuer of the PAI, (ii) a specific vendor; and (iii) the user of the mobile wallet. In response to verifying, a unique VSPAI is created that is associated with the PAI of the user and the specific vendor. Then, when a payment request is received including the unique VSPAI for a transaction with a particular vendor, the particular vendor is verified as the specific vendor associated with the unique VSPAI. In response to verifying that the particular vendor, payment of the transaction by the issuer using the PAI associated with the unique VSPAI is facilitated.

Giordano (US Pub. No. 20020152123 A1) discloses a method and apparatus for processing retail non-cash transaction at a kiosk or other similar self-service station. A terminal located at the kiosk is similar to online consumer computer 710 except that a product database similar to that found in online merchant computer 734 is stored in the mass storage device. In operation, the customer in merchant store 12 approaches a kiosk in the store, indicates a food, merchandise or service selection, and provides a customer/transmitter ID using input device 920, customer transceiver 50 or a combination of the two. In doing so, the customer has placed an

order for the desired article of food, merchandise or service and simultaneously initiated payment processing. Once the transaction is authorized, a receipt is printed on printer 990 and the purchase is delivered to the customer, either at the kiosk or at another predetermined location.

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

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANTZY POINVIL whose telephone number is (571)272-6797. The examiner can normally be reached on M-Th 7:00AM to 5:30PM.

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, Michael Anderson can be reached on 571-270-0508. 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.

/FP/

/FRANTZY POINVIL/
Primary Examiner, Art Unit 3698

November 23, 2023

Notice of References Cited	Application/Control No. 18/197,070	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner FRANTZY POINVIL	Art Unit 3698	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-11010759-B1	05-2021	Maeng; Joon	G06Q20/401	1/1
*	B	US-20140279537-A1	09-2014	Cicoretti; Dean L.	G06Q20/40	705/44
*	C	US-20120158528-A1	06-2012	Hsu; Wesley	G06Q20/322	705/16
*	D	US-20020152123-A1	10-2002	Giordano, Joseph	G06Q20/04	705/14.36
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	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	Mobile payments head to the United States, Mobile Internet 6.10: 1. Information Gatekeepers, Inc., Dialog Accession No. 123850832, October . (Year: 2004).
	V	"During the period 2--5 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million", M2 PressWire 28 February. (Year: 2006).
	W	
	X	

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

Petitioner Exhibit 1002-0197

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

CPC - Searched*		
Symbol	**Date**	**Examiner**
(G06Q20/40 or G06Q20/18 or G06Q20/322 or G06Q20/3226 or G06Q20/327 or G06Q20/3278 or G07F7/0893 or G07F9/023).cpc.	08/17/2023	FP
G06Q20/40; G06Q20/18; G06Q20/322; G06Q20/3226; G06Q20/327; G06Q20/3278; G07F7/0893; G07F9/023	11/24/2023	FP

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
705	3-44	08/17/2023	FP
705	3-44	11/24/2023	FP

* 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**
See the attached DAV and Proquest searches.	09/05/2023	FP
CBM2020-00026 Reviewed EX2004 – Tushie Disclosure.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. EX2002 – US Pat. No. 8,489,140 issued to Weiner.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. EX2001 – US Pub. No. 20130166448A1 issued to Narayanan.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1008 – Plaintiff – Claim Charts of U.S. Patent No. 9,659,296.	09/05/2023	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	Petitioner Exhibit 1002-0198

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	Art Unit
	FRANTZY POINVIL	3698

CBM2020-0026 Reviewed Document Id. 1007 – Declaration of David R. Tushie.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1006 - US Patent No. 9,659,296, Patent Prosecution history,	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1004 - US Patent No. 9,898,884 issued to Arora,	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1003 - US Pub. No. 2012/ 0029691 to Mockus.	09/05/2023	FP
CBM2020-0026 Reviewed Document Id. 1001 – U.S. Patent No. 9,659,296.	09/05/2023	FP
CBM2020-0026 Reviewed Decision of Trial Instituted Document.	09/05/2023	FP
CBM2020-0026 Reviewed Patent Owner's Preliminary Response, Paper No. 7.	09/05/2023	FP
CBM2020-0026 Reviewed Petitioners' Updated Mandatory Notices, Paper No. 6.	09/05/2023	FP
IPR2021-00086 Reviewed Document Id. EX2008 Docket Entry Listings.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2004 Tushie Disclosure	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2003 – Defendants' Second Supplemental Disclosure.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2002 – US Pat. No. 8,489,140 issued to Weiner.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX2001 US Pub. No. 20130166448A1 issued to Narayanan.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1013 of Defendants' KioSoft Technologies LLC and TechTres, Inc. on 9/6/2023	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1009 US Patent No. 9,898,884 issued to Arora.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1008 - Plaintiff Claim Charts of U.S. Patent No. 9,659,296 on 9/6/2023	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1007 – Declaration of David R. Tushie.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1006 - US Patent No. 9,659,296, Patent Prosecution history.	09/06/2023	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	Petitioner Exhibit 1002-0199

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

IPR2021-00086 Reviewed Document Id. EX1004 U.S. Patent No. 8,903,737 issued to Cameron.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1003 U.S. Pub. No. 20030130892A1 by Athwal.	09/06/2023	FP
IPR2021-00086 Reviewed Document Id. EX1001 U.S. Patent No. 9,659,296 issued to Patel.	09/06/2023	FP
IPR2023-01186 Reviewed All filed Documents	09/05/2023	fp
PGR2021-00093 Reviewed all Filed Documents.	09/05/2023	fp
PGR2023-00042 Reviewed All filed Documents.	09/05/2023	fp
PGR2023-00050 Reviewed All filed Document.	09/05/2023	fp
See the attached DAV and Proquest searches.	11/27/2023	FP

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
705	44	11/24/2023	FP

/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	Petitioner Exhibit 1002-0200

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

✓	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	08/17/2023	11/24/2023							
1	1	✓	=							
2	2	✓	=							
3	3	✓	=							
4	4	✓	=							
5	5	✓	=							
6	6	✓	=							
7	7	✓	=							
8	8	✓	=							
9	9	✓	=							
10	10	✓	=							
11	11	✓	=							
12	12	✓	=							
13	13	✓	=							
14	14	✓	=							
15	15	✓	=							
16	16	✓	=							
17	17	✓	=							
18	18	✓	=							
19	19	✓	=							
20	20	✓	=							

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

CPC						
Symbol					**Type**	**Version**
G06Q	/	20	/	40	F	2013-01-01
G06Q	/	20	/	327	I	2013-01-01
G06Q	/	20	/	18	I	2013-01-01
G06Q	/	20	/	322	I	2013-01-01
G06Q	/	20	/	3226	I	2013-01-01
G06Q	/	20	/	3278	I	2013-01-01
G07F	/	7	/	0893	I	2013-01-01
G07F	/	9	/	023	I	2013-01-01

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	24 November 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	10c

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06Q	/	20	/	40

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
705	44

CROSS REFERENCES(S)							
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**						
705	44						

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	24 November 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	10c

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/197,070	Patel, Paresh K.
	Examiner	**Art Unit**
	FRANTZY POINVIL	3698

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/FRANTZY POINVIL/ Primary Examiner, Art Unit 3698	24 November 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	10c

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Search Strategy from Dialog

November 24 2023 11:37

Petitioner Exhibit 1002-0205
ProQuest

Search Strategy

Databases: ABI/INFORM® Professional Advanced, Abstracts in New Technology & Engineering, AdisInsight: Drugs, AdisInsight: Trials, Adis Pharmacoeconomics & Outcomes News, AGRICOLA, AGRIS, Allied & Complementary Medicine™, Analytical Abstracts, APA PsycInfo®, Aqualine, Aquatic Science & Fisheries Abstracts (ASFA), Australian Education Index, BIOSIS® Toxicology, BIOSIS Previews®, British Library Inside Conferences, British Nursing Index, Business & Industry, CAB ABSTRACTS, Chemical Business Newsbase, Chemical Engineering & Biotechnology Abstracts, Chemical Safety Newsbase, Civil Engineering Abstracts, ClinicalTrials.gov, Current Contents® Search, Derwent Drug File, Derwent Drug Registry, DH-DATA: Health Administration, Medical Toxicology & Environmental Health, DIOGENES® FDA Regulatory Updates, Drug Information Fulltext, Earthquake Engineering Abstracts, EconLit, Ei Compendex®, Ei EnCompassLIT, Embase®, Embase® French Local Literature, EMCare®, ERIC, ESPICOM Pharmaceutical & Medical Device News, FDAnews, FLUIDEX (Fluid Engineering Abstracts), Foodline®: MARKET, Foodline®: PRODUCT, Foodline®: SCIENCE, FSTA®, Gale Group Computer Database™, Gale Group Health Periodicals Database, Gale Group New Product Announcements / Plus®, Gale Group Newsletter Database™, Gale Group PharmaBiomed Business Journals, Gale Group PROMT®, Gale Group Trade & Industry Database™, GEOBASE, GeoRef, Global Health, HSELINE: Health and Safety, ICONDA - International Construction Database, IMS Company Profiles, IMS New Product Focus, IMS Pharma Trademarks, IMS R&D Focus, IMS R&D Focus Drug News, Inspec®, International Pharmaceutical Abstracts, Jane's Defense & Aerospace News, King's Fund, KOSMET: Cosmetic Science, Lancet Titles, Mechanical & Transportation Engineering Abstracts, MEDLINE®, Meteorological & Geoastrophysical Abstracts, Morressier Life Science Conference Abstracts and Posters, New England Journal of Medicine, Northern Light Life Sciences Conference Abstracts, NTIS: National Technical Information Service, Oceanic Abstracts, PAIS International, Paperbase, PAPERCHEM, ProQuest Advanced Tech & Aerospace Professional, ProQuest Biological & Health Science Professional, ProQuest Dissertations and Theses Professional, ProQuest Environmental Science Professional, ProQuest Materials Research Professional, ProQuest Newsstand Professional, ProQuest Technology Research Professional, Prous Science Daily Essentials, Prous Science Drug Data Report, Prous Science Drugs Of The Future™, Publicly Available Content, Registry of Toxic Effects of Chemical Substances (RTECS®), SciSearch®: a Cited Reference Science Database, Social SciSearch®, ToxFile®, Transport Research International Documentation, TULSA™ (Petroleum Abstracts), UBM Computer Full Text, Weldasearch®

Set#	Searched for	Results
S1	((vending pre/5 machine[*1]) or kiosk[*1]) pre/15 (mobile* or phone[*1] or transceiv*)	47076
S2	(((Select* or chos* or choos* or accept*) or pre/15 or (payee* or seller[*1])) or pre/15 or (terminal[*1] or computer[*1] or mobile or phone or device[*1]))	284044009
S3	S1 and S2	47015
S4	((((Select* or chos* or choos* or accept*) near/40 (payee* or vendor[*1] or seller[*1])) near/40 (terminal[*1] or computer[*1] or kiosk[*1])) near/40 (mobile or phone or device[*1])) near/40 (pay* or card[*1])	10321
S5	S2 and S4	10321
S6	S3 and S5	43°
S7	((((mobile near/40 wireless) near/40 payment[*1]) near/40 (machine or kiosk*)) near/40 (dispens* or return*)) near/40 (good[*1] or service[*1] or item[*1])	31°

° Duplicates are removed from the search and from the result count.

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 06:47 AM
L2	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 06:50 AM
L3	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:01 AM
L4	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:06 AM
L5	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:16 AM
L6	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:34 AM
L7	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/08/17 07:44 AM
L8	16188	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:04 AM
L9	1358296	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:05 AM
L10	379486	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:09 AM
L11	38322	L9 AND l10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:13 AM

Petitioner Exhibit 1002-0209

L12	4573	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:14 AM
L13	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:42 AM
L14	4858	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:42 AM
L15	101	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 09:43 AM
L16	146744	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 10:34 AM
L17	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/08/17 10:35 AM
L18	134	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/17 10:36 AM
L19	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 10:39 AM
L20	1548	(payee$ OR vendor$1 OR seller$1) SAME	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/08/17 12:52 PM

Petitioner Exhibit 1002-0210

		(terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L21	18	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 12:52 PM
L22	392	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 12:56 PM
L23	141	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/17 01:47 PM
L24	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L25	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L26	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L27	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L28	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L29	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L30	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L31	16284	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM

Petitioner Exhibit 1002-0211

		device$1) SAME (pay$ OR card$1)					
L32	1374202	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L33	383115	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L34	38712	L9 AND l10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L35	4602	L8 AND l11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L36	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L37	4951	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L38	101	L14 AND l12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2023/09/25 07:49 AM

Petitioner Exhibit 1002-0212

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L39	147408	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L40	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/09/25 07:49 AM
L41	146	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/09/25 07:49 AM
L42	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L43	1561	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L44	21	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L45	396	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/09/25 07:49 AM
L46	142	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2023/09/25 07:49 AM

Petitioner Exhibit 1002-0213

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L47	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L48	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L49	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L50	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L51	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L52	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L53	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L54	16422	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR device$1) SAME (pay$ OR card$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L55	1388309	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L56	389146	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L57	39432	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM

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L58	4662	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L59	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L60	5091	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L61	105	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L62	148744	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L63	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L64	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/24 09:45 AM
L65	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L66	1583	(payee$ OR vendor$1 OR seller$1) SAME	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/11/24 09:45 AM

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		(terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L67	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L68	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L69	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L70	1	"8856045".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L71	1	"9547859".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L72	1	"9256873".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L73	1	"9659296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L74	1	"10891614".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L75	1	"11501296".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L76	1	"11481772".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L77	16422	(Select$ OR chos$ OR choos$ OR accept$) SAME (payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR kiosk$1) SAME (mobile OR phone OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM

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		device$1) SAME (pay$ OR card$1)					
L78	1388309	(detect$ OR identif$) SAME (vending OR machine$1 OR kiosk$1) SAME (mobile$ OR phone$1 OR transceiv$ OR transmit$)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L79	389146	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) smae (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L80	39432	L9 AND I10	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L81	4662	L8 AND I11	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L82	7	(mobile OR wireless OR gps) adj15 accelerometer$1 adj15 (walk$ OR distance$ OR travel$) adj15 (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L83	5091	(mobile OR wireless OR gps) SAME accelerometer$1 SAME (walk$ OR distance$ OR travel$) SAME (transaction$ OR kiosk$1 OR machine$1 OR vendor$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L84	105	L14 AND I12	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2023/11/24 09:45 AM

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			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L85	148744	(G06Q20/40 OR G06Q20/18 OR G06Q20/322 OR G06Q20/3226 OR G06Q20/327 OR G06Q20/3278 OR G07F7/0893 OR G07F9/023).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L86	41	((("PAYRANGE") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/11/24 09:45 AM
L87	149	((("PATEL") near3 ("Paresh"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/24 09:45 AM
L88	11	L15 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L89	1583	(payee$ OR vendor$1 OR seller$1) SAME (terminal$1 OR computer$1 OR mobile OR kiosk$1) SAME (phone$1 OR device$1) SAME (location$1 OR geograph$) SAME (id$1 OR identif$) adj15 pay$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L90	20	L20 AND L14	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L91	403	L20 AND ((vending adj4 machine$1) OR kiosk$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/11/24 09:45 AM
L92	143	L22 AND I16	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2023/11/24 09:45 AM

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			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million

Publication info: M2 Presswire 28 Feb 2006: NA.

ProQuest document link

Abstract (English): M2 PRESSWIRE-28 February 2006-Research and Markets: During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million(C)1994-2006 M2 COMMUNICATIONS LTD
RDATE:02032006
Research and Markets (http://www.researchandmarkets.com/reports/c14771) has announced the addition of Wireless M2M Communication and Retail to their offering.
What is the status for wireless M2M communication in the European retail sector?

Links: Check USPTO-STIC for Availability

Full text: M2 PRESSWIRE-28 February 2006-Research and Markets: During the period 2005 to 2009, the total number of wireless data connections used for retail applications in Europe can be expected to rise from less than 1 million to around 3 million(C)1994-2006 M2 COMMUNICATIONS LTD
RDATE:02032006
Research and Markets (http://www.researchandmarkets.com/reports/c14771) has announced the addition of Wireless M2M Communication and Retail to their offering.
What is the status for wireless M2M communication in the European retail sector? POS terminals and on street parking solutions are two areas where the new technology is already widely adopted. Remote management solutions for vending machines are expected to take off on a large scale in 2005. Learn more about the opportunities associated with the transformation of the European vending industry and the implementation for the EMV standard for secure card payments in this new report.
The highlights of this report are as follow:
- Overview of the European card payment, vending, parking and transportation ticketing industries.
- Introduction to key applications for wireless M2M communication in the retail sector.
- Analysis and forecasts of adoption of mobile communication for retail.
- Case studies of the implementation of wireless M2M communication solutions by industry leaders such as Parkeon, Selecta and VeriFone.
- Profiles of 65 leading POS terminal vendors, vending machine manufacturers, vending operators and parking and ticketing solution vendors.
Key questions answered by the report:
- What is the potential market size for wireless M2M communication in the retail sector? - Which are the key applications that offer sizable business opportunities? - How can the mobile industry benefit from deployment of 13 million EMV compliant POS terminals? - At what rate are wireless M2M communication solutions being adopted in the vending industry? - What are the opportunities for the mobile industry in the areas of parking and ticketing solutions?
Retail is one of the first sectors in Europe that has seen some significant breakthroughs for wireless M2M communication technology in certain application areas. Wireless POS terminals are widely used to enable card payments in businesses where mobility is required and modern on street parking management solutions rely on information transferred over wireless networks. The vending industry is expected to become the next segment where remote management systems enabled by mobile data communication will be deployed on a large scale from 2005 and onwards.
During the period 2005 to 2009, the total number of wireless data connections used for retail applications in

Europe can be expected to rise from less than 1 million to around 3 million.
Growth could however be many times higher if the mobile industry is able to take advantage of the ongoing migration to EMV in the card payments industry. As European merchants prepare to replace well over 10 million POS terminals to meet the new security standard, the mobile industry has a unique opportunity to initiate a shift from landline to wireless connections as primary means of communication for card payment systems. Such a development will however require tailored solutions that combine inexpensive, reliable terminals with secure high performance communication services.
Topics covered in this report include:
- Vending Machines - Parking and Ticketing Machines - Market Opportunity for Mobile Industry Players - Case Studies
For more information visit http://www.researchandmarkets.com/reports/c14771
CONTACT: Laura Wood, Senior Manager, Research and MarketsFax: +353 1 4100 980e-mail: press@researchandmarkets.com
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PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	10	(radio AND transceiver$1 AND mobile AND dispens$ AND identif$ AND wireless AND transaction AND interface$1 AND payment$1).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/24 09:51 AM

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Mobile payment heads to the U.S.

Publication Info: Mobile Internet 6.10: 1. Information Gatekeepers, Inc. (Oct 2004)
ProQuest document link

Abstract (English): Wireless Payments by SMS or micro-browsers have long been a mainstay in high mobile-penetration markets like Japan. The most famous example of this is probably Cmode--Coca Cola vending machines where thirsty users purchase soda using their phones. Following the recent announcement that KDDI would be joining DoCoMo's mobile payment effort by including FeliCa chips in future handsets, Coke is joining in too. New Cmode2 vending machines will support FeliCa chips, as well as current payment methods. However neither of these technologies are in widespread use in the U.S., and they are set to launch, or at least test-launch, nearly simultaneously.

Links: Check USPTO-STIC for Availability

Full text: Wireless Payments by SMS or micro-browsers have long been a mainstay in high mobile-penetration markets like Japan. The most famous example of this is probably Cmode--Coca Cola vending machines where thirsty users purchase soda using their phones. Following the recent announcement that KDDI would be joining DoCoMo's mobile payment effort by including FeliCa chips in future handsets, Coke is joining in too. New Cmode2 vending machines will support FeliCa chips, as well as current payment methods. However neither of these technologies are in widespread use in the U.S., and they are set to launch, or at least test-launch, nearly simultaneously.

AT&T Wireless announced a partnership with USA Technologies to bring e-Port, a wireless payment system, to stateside vending machines and other automated purchase devices. AT&T's part in this is minor, as it will simply provide the wireless access (over GPRS) for USA Technologies to send and process transactions. Vendors that choose to include e-Port in their machines or kiosks will only have to worry about electric supply and not a phone line, even if they want to enable credit card transactions on their machine. This is a more U.S.-centric version of Cmode-like payments, since the wireless aspect is part of the vending machine, not in a handset. Since mobile penetration has only recently crossed 50 percent in the U.S., and since different carriers have different capabilities and technologies, it is probably too difficult to rely on handsets for purchases yet.

E-Port may provide a stop-gap until efforts to deploy Near Field Communication (NFC) systems like FeliCa have gained momentum. To that end, Motorola announced that it would launch a few handsets that include MasterCard's PayPass, an NFC solution, in a few test markets. As on FeliCa handsets, PayPass-equipped phones will include a secure application space allowing subscribers to use them for ticketing, public transportation, and other situations in addition to payments. Nokia, Samsung, and Visa have previously announced that they would support this same protocol. Support from the top three manufacturers and two largest credit cards in the West should all but assure that this will be the standard to replace the ubiquitous magnetic stripe. Since it will be some time before NFC could dominate payment technology in the U.S., AT&T's e-Port partnership capitalizes on near-term demand for wireless payment. Like Cmode, this may even put AT&T and USA Technologies at an advantage when NFC takes off.

Subject: All company;All product and service information;Applications;Joint venture;Product introduction; Computer;Mobile communications;Telecom equipment;Telecom services;Telecommunications

Location: North America;United States

Company / organization: AT&T WIRELESS SERVICES INC (AT&T CORP); USA TECHNOLOGIES INC; AT&T CORP

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Title: METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

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05/14/2023	705	3698	104402-5074-US
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APPLICANTS

PAYRANGE INC.,

INVENTORS

Paresh K. Patel, Portland, OR, UNITED STATES

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

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Foreword

This Class-1 specification defines the base (or foundation) of four EPCglobal radio-frequency identification (RFID) protocols. The feature set for all four protocols is located at www.epcglobalinc.org/standards. The feature set for the Class-1 protocol is normative to this document.

The feature set for higher-class protocols is informative to this document.

Regardless of the class definitions, higher-class Tags shall not conflict with the operation of, nor degrade the performance of, Class-1 Tags located in the same RF environment.

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Introduction

This specification defines the physical and logical requirements for a passive-backscatter, Interrogator-talks-first (ITF), radio-frequency identification (RFID) system operating in the 860 MHz – 960 MHz frequency range. The system comprises Interrogators, also known as Readers, and Tags, also known as Labels.

An Interrogator transmits information to a Tag by modulating an RF signal in the 860 MHz – 960 MHz frequency range. The Tag receives both information and operating energy from this RF signal. Tags are passive, meaning that they receive all of their operating energy from the Interrogator's RF waveform.

An Interrogator receives information from a Tag by transmitting a continuous-wave (CW) RF signal to the Tag; the Tag responds by modulating the reflection coefficient of its antenna, thereby backscattering an information signal to the Interrogator. The system is ITF, meaning that a Tag modulates its antenna reflection coefficient with an information signal only after being directed to do so by an Interrogator.

Interrogators and Tags are not required to talk simultaneously; rather, communications are half-duplex, meaning that Interrogators talk and Tags listen, or vice versa.

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1. Scope

This document specifies:

- Physical interactions (the signaling layer of the communication link) between Interrogators and Tags,
- Interrogator and Tag operating procedures and commands, and
- The collision arbitration scheme used to identify a specific Tag in a multiple-Tag environment.

2. Conformance

2.1 Claiming conformance

A device shall not claim conformance with this specification unless the device complies with

a) all clauses in this specification (except those marked as optional), and

b) the conformance document associated with this specification, and,

c) all local radio regulations.

Conformance may also require a license from the owner of any intellectual property utilized by said device.

2.2 General conformance requirements

2.2.1 Interrogators

To conform to this specification, an Interrogator shall:

- Meet the requirements of this specification,
- Implement the mandatory commands defined in this specification,
- Modulate/transmit and receive/demodulate a sufficient set of the electrical signals defined in the signaling layer of this specification to communicate with conformant Tags, and
- Conform to all local radio regulations.

To conform to this specification, an Interrogator may:

- Implement any subset of the optional commands defined in this specification, and
- Implement any proprietary and/or custom commands in conformance with this specification.

To conform to this specification, an Interrogator shall not:

- Implement any command that conflicts with this specification, or
- Require using an optional, proprietary, or custom command to meet the requirements of this specification.

2.2.2 Tags

To conform to this specification, a Tag shall:

- Meet the requirements of this specification,
- Operate over the frequency range from 860 – 960 MHz, inclusive,
- Implement the mandatory commands defined in this specification,
- Modulate a backscatter signal only after receiving the requisite command from an Interrogator, and
- Conform to all local radio regulations.

To conform to this specification, a Tag may:

- Implement any subset of the optional commands defined in this specification, and
- Implement any proprietary and/or custom commands as defined in Proprietary commands and 2.3.4, respectively.

To conform to this specification, a Tag shall not:

- Implement any command that conflicts with this specification,

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- Require using an optional, proprietary, or custom command to meet the requirements of this specification, or
- Modulate a backscatter signal unless commanded to do so by an Interrogator using the signaling layer defined in this specification.

2.3 Command structure and extensibility

This specification allows four command types: (1) mandatory, (2) optional, (3) proprietary, and (4) custom. Subclause 6.3.2.11 and Table 6.18 define the structure of the command codes used by Interrogators and Tags for each of the four types, as well as the availability of future extensions.

All commands defined by this specification are either mandatory or optional.

Proprietary or custom commands are vendor-defined.

2.3.1 Mandatory commands

Conforming Tags shall support all mandatory commands. Conforming Interrogators shall support all mandatory commands.

2.3.2 Optional commands

Conforming Tags may or may not support optional commands. Conforming Interrogators may or may not support optional commands. If a Tag or an Interrogator implements an optional command, it shall implement it in the manner specified in this specification.

2.3.3 Proprietary commands

Proprietary commands may be enabled in conformance with this specification, but are not specified herein. All proprietary commands shall be capable of being permanently disabled. Proprietary commands are intended for manufacturing purposes and shall not be used in field-deployed RFID systems.

2.3.4 Custom commands

Custom commands may be enabled in conformance with this specification, but are not specified herein. An Interrogator shall issue a custom command only after (1) singulating a Tag, and (2) reading (or having prior knowledge of) the Tag manufacturer's identification in the Tag's TID memory. An Interrogator shall use a custom command only in accordance with the specifications of the Tag manufacturer identified in the Tag ID. A custom command shall not solely duplicate the functionality of any mandatory or optional command defined in this specification by a different method.

2.4 Reserved for Future Use (RFU)

This specification denotes some Tag memory addresses, Interrogator command codes, and bit fields within some Interrogator commands as being RFU. In general, EPCglobal is reserving these RFU values for use in higher-class specifications. Under some circumstances EPCglobal may permit another standards body or related organization to use one or more of these RFU values for standardization purposes. In these circumstances the permitted body shall keep EPCglobal appraised, in a timely manner, of its use or potential use of these RFU values. Third parties, including but not limited to solution providers and end users, shall not use these RFU values for proprietary purposes.

Bit E_h of XPC_W1 (EPC memory location 211_h – see 6.3.2.1.2.5) shall be reserved for use as a protocol functionality indicator. If another standards-setting body authorizes any physical or logical Tag operation that is incompatible with this EPCglobal specification then that standards-setting body shall employ bit E_h as follows:

- If bit E_h of XPC_W1 contains a logical 0 then the application is referred to as an EPCglobal™ Application and a Tag shall follow the physical and logical requirements specified by this EPC™ Class-1 Generation-2 UHF RFID Protocol. If bit E_h contains a logical 1 then the application is referred to as a non-EPCglobal™ Application and a Tag may follow the physical and logical requirements specified by a non-EPC™ Protocol. The default value for bit E_h shall be 0.

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3. Normative references

The following referenced documents are indispensable to the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition (including any amendments) applies.

EPCglobal™: *EPC™ Tag Data Standards*

EPCglobal™ (2004): *FMCG RFID Physical Requirements Document*

EPCglobal™ (2007): *ILT JRG Protocol Requirements Document V1.2.3*

European Telecommunications Standards Institute (ETSI), EN 300 220 (all parts): *Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW*

European Telecommunications Standards Institute (ETSI), EN 302 208: *Electromagnetic compatibility and radio spectrum matters (ERM) – Radio-frequency identification equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W, Part 1 – Technical characteristics and test methods*

European Telecommunications Standards Institute (ETSI), EN 302 208: *Electromagnetic compatibility and radio spectrum matters (ERM) – Radio-frequency identification equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W, Part 2 – Harmonized EN under article 3.2 of the R&TTE directive*

ISO/IEC Directives, Part 2: *Rules for the structure and drafting of International Standards*

ISO/IEC 3309: *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures – Frame structure*

ISO/IEC 15961: *Information technology, Automatic identification and data capture – Radio frequency identification (RFID) for item management – Data protocol: application interface*

ISO/IEC 15962: *Information technology, Automatic identification and data capture techniques – Radio frequency identification (RFID) for item management – Data protocol: data encoding rules and logical memory functions*

ISO/IEC 15963: *Information technology — Radiofrequency identification for item management — Unique identification for RF tags*

ISO/IEC 18000-1: *Information technology — Radio frequency identification for item management — Part 1: Reference architecture and definition of parameters to be standardized*

ISO/IEC 18000-6: *Information technology automatic identification and data capture techniques — Radio frequency identification for item management air interface — Part 6: Parameters for air interface communications at 860–960 MHz*

ISO/IEC 19762: *Information technology AIDC techniques – Harmonized vocabulary – Part 3: radio-frequency identification (RFID)*

U.S. Code of Federal Regulations (CFR), Title 47, Chapter I, Part 15: *Radio-frequency devices, U.S. Federal Communications Commission*

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4. Terms and definitions

The principal terms and definitions used in this specification are described in ISO/IEC 19762.

4.1 Additional terms and definitions

Terms and definitions specific to this document that supersede any normative references are as follows:

- **Air interface**

  The complete communication link between an Interrogator and a Tag including the physical layer, collision arbitration algorithm, command and response structure, and data-coding methodology.

- **Command set**

  The set of commands used to explore and modify a Tag population.

- **Continuous wave**

  Typically a sinusoid at a given frequency, but more generally any Interrogator waveform suitable for powering a passive Tag without amplitude and/or phase modulation of sufficient magnitude to be interpreted by a Tag as transmitted data.

- **Cover-coding**

  A method by which an Interrogator obscures information that it is transmitting to a Tag. To cover-code data or a password, an Interrogator first requests a random number from the Tag. The Interrogator then performs a bit-wise EXOR of the data or password with this random number, and transmits the cover-coded (also called ciphertext) string to the Tag. The Tag uncovers the data or password by performing a bit-wise EXOR of the received cover-coded string with the original random number.

- **Dense-Interrogator environment**

  An operating environment (defined below) within which most or all of the available channels are occupied by active Interrogators (for example, 25 active Interrogators operating in 25 available channels).

- **Dense-Interrogator mode**

  A set of Interrogator-to-Tag and Tag-to-Interrogator signaling parameters used in dense-Interrogator environments.

- **Extended temperature range**

  –40 °C to +65 °C (see nominal temperature range).

- **EPCglobal™ Application**

  An application whose usage denotes an acceptance of EPCglobal™ standards and policies (see non-EPCglobal™ Application).

- **Full-duplex communications**

  A communications channel that carries data in both directions at once. See also half-duplex communications.

- **Half-duplex communications**

  A communications channel that carries data in one direction at a time rather than in both directions at once. See also full-duplex communications.

- **Inventoried flag**

  A flag that indicates whether a Tag may respond to an Interrogator. Tags maintain a separate **inventoried** flag for each of four sessions; each flag has symmetric *A* and *B* values. Within any given session, Interrogators typically inventory Tags from *A* to *B* followed by a re-inventory of Tags from *B* back to *A* (or vice versa).

- **Inventory round**

  The period initiated by a *Query* command and terminated by either a subsequent *Query* command (which also starts a new inventory round) or a *Select* command.

- **Multiple-Interrogator environment**

  An operating environment (defined below) within which a modest number of the available channels are occupied by active Interrogators (for example, 5 active Interrogators operating in 25 available channels).

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- **Nominal temperature range**

  –25 °C to +40 °C (see extended temperature range).

- **Non-EPCglobal™ Application**

  An application whose usage does not denote an acceptance of EPCglobal™ standards and policies (see EPCglobal™ Application).

- **Operating environment**

  A region within which an Interrogator's RF transmissions are attenuated by less than 90dB. In free space, the operating environment is a sphere whose radius is approximately 1000m, with the Interrogator located at the center. In a building or other enclosure, the size and shape of the operating environment depends on factors such as the material properties and shape of the building, and may be less than 1000m in certain directions and greater than 1000m in other directions.

- **Operating procedure**

  Collectively, the set of functions and commands used by an Interrogator to identify and modify Tags. (Also known as the *Tag-identification layer*.)

- **PacketCRC**

  A 16-bit cyclic-redundancy check (CRC) code that a Tag may dynamically calculate over its PC, optional XPC, and EPC and backscatter during inventory (see StoredCRC).

- **PacketPC**

  Protocol-control information that a Tag with nonzero-valued XI dynamically calculates and backscatters during inventory (see StoredPC).

- **Passive Tag (or passive Label)**

  A Tag (or Label) whose transceiver is powered by the RF field.

- **Permalock or Permalocked**

  A memory location whose lock status is unchangeable (i.e. the memory location is permanently locked or permanently unlocked) except by recommissioning the Tag is said to be permalocked.

- **Persistent memory or persistent flag**

  A memory or flag value whose state is maintained during a brief loss of Tag power.

- **Physical layer**

  The data coding and modulation waveforms used in Interrogator-to-Tag and Tag-to-Interrogator signaling.

- **Protocol**

  Collectively, a physical layer and a Tag-identification layer specification.

- ***Q***

  A parameter that an Interrogator uses to regulate the probability of Tag response. An Interrogator commands Tags in an inventory round to load a *Q*-bit random (or pseudo-random) number into their slot counter; the Interrogator may also command Tags to decrement their slot counter. Tags reply when the value in their slot counter (i.e. their slot – see below) is zero. *Q* is an integer in the range (0,15); the corresponding Tag-response probabilities range from $2^{0} = 1$ to $2^{-15} = 0.000031$.

- **Random-slotted collision arbitration**

  A collision-arbitration algorithm where Tags load a random (or pseudo-random) number into a slot counter, decrement this slot counter based on Interrogator commands, and reply to the Interrogator when their slot counter reaches zero.

- **Recommissioning**

  A significant altering of a Tag's functionality and/or memory contents, as commanded by an Interrogator, typically in response to a change in the Tag's usage model or purpose.

- **Session**

  An inventory process comprising an Interrogator and an associated Tag population. An Interrogator chooses one of four sessions and inventories Tags within that session. The Interrogator and associated Tag population

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operate in one and only one session for the duration of an inventory round (defined above). For each session, Tags maintain a corresponding **inventoried** flag. Sessions allow Tags to keep track of their inventoried status separately for each of four possible time-interleaved inventory processes, using an independent **inventoried** flag for each process.

- **Single-Interrogator environment**
  An operating environment (defined above) within which there is a single active Interrogator at any given time.
- **Singulation**
  Identifying an individual Tag in a multiple-Tag environment.
- **Slot**
  Slot corresponds to the point in an inventory round at which a Tag may respond. Slot is the value output by a Tag's slot counter; Tags reply when their slot (i.e. the value in their slot counter) is zero. See also *Q* (above).
- **StoredCRC**
  A 16-bit cyclic-redundancy check (CRC) code that a Tag calculates over its StoredPC and EPC and stores in EPC memory at power-up, and may backscatter during inventory (see PacketCRC).
- **StoredPC**
  Protocol-control information stored in EPC memory that a Tag with zero-valued XI backscatters during inventory (see PacketPC).
- **Tag-identification layer**
  Collectively, the set of functions and commands used by an Interrogator to identify and modify Tags (also known as the *operating procedure*).
- **Tari**
  Reference time interval for a data-0 in Interrogator-to-Tag signaling. The mnemonic "Tari" derives from the ISO/IEC 18000-6 (part A) specification, in which Tari is an abbreviation for Type A Reference Interval.

5. Symbols, abbreviated terms, and notation

The principal symbols and abbreviated terms used in this specification are detailed in ISO/IEC 19762, *Information technology AIDC techniques – vocabulary*. Symbols, abbreviated terms, and notation specific to this document are as follows:

5.1 Symbols

BLF	Backscatter-link frequency (BLF = $1/T_{pri}$ = DR/TRcal)
DR	Divide ratio
FT	Frequency tolerance
M	Number of subcarrier cycles per symbol
$\mathbf{M_h}$	RF signal envelope ripple (overshoot)
$\mathbf{M_{hh}}$	FHSS signal envelope ripple (overshoot)
$\mathbf{M_l}$	RF signal envelope ripple (undershoot)
$\mathbf{M_{hl}}$	FHSS signal envelope ripple (undershoot)
$\mathbf{M_s}$	RF signal level when OFF
$\mathbf{M_{hs}}$	FHSS signal level during a hop
Q	Slot-count parameter
R=>T	Interrogator-to-Tag
RTcal	Interrogator-to-Tag calibration symbol
$\mathbf{T_1}$	Time from Interrogator transmission to Tag response
$\mathbf{T_2}$	Time from Tag response to Interrogator transmission
$\mathbf{T_3}$	Time an Interrogator waits, after T_1, before it issues another command
$\mathbf{T_4}$	Minimum time between Interrogator commands

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T_f or $T_{f,10\text{-}90\%}$	RF signal envelope fall time
T_{hf}	FHSS signal envelope fall time
T_{hr}	FHSS signal envelope rise time
T_{hs}	Time for an FHSS signal to settle to within a specified percentage of its final value
T_{pri}	Backscatter-link pulse-repetition interval (T_{pri} = 1/BLF = TRcal/DR)
T_r or $T_{r,10\text{-}90\%}$	RF signal envelope rise time
T_s	Time for an RF signal to settle to within a specified percentage of its final value
T=>R	Tag-to-Interrogator
TRcal	Tag-to-Interrogator calibration symbol
x_{fp}	floating-point value
$xxxx_2$	binary notation
$xxxx_h$	hexadecimal notation

5.2 Abbreviated terms

AFI	Application family identifier
AM	Amplitude modulation
ASK	Amplitude shift keying
CEPT	Conference of European Posts and Telecommunications
Ciphertext	Information that is cover-coded
CRC	Cyclic redundancy check
CW	Continuous wave
dBch	Decibels referenced to the integrated power in the reference channel
DSB	Double sideband
DSB-ASK	Double-sideband amplitude-shift keying
EPC	Electronic product code
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
FDM	Frequency-Division Multiplexing
FHSS	Frequency-hopping spread spectrum
Handle	16-bit Tag-authentication number
NSI	Numbering system identifier
PC	Protocol control
PIE	Pulse-interval encoding
Pivot	Decision threshold differentiating an R=>T data-0 symbol from a data-1 symbol
Plaintext	Information that is not cover-coded
ppm	Parts-per-million
PSK	Phase shift keying or phase shift keyed
PR-ASK	Phase-reversal amplitude shift keying
RF	Radio frequency
RFID	Radio-frequency identification
RFU	Reserved for future use
RN16	16-bit random or pseudo-random number
RNG	Random or pseudo-random number generator
ITF	Interrogator talks first (reader talks first)
SSB	Single sideband
SSB-ASK	Single-sideband amplitude-shift keying
TDM	Time-division multiplexing or time-division multiplexed (as appropriate)
Tag ID	Tag-identification or Tag identifier, depending on context
Word	16 bits
UMI	User-memory indicator
XI	XPC_W1 indicator

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XPC	Extended protocol control
XPC_W1	XPC word 1
XPC_W2	XPC word 2
XEB	XPC extension bit

5.3 Notation

This specification uses the following notational conventions:

- States and flags are denoted in bold. Example: **ready**.
- Commands are denoted in italics. Variables are also denoted in italics. Where there might be confusion between commands and variables, this specification will make an explicit statement. Example: *Query*.
- Command parameters are underlined. Example: Pointer.
- For logical negation, labels are preceded by '~'. Example: If **flag** is true, then **~flag** is false.
- The symbol, R=>T, refers to commands or signaling from an Interrogator to a Tag (Reader-to-Tag).
- The symbol, T=>R, refers to commands or signaling from a Tag to an Interrogator (Tag-to-Reader).

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6. Protocol requirements

6.1 Protocol overview

6.1.1 Physical layer

An Interrogator sends information to one or more Tags by modulating an RF carrier using double-sideband amplitude shift keying (DSB-ASK), single-sideband amplitude shift keying (SSB-ASK), or phase-reversal amplitude shift keying (PR-ASK) using a pulse-interval encoding (PIE) format. Tags receive their operating energy from this same modulated RF carrier.

An Interrogator receives information from a Tag by transmitting an unmodulated RF carrier and listening for a backscattered reply. Tags communicate information by backscatter modulating the amplitude and/or phase of the RF carrier. The encoding format, selected in response to Interrogator commands, is either FM0 or Miller-modulated subcarrier. The communications link between Interrogators and Tags is half-duplex, meaning that Tags shall not be required to demodulate Interrogator commands while backscattering. A Tag shall not respond to a mandatory or optional command using full-duplex communications.

6.1.2 Tag-identification layer

An Interrogator manages Tag populations using three basic operations:

a) **Select.** The operation of choosing a Tag population for inventory and access. A *Select* command may be applied successively to select a particular Tag population based on user-specified criteria. This operation is analogous to selecting records from a database.

b) **Inventory.** The operation of identifying Tags. An Interrogator begins an inventory round by transmitting a *Query* command in one of four sessions. One or more Tags may reply. The Interrogator detects a single Tag reply and requests the PC/XPC word(s), EPC, and CRC from the Tag. Inventory comprises multiple commands. An inventory round operates in one and only one session at a time.

c) **Access.** The operation of communicating with (reading from and/or writing to) a Tag. An individual Tag must be uniquely identified prior to access. Access comprises multiple commands, some of which employ one-time-pad based cover-coding of the R=>T link.

6.2 Protocol parameters

6.2.1 Signaling – Physical and media access control (MAC) parameters

Table 6.1 and Table 6.2 provide an overview of parameters for R=>T and T=>R communications according to this specification; for detailed requirements refer to the referenced Subclause. For those parameters that do not apply to or are not used in this specification, the notation “N/A” shall indicate that the parameter is “Not Applicable”.

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Table 6.1 – Interrogator-to-Tag (R=>T) communications

Ref.	Parameter Name	Description	Subclause
Int:1	Operating Frequency Range	860 – 960 MHz, as required by local regulations	6.3.1.1
Int:1a	Default Operating Frequency	Determined by local radio regulations and by the radio-frequency environment at the time of the communication	6.3.1.1
Int:1b	Operating Channels (spread-spectrum systems)	In accordance with local regulations; if the channelization is unregulated, then as specified	6.3.1.2.10, Annex G
Int:1c	Operating Frequency Accuracy	As specified	6.3.1.2.1
Int:1d	Frequency Hop Rate (frequency-hopping [FHSS] systems)	In accordance with local regulations	6.3.1.2.9
Int:1e	Frequency Hop Sequence (frequency-hopping [FHSS] systems)	In accordance with local regulations	6.3.1.2.9
Int:2	Occupied Channel Bandwidth	In accordance with local regulations	N/A
Int:2a	Minimum Receiver Bandwidth	In accordance with local regulations	N/A
Int:3	Interrogator Transmit Maximum EIRP	In accordance with local regulations	N/A
Int:4	Interrogator Transmit Spurious Emissions	As specified; tighter emission limits may be imposed by local regulations	6.3.1.2.11
Int:4a	Interrogator Transmit Spurious Emissions, In-Band (spread-spectrum systems)	As specified; tighter emission limits may be imposed by local regulations	6.3.1.2.11
Int:4b	Interrogator Transmit Spurious Emissions, Out-of-Band	As specified; tighter emission limits may be imposed by local regulations	6.3.1.2.11
Int:5	Interrogator Transmitter Spectrum Mask	As specified; tighter emission limits may be imposed by local regulations	Figure 6.6, Figure 6.7
Int:6	Timing	As specified	6.3.1.6, Figure 6.16, Table 6.13
Int:6a	Transmit-to-Receive Turn-Around Time	MAX(RTcal,$10T_{pri}$) nominal	6.3.1.6, Figure 6.16, Table 6.13
Int:6b	Receive-to-Transmit Turn-Around Time	$3T_{pri}$ minimum; $20T_{pri}$ maximum when Tag is in **reply** & **acknowledged** states; no limit otherwise	6.3.1.6, Figure 6.16, Table 6.13
Int:6c	Dwell Time or Interrogator Transmit Power-On Ramp	1500 µs, maximum settling time	6.3.1.2.6, Figure 6.3, Table 6.6
Int:6d	Decay Time or Interrogator Transmit Power-Down Ramp	500 µs, maximum	6.3.1.2.7 Figure 6.3, Table 6.7
Int:7	Modulation	DSB-ASK, SSB-ASK, or PR-ASK	6.3.1.2.2
Int:7a	Spreading Sequence (direct-sequence [DSSS] systems)	N/A	N/A
Int:7b	Chip Rate (spread-spectrum systems)	N/A	N/A
Int:7c	Chip Rate Accuracy (spread-spectrum systems)	N/A	N/A
Int:7d	Modulation Depth	90% nominal	6.3.1.2.5, Figure 6.2, Table 6.5
Int:7e	Duty Cycle	48% – 82.3% (time the waveform is high)	6.3.1.2.3, Figure 6.1, Table 6.5
Int:7f	FM Deviation	N/A	N/A
Int:8	Data Coding	PIE	6.3.1.2.3, Figure 6.1
Int:9	Bit Rate	26.7 kbps to 128 kbps (assuming equiprobable data)	6.3.1.2.4
Int:9a	Bit Rate Accuracy	+/– 1%, minimum	6.3.1.2.4
Int:10	Interrogator Transmit Modulation Accuracy	As specified	6.3.1.2.4

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Ref.	Parameter Name	Description	Subclause
Int:11	Preamble	Required	6.3.1.2.8
Int:11a	Preamble Length	As specified	6.3.1.2.8
Int:11b	Preamble Waveform(s)	As specified	Figure 6.4
Int:11c	Bit Sync Sequence	None	N/A
Int:11d	Frame Sync Sequence	Required	6.3.1.2.8, Figure 6.4
Int:12	Scrambling (spread-spectrum systems)	N/A	N/A
Int:13	Bit Transmission Order	MSB is transmitted first	6.3.1.4
Int:14	Wake-up Process	As specified	6.3.1.3.4
Int:15	Polarization	Not specified	N/A

Table 6.2 – Tag-to-Interrogator (T=>R) communications

Ref.	Parameter Name	Description	Subclause
Tag:1	Operating Frequency Range	860 – 960 MHz, inclusive	6.3.1.1
Tag:1a	Default Operating Frequency	Tags respond to Interrogator signals that satisfy Int:1a	6.3.1.1
Tag:1b	Operating Channels (spread-spectrum systems)	Tags respond to Interrogator signals that satisfy Int:1b	6.3.1.2.10
Tag:1c	Operating Frequency Accuracy	As specified	6.3.1.3.3 Table 6.9
Tag:1d	Frequency Hop Rate (frequency-hopping [FHSS] systems)	Tags respond to Interrogator signals that satisfy Int:1d	6.3.1.2.9
Tag:1e	Frequency Hop Sequence (frequency-hopping [FHSS] systems)	Tags respond to Interrogator signals that satisfy Int:1e	6.3.1.2.9
Tag:2	Occupied Channel Bandwidth	In accordance with local regulations	N/A
Tag:3	Transmit Maximum EIRP	In accordance with local regulations	N/A
Tag:4	Transmit Spurious Emissions	In accordance with local regulations	N/A
Tag:4a	Transmit Spurious Emissions, In-Band (spread-spectrum systems)	In accordance with local regulations	N/A
Tag:4b	Transmit Spurious Emissions, Out-of-Band	In accordance with local regulations	N/A
Tag:5	Transmit Spectrum Mask	In accordance with local regulations	N/A
Tag:6a	Transmit-to-Receive Turn-Around Time	$3T_{pri}$ minimum, $32T_{pri}$ maximum in **reply** & **acknowledged** states; no limit otherwise	6.3.1.6, Figure 6.16, Table 6.13
Tag:6b	Receive-to-Transmit Turn-Around Time	MAX(RTcal, $10T_{pri}$) nominal	6.3.1.6, Figure 6.16, Table 6.13
Tag:6c	Dwell Time or Transmit Power-On Ramp	Receive commands 1.5 ms after power-up	6.3.1.3.4
Tag:6d	Decay Time or Transmit Power-Down Ramp	N/A	N/A

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Ref.	Parameter Name	Description	Subclause
Tag:7	Modulation	ASK and/or PSK modulation (selected by Tag)	6.3.1.3.1
Tag:7a	Spreading Sequence (direct sequence [DSSS] systems)	N/A	N/A
Tag:7b	Chip Rate (spread-spectrum systems)	N/A	N/A
Tag:7c	Chip Rate Accuracy (spread-spectrum systems)	N/A	N/A
Tag:7d	On-Off Ratio	Not specified	N/A
Tag:7e	Subcarrier Frequency	40 kHz to 640 kHz	6.3.1.3.3 Table 6.9
Tag:7f	Subcarrier Frequency Accuracy	As specified	Table 6.9
Tag:7g	Subcarrier Modulation	Miller, at the data rate	6.3.1.3.2.3, Figure 6.13
Tag:7h	Duty Cycle	FM0: 50%, nominal Subcarrier: 50%, nominal	6.3.1.3.2.1, 6.3.1.3.2.3
Tag:7I	FM Deviation	N/A	N/A
Tag:8	Data Coding	Baseband FM0 or Miller-modulated subcarrier (selected by the Interrogator)	6.3.1.3.2
Tag:9	Bit Rate	FM0: 40 kbps to 640 kbps Subcarrier modulated: 5 kbps to 320 kbps	6.3.1.3.3, Table 6.9, Table 6.10
Tag:9a	Bit Rate Accuracy	Same as Subcarrier Frequency Accuracy; see Tag:7f	6.3.1.3.3, Table 6.9, Table 6.10
Tag:10	Tag Transmit Modulation Accuracy (frequency-hopping [FHSS] systems	N/A	N/A
Tag:11	Preamble	Required	6.3.1.3.2.2, 6.3.1.3.2.4
Tag:11a	Preamble Length	As specified	Figure 6.11, Figure 6.15
Tag:11b	Preamble Waveform	As specified	Figure 6.11, Figure 6.15
Tag:11c	Bit-Sync Sequence	None	N/A
Tag:11d	Frame-Sync Sequence	None	N/A
Tag:12	Scrambling (spread-spectrum systems)	N/A	N/A
Tag:13	Bit Transmission Order	MSB is transmitted first	6.3.1.4
Tag:14	Reserved	Deliberately left blank	N/A
Tag:15	Polarization	Tag dependent; not specified by this document	N/A
Tag:16	Minimum Tag Receiver Bandwidth	Tag dependent; not specified by this document.	N/A

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6.2.2 Logical – Operating procedure parameters

Table 6.3 and Table 6.4 identify and describe parameters used by an Interrogator during the selection, inventory, and access of Tags according to this specification. For those parameters that do not apply to or are not used in this specification, the notation "N/A" shall indicate that the parameter is "Not Applicable".

Table 6.3 – Tag inventory and access parameters

Ref.	Parameter Name	Description	Subclause
P:1	Who Talks First	Interrogator	6.3
P:2	Tag Addressing Capability	As specified	6.3.2.1
P:3	Tag EPC	Contained in Tag memory	6.3.2.1
P:3a	EPC Length	As specified	6.3.2.1.2.2
P:3b	EPC Format	NSI < 100_h: As specified in EPCglobal™ Tag Data Standards, NSI ≥ 100_h: As specified in ISO/IEC 15961	6.3.2.1.2.2 6.3.2.1.2.3 6.3.2.1.2.4
P:4	Read size	Multiples of 16 bits	6.3.2.11.3.2 Table 6.33
P:5	Write Size	Multiples of 16 bits	6.3.2.11.3.3, Table 6.35, 6.3.2.11.3.7, Table 6.46
P:6	Read Transaction Time	Varied with R=>T and T=>R link rate and number of bits being read	6.3.2.11.3.2
P:7	Write Transaction Time	20 ms (maximum) after end of *Write* command	6.3.2.11.3.3, 6.3.2.11.3.7, Figure 6.22
P:8	Error Detection	Interrogator-to-Tag: *Select* command: 16-bit CRC *Query* command: 5-bit CRC Other Inventory commands: Command length Access commands: 16-bit CRC Tag-to-Interrogator: PC/XPC, EPC: 16-bit CRC RN16: None or 16-bit CRC (varies by command) handle: 16-bit CRC All other: 16-bit CRC	6.3.2.11 and its subsections
P:9	Error Correction	None	N/A
P:10	Memory Size	Tag dependent, extensible (size is neither limited nor specified by this document)	N/A
P:11	Command Structure and Extensibility	As specified	Table 6.18

Table 6.4 – Collision management parameters

Ref.	Parameter Name	Description	Subclause
A:1	Type (Probabilistic or Deterministic)	Probabilistic	6.3.2.6
A:2	Linearity	Linear up to 2^{15} Tags in the Interrogator's RF field; above that number, NlogN for Tags with unique EPCs	6.3.2.8
A:3	Tag Inventory Capacity	Unlimited for Tags with unique EPCs	6.3.2.8

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6.3 Description of operating procedure

The operating procedure defines the physical and logical requirements for an Interrogator-talks-first (ITF), random-slotted collision arbitration, RFID system operating in the 860 MHz – 960 MHz frequency range.

6.3.1 Signaling

The signaling interface between an Interrogator and a Tag may be viewed as the physical layer in a layered network communication system. The signaling interface defines frequencies, modulation, data coding, RF envelope, data rates, and other parameters required for RF communications.

6.3.1.1 Operational frequencies

Tags shall receive power from and communicate with Interrogators within the frequency range from 860 MHz to 960 MHz, inclusive. An Interrogator's choice of operational frequency will be determined by local radio regulations and by the local radio-frequency environment. Interrogators certified for operation in dense-Interrogator environments shall support, but are not required to always use, the optional dense-Interrogator mode described in Annex G.

6.3.1.2 Interrogator-to-Tag (R=>T) communications

An Interrogator communicates with one or more Tags by modulating an RF carrier using DSB-ASK, SSB-ASK, or PR-ASK with PIE encoding. Interrogators shall use a fixed modulation format and data rate for the duration of an inventory round, where "inventory round" is defined in 4.1. The Interrogator sets the data rate by means of the preamble that initiates the round.

The high values in Figure 6.1, Figure 6.2, Figure 6.3, Figure 6.4, and Figure 6.5 correspond to emitted CW (i.e. an Interrogator delivering power to the Tag or Tags) whereas the low values correspond to attenuated CW.

6.3.1.2.1 Interrogator frequency accuracy

Interrogators certified for operation in single- or multiple-Interrogator environments shall have a frequency accuracy that meets local regulations.

Interrogators certified for operation in dense-Interrogator environments shall have a frequency accuracy of +/– 10 ppm over the nominal temperature range (–25°C to +40°C) and +/– 20 ppm over the extended temperature range (–40°C to +65°C). Interrogators rated by the manufacturer to have a temperature range wider than nominal but different from extended shall have a frequency accuracy of +/– 10 ppm over the nominal temperature range and +/– 20 ppm to the extent of their rated range. If local regulations specify tighter frequency accuracy then the Interrogator shall meet the local regulations.

6.3.1.2.2 Modulation

Interrogators shall communicate using DSB-ASK, SSB-ASK, or PR-ASK modulation, detailed in Annex H. Tags shall demodulate all three modulation types.

6.3.1.2.3 Data encoding

The R=>T link shall use PIE, shown in Figure 6.1. Tari is the reference time interval for Interrogator-to-Tag signaling, and is the duration of a data-0. High values represent transmitted CW; low values represent attenuated CW.

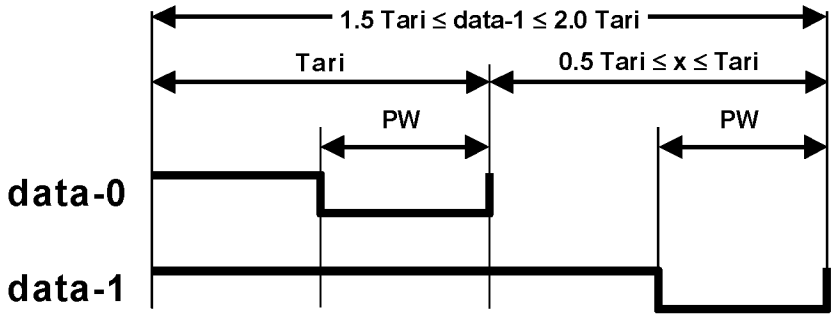


Figure 6.1 – PIE symbols

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Pulse modulation depth, rise time, fall time, and PW shall be as specified in Table 6.5, and shall be the same for a data-0 and a data-1. Interrogators shall use a fixed modulation depth, rise time, fall time, PW, Tari, data-0 length, and data-1 length for the duration of an inventory round. The RF envelope shall be as specified in Figure 6.2.

6.3.1.2.4 Tari values

Interrogators shall communicate using Tari values in the range of 6.25µs to 25µs. Interrogator compliance shall be evaluated using at least one Tari value between 6.25µs and 25µs with at least one value of the parameter *x*. The tolerance on all parameters specified in units of Tari shall be +/–1%. The choice of Tari value and *x* shall be in accordance with local radio regulations.

6.3.1.2.5 R=>T RF envelope

The R=>T RF envelope shall comply with Figure 6.2 and Table 6.5. The electric or magnetic field strength A (as appropriate) is the maximum amplitude of the RF envelope, measured in units of V/m or A/m, respectively. Tari is defined in Figure 6.1. The pulsewidth is measured at the 50% point on the pulse. An Interrogator shall not change the R=>T modulation type (i.e. shall not switch between DSB-ASK, SSB-ASK, or PR-ASK) without first powering down its RF waveform (see 6.3.1.2.7).

6.3.1.2.6 Interrogator power-up waveform

The Interrogator power-up RF envelope shall comply with Figure 6.3 and Table 6.6. Once the carrier level has risen above the 10% level, the power-up envelope shall rise monotonically until at least the ripple limit M_l. The RF envelope shall not fall below the 90% point in Figure 6.3 during interval T_s. Interrogators shall not issue commands before the end of the maximum settling-time interval in Table 6.6 (i.e. before the end of T_s). Interrogators shall meet the frequency-accuracy requirement specified in 6.3.1.2.1 by the end of interval T_s in Figure 6.3.

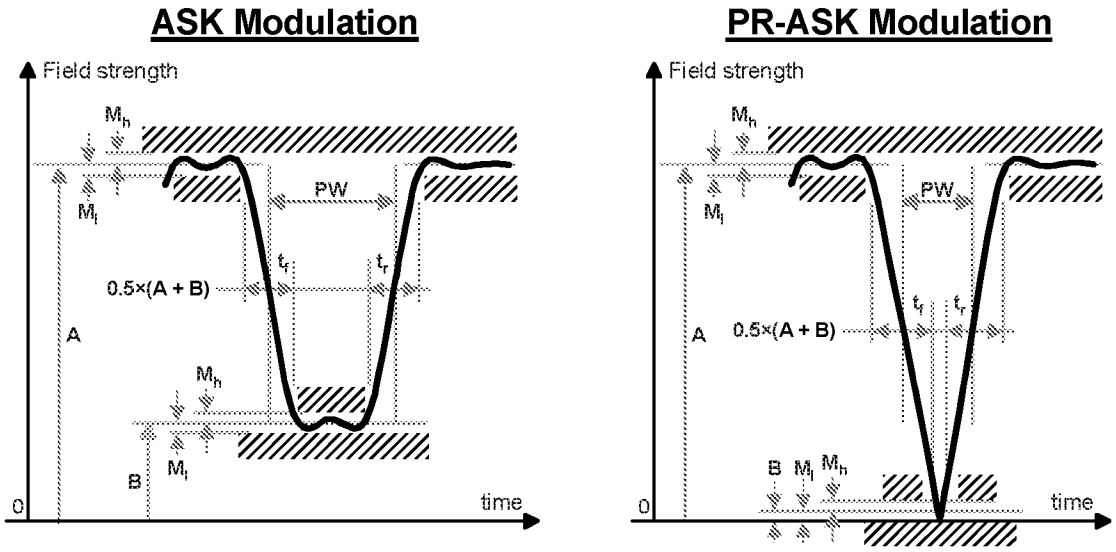


Figure 6.2 – Interrogator-to-Tag RF envelope

Table 6.5 – RF envelope parameters

Tari	Parameter	Symbol	Minimum	Nominal	Maximum	Units
6.25 µs to 25 µs	Modulation Depth	(A–B)/A	80	90	100	%
	RF Envelope Ripple	$M_h = M_l$	0		0.05(A–B)	V/m or A/m
	RF Envelope Rise Time	$t_{r,10–90\%}$	0		0.33Tari	µs
	RF Envelope Fall Time	$t_{f,10–90\%}$	0		0.33Tari	µs
	RF Pulsewidth	PW	MAX(0.265Tari, 2)		0.525Tari	µs

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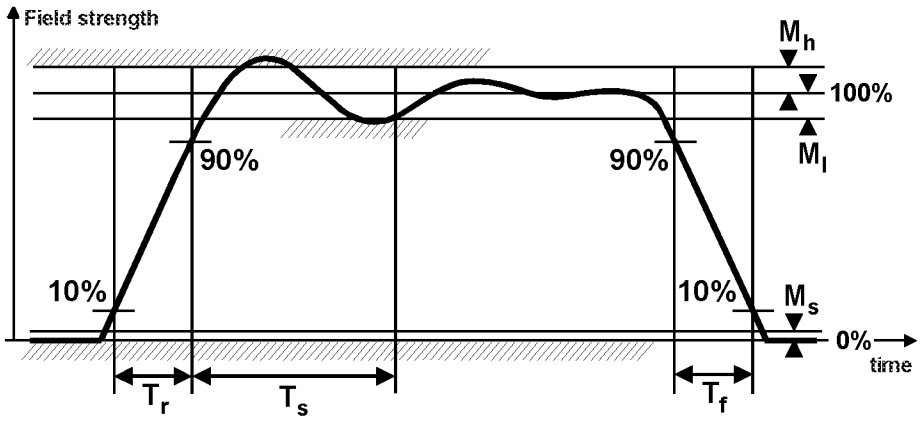


Figure 6.3 – Interrogator power-up and power-down RF envelope

Table 6.6 – Interrogator power-up waveform parameters

Parameter	Definition	Minimum	Nominal	Maximum	Units
T_r	Rise time	1		500	µs
T_s	Settling time			1500	µs
M_s	Signal level when OFF			1	% full scale
M_l	Undershoot			5	% full scale
M_h	Overshoot			5	% full scale

Table 6.7 – Interrogator power-down waveform parameters

Parameter	Definition	Minimum	Nominal	Maximum	Units
T_f	Fall time	1		500	µs
M_s	Signal level when OFF			1	% full scale
M_l	Undershoot			5	% full scale
M_h	Overshoot			5	% full scale

6.3.1.2.7 Interrogator power-down waveform

The Interrogator power-down RF envelope shall comply with Figure 6.3 and Table 6.7. Once the carrier level has fallen below the 90% level, the power-down envelope shall fall monotonically until the power-off limit M_s. Once powered off, an Interrogator shall remain powered off for a least 1ms before powering up again.

6.3.1.2.8 R=>T preamble and frame-sync

An Interrogator shall begin all R=>T signaling with either a preamble or a frame-sync, both of which are shown in Figure 6.4. A preamble shall precede a *Query* command (see 6.3.2.11.2.1) and denotes the start of an inventory round. All other signaling shall begin with a frame-sync. The tolerance on all parameters specified in units of Tari shall be +/–1%. PW shall be as specified in Table 6.5. The RF envelope shall be as specified in Figure 6.2.

A preamble shall comprise a fixed-length start delimiter, a data-0 symbol, an R=>T calibration (RTcal) symbol, and a T=>R calibration (TRcal) symbol.

- **RTcal:** An Interrogator shall set RTcal equal to the length of a data-0 symbol plus the length of a data-1 symbol (RTcal = 0_{length} + 1_{length}). A Tag shall measure the length of RTcal and compute *pivot* = RTcal / 2. A Tag shall interpret subsequent Interrogator symbols shorter than *pivot* to be data-0s, and subsequent Interrogator symbols longer than *pivot* to be data-1s. A Tag shall interpret symbols longer than 4 RTcal to be invalid. Prior to changing RTcal, an Interrogator shall transmit CW for a minimum of 8 RTcal.

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- **TRcal:** An Interrogator shall specify a Tag's backscatter link frequency (its FM0 datarate or the frequency of its Miller subcarrier) using the TRcal and divide ratio (DR) in the preamble and payload, respectively, of a *Query* command that initiates an inventory round. Equation (1) specifies the relationship between the backscatter link frequency (BLF), TRcal, and DR. A Tag shall measure the length of TRcal, compute BLF, and adjust its T=>R link rate to be equal to BLF (Table 6.9 shows BLF values and tolerances). The TRcal and RTcal that an Interrogator uses in any inventory round shall meet the constraints in Equation (2):

$$BLF = \frac{DR}{TRcal} \quad (1)$$

$$1.1 \times RTcal \leq TRcal \leq 3 \times RTcal \quad (2)$$

A frame-sync is identical to a preamble, minus the TRcal symbol. An Interrogator, for the duration of an inventory round, shall use the same length RTcal in a frame-sync as it used in the preamble that initiated the round.

6.3.1.2.9 Frequency-hopping spread-spectrum waveform

When an Interrogator uses frequency-hopping spread spectrum (FHSS) signaling, the Interrogator's RF envelope shall comply with Figure 6.5 and Table 6.8. The RF envelope shall not fall below the 90% point in Figure 6.5 during interval T_{hs}. Interrogators shall not issue commands before the end of the maximum settling-time interval in Table 6.8 (i.e. before the end of T_{hs}). The maximum time between frequency hops and the minimum RF-off time during a hop shall meet local regulatory requirements. Interrogators shall meet the frequency-accuracy requirement specified in 6.3.1.2.1 by the end of interval T_{hs} in Figure 6.5.

6.3.1.2.10 Frequency-hopping spread-spectrum channelization

Interrogators certified for operation in single-Interrogator environments shall meet local regulations for spread-spectrum channelization. Interrogators certified for operation in multiple- or dense-Interrogator environments shall meet local regulations for spread-spectrum channelization, unless the channelization is unregulated, in which case Interrogators shall adopt the channel plan at www.epcglobalinc.org/regulatorychannelplans for the chosen regulatory region (see also Annex G, which describes multiple- and dense-Interrogator channelized signaling).

6.3.1.2.11 Transmit mask

Interrogators certified for operation according to this protocol shall meet local regulations for out-of-channel and out-of-band spurious radio-frequency emissions.

Interrogators certified for operation in multiple-Interrogator environments, in addition to meeting local regulations, shall also meet the Multiple-Interrogator Transmit Mask defined in this specification:

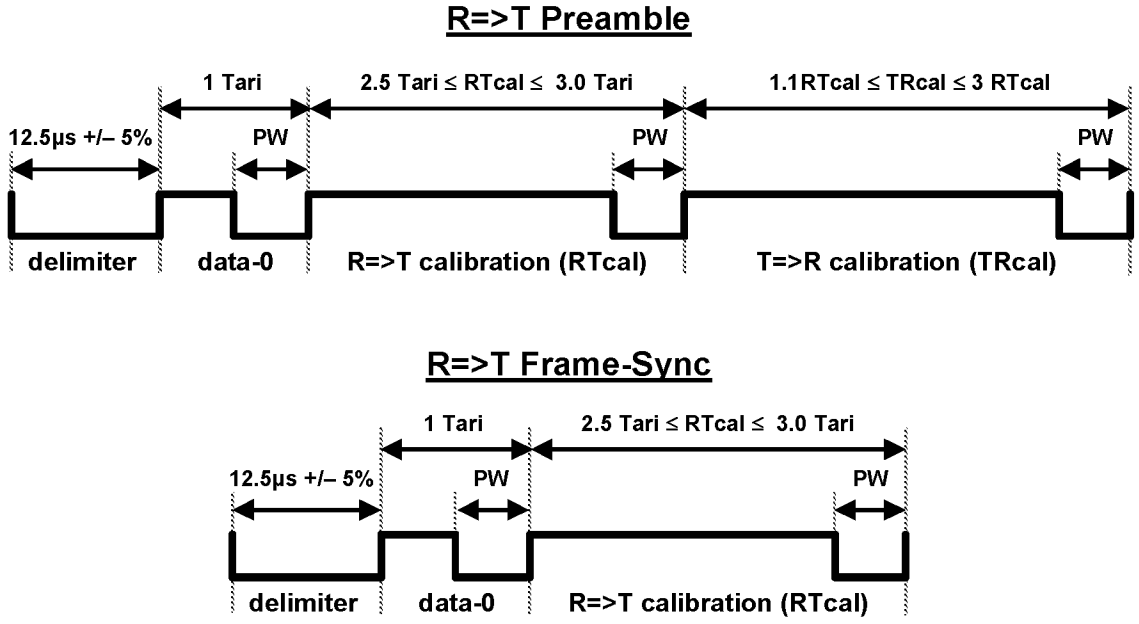


Figure 6.4 – R=>T preamble and frame-sync

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Multiple-Interrogator Transmit Mask: For an Interrogator transmitting random data in channel *R*, and any other channel $S \neq R$, the ratio of the integrated power *P*() in channel *S* to that in channel *R* shall not exceed the specified values:

- $|R - S| = 1$: $10\log_{10}(P(S) / P(R)) < -20$ dB
- $|R - S| = 2$: $10\log_{10}(P(S) / P(R)) < -50$ dB
- $|R - S| = 3$: $10\log_{10}(P(S) / P(R)) < -60$ dB
- $|R - S| > 3$: $10\log_{10}(P(S) / P(R)) < -65$ dB

Where *P*() denotes the total integrated power in the specified channel. This mask is shown graphically in Figure 6.6, with dBch defined as dB referenced to the integrated power in the reference channel. The channel width shall be as specified by local regulations, unless the width is unregulated, in which case Interrogators shall adopt the width shown at www.epcglobalinc.org/regulatorychannelplans for the chosen regulatory region. The channel spacing shall be set equal to the channel width (measured channel center to channel center). For any transmit channel *R*, two exceptions to the mask are permitted, provided that

- neither exception exceeds –50 dBch, and
- neither exception exceeds local regulatory requirements.

An exception occurs when the integrated power in a channel *S* exceeds the mask. Each channel that exceeds the mask shall be counted as an exception.

Interrogators certified for operation in dense-Interrogator environments shall meet both local regulations and the Transmit Mask shown in Figure 6.6 of this specification, except when operating in the optional dense-Interrogator mode described in Annex G, in which case they shall instead meet the Dense-Interrogator Transmit Mask described below and shown in Figure 6.7. Interrogators may meet the Dense-Interrogator Transmit Mask during non-dense-Interrogator operation. Regardless of the mask used, Interrogators certified for operation in dense-Interrogator environments shall not be permitted the two exceptions to the transmit mask that are allowed for Interrogators certified for operation in multiple-Interrogator environments.

Dense-Interrogator Transmit Mask: For Interrogator transmissions centered at a frequency f_c, a 2.5/Tari bandwidth R_{BW} also centered at f_c, an offset frequency f_o = 2.5/Tari, and a 2.5/Tari bandwidth S_{BW} centered at

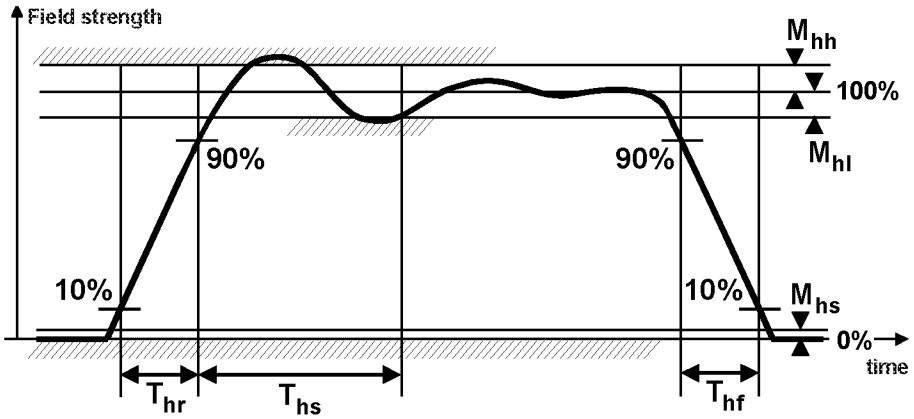


Figure 6.5 – FHSS Interrogator RF envelope

Table 6.8 – FHSS waveform parameters

Parameter	Definition	Minimum	Nominal	Maximum	Units
T_{hr}	Rise time			500	µs
T_{hs}	Settling time			1500	µs
T_{hf}	Fall time			500	µs
M_{hs}	Signal level during hop			1	% full scale
M_{hl}	Undershoot			5	% full scale
M_{hh}	Overshoot			5	% full scale

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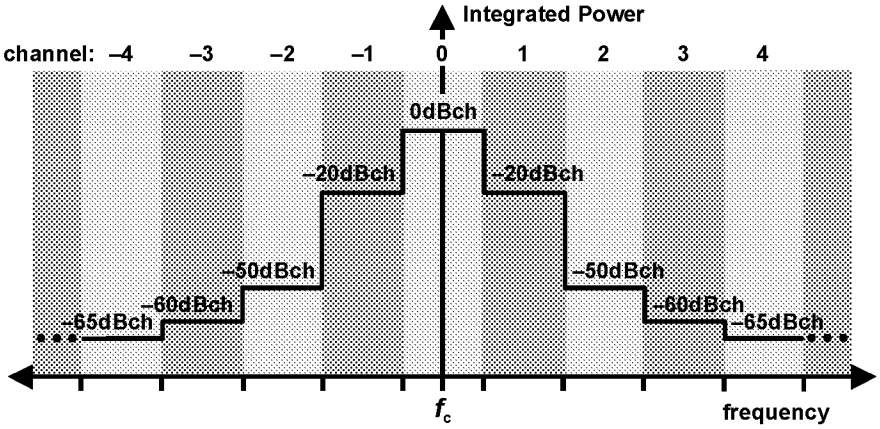


Figure 6.6 – Transmit mask for multiple-Interrogator environments

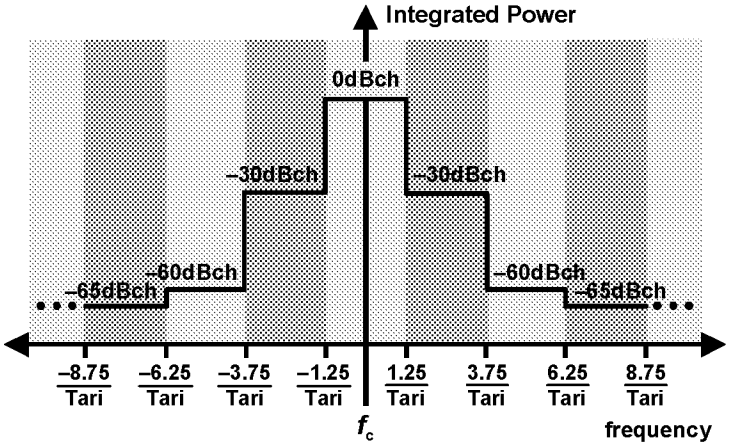


Figure 6.7 – Transmit mask for dense-Interrogator environments

($n \times f_o$) + f_c (integer n), the ratio of the integrated power $P()$ in S_{BW} to that in R_{BW} with the Interrogator transmitting random data shall not exceed the specified values:

- $|n| = 1$: $10\log_{10}(P(S_{BW}) / P(R_{BW})) < -30$ dB
- $|n| = 2$: $10\log_{10}(P(S_{BW}) / P(R_{BW})) < -60$ dB
- $|n| > 2$: $10\log_{10}(P(S_{BW}) / P(R_{BW})) < -65$ dB

Where $P()$ denotes the total integrated power in the 2.5/Tari reference bandwidth. This mask is shown graphically in Figure 6.7, with dBch defined as dB referenced to the integrated power in the reference channel.

6.3.1.3 Tag-to-Interrogator (T=>R) communications

A Tag communicates with an Interrogator using backscatter modulation, in which the Tag switches the reflection coefficient of its antenna between two states in accordance with the data being sent.

A Tag shall backscatter using a fixed modulation format, data encoding, and data rate for the duration of an inventory round, where "inventory round" is defined in 4.1. The Tag selects the modulation format; the Interrogator selects the encoding and data rate by means of the *Query* command that initiates the round. The low values in Figure 6.9, Figure 6.10, Figure 6.11, Figure 6.13, Figure 6.14, and Figure 6.15 correspond to the antenna-reflectivity state the Tag exhibits during the CW period prior to a T=>R preamble (e.g. ASK Tag absorbing power), whereas the high values correspond to the antenna-reflectivity state the Tag exhibits during the first high pulse of a T=>R preamble (e.g. ASK Tag reflecting power).

6.3.1.3.1 Modulation

Tag backscatter shall use ASK and/or PSK modulation. The Tag vendor selects the modulation format. Interrogators shall demodulate both modulation types.

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6.3.1.3.2 Data encoding

Tags shall encode the backscattered data as either FM0 baseband or Miller modulation of a subcarrier at the data rate. The Interrogator commands the encoding choice.

6.3.1.3.2.1 FM0 baseband

Figure 6.8 shows basis functions and a state diagram for generating FM0 (bi-phase space) encoding. FM0 inverts the baseband phase at every symbol boundary; a data-0 has an additional mid-symbol phase inversion. The state diagram in Figure 6.8 maps a logical data sequence to the FM0 basis functions that are transmitted. The state labels, S_1–S_4, indicate four possible FM0-encoded symbols, represented by the two phases of each of the FM0 basis functions. The state labels also represent the FM0 waveform that is transmitted upon entering the state. The labels on the state transitions indicate the logical values of the data sequence to be encoded. For example, a transition from state S_2 to S_3 is disallowed because the resulting transmission would not have a phase inversion on a symbol boundary.

Figure 6.9 shows generated baseband FM0 symbols and sequences. The duty cycle of a 00 or 11 sequence, measured at the modulator output, shall be a minimum of 45% and a maximum of 55%, with a nominal value of 50%. FM0 encoding has memory; consequently, the choice of FM0 sequences in Figure 6.9 depends on prior transmissions. FM0 signaling shall always end with a "dummy" data-1 bit at the end of a transmission, as shown in Figure 6.10.

6.3.1.3.2.2 FM0 preamble

T=>R FM0 signaling shall begin with one of the two preambles shown in Figure 6.11. The choice depends on the value of the TRext bit specified in the *Query* command that initiated the inventory round, unless a Tag is replying to a command that writes to memory, in which case a Tag shall use the extended preamble regardless of TRext (i.e. the Tag replies as if TRext=1 regardless of the TRext value specified in the *Query*—see 6.3.2.11.3). The "v" shown in Figure 6.11 indicates an FM0 violation (i.e. a phase inversion should have occurred but did not).

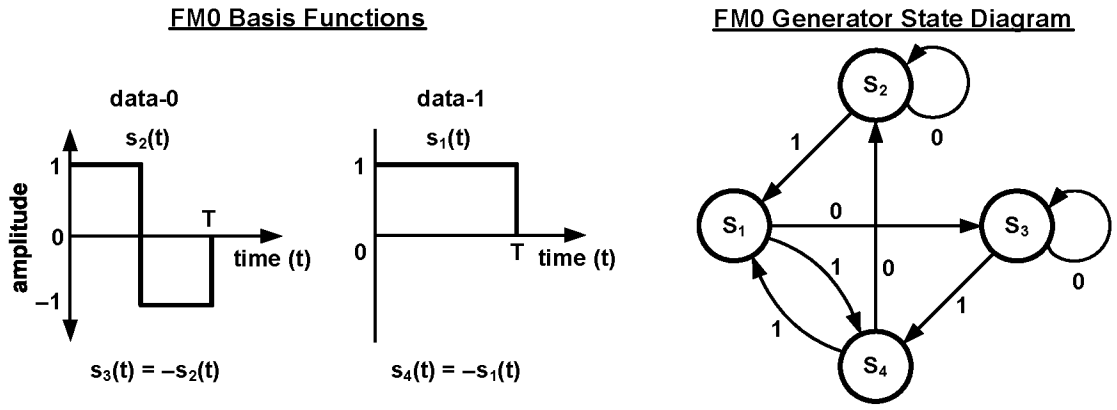


Figure 6.8 – FM0 basis functions and generator state diagram

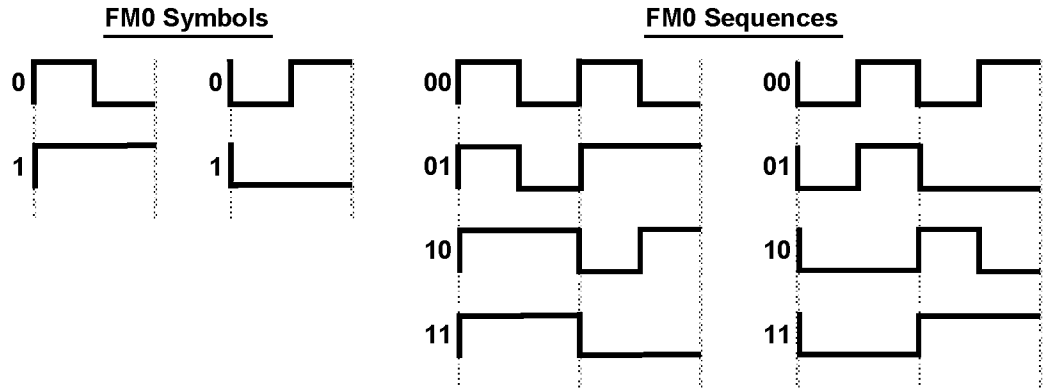


Figure 6.9 – FM0 symbols and sequences

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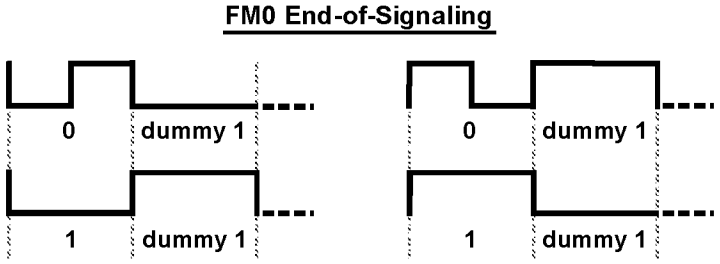


Figure 6.10 – Terminating FM0 transmissions

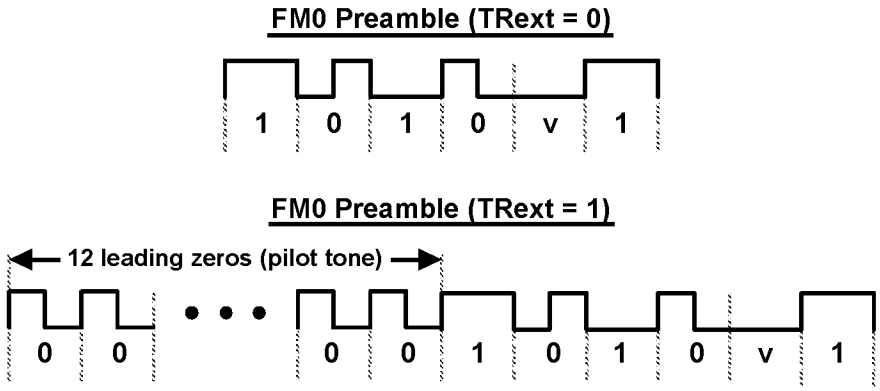


Figure 6.11 – FM0 T=>R preamble

6.3.1.3.2.3 Miller-modulated subcarrier

Figure 6.12 shows basis functions and a state diagram for generating Miller encoding. Baseband Miller inverts its phase between two data-0s in sequence. Baseband Miller also places a phase inversion in the middle of a data-1 symbol. The state diagram in Figure 6.12 maps a logical data sequence to baseband Miller basis functions. The state labels, S_1–S_4, indicate four possible Miller-encoded symbols, represented by the two phases of each of the Miller basis functions. The state labels also represent the baseband Miller waveform that is generated upon entering the state. The transmitted waveform is the baseband waveform multiplied by a square-wave at M times the symbol rate. The labels on the state transitions indicate the logical values of the data sequence to be encoded. For example, a transition from state S_1 to S_3 is disallowed because the resulting transmission would have a phase inversion on a symbol boundary between a data-0 and a data-1.

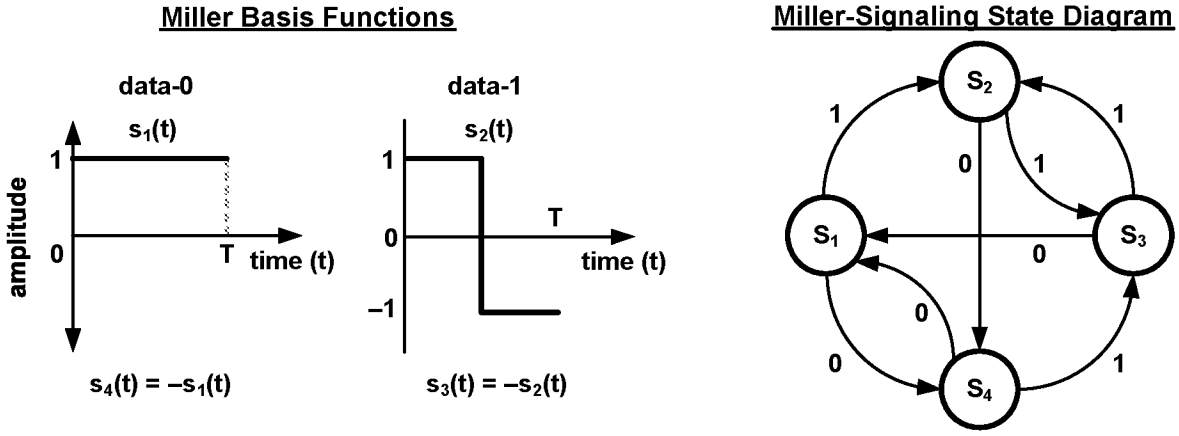


Figure 6.12 – Miller basis functions and generator state diagram

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Figure 6.13 shows Miller-modulated subcarrier sequences; the Miller sequence shall contain exactly two, four, or eight subcarrier cycles per bit, depending on the M value specified in the *Query* command that initiated the inventory round (see Table 6.10). The duty cycle of a 0 or 1 symbol, measured at the modulator output, shall be a minimum of 45% and a maximum of 55%, with a nominal value of 50%. Miller encoding has memory; consequently, the choice of Miller sequences in Figure 6.13 depends on prior transmissions. Miller signaling shall always end with a "dummy" data-1 bit at the end of a transmission, as shown in Figure 6.14.

6.3.1.3.2.4 Miller subcarrier preamble

T=>R subcarrier signaling shall begin with one of the two preambles shown in Figure 6.15. The choice depends on the value of the TRext bit specified in the *Query* command that initiated the inventory round, unless a Tag is replying to a command that writes to memory, in which case a Tag shall use the extended preamble regardless of TRext (i.e. the Tag replies as if TRext=1 regardless of the TRext value specified in the *Query*—see 6.3.2.11.3).

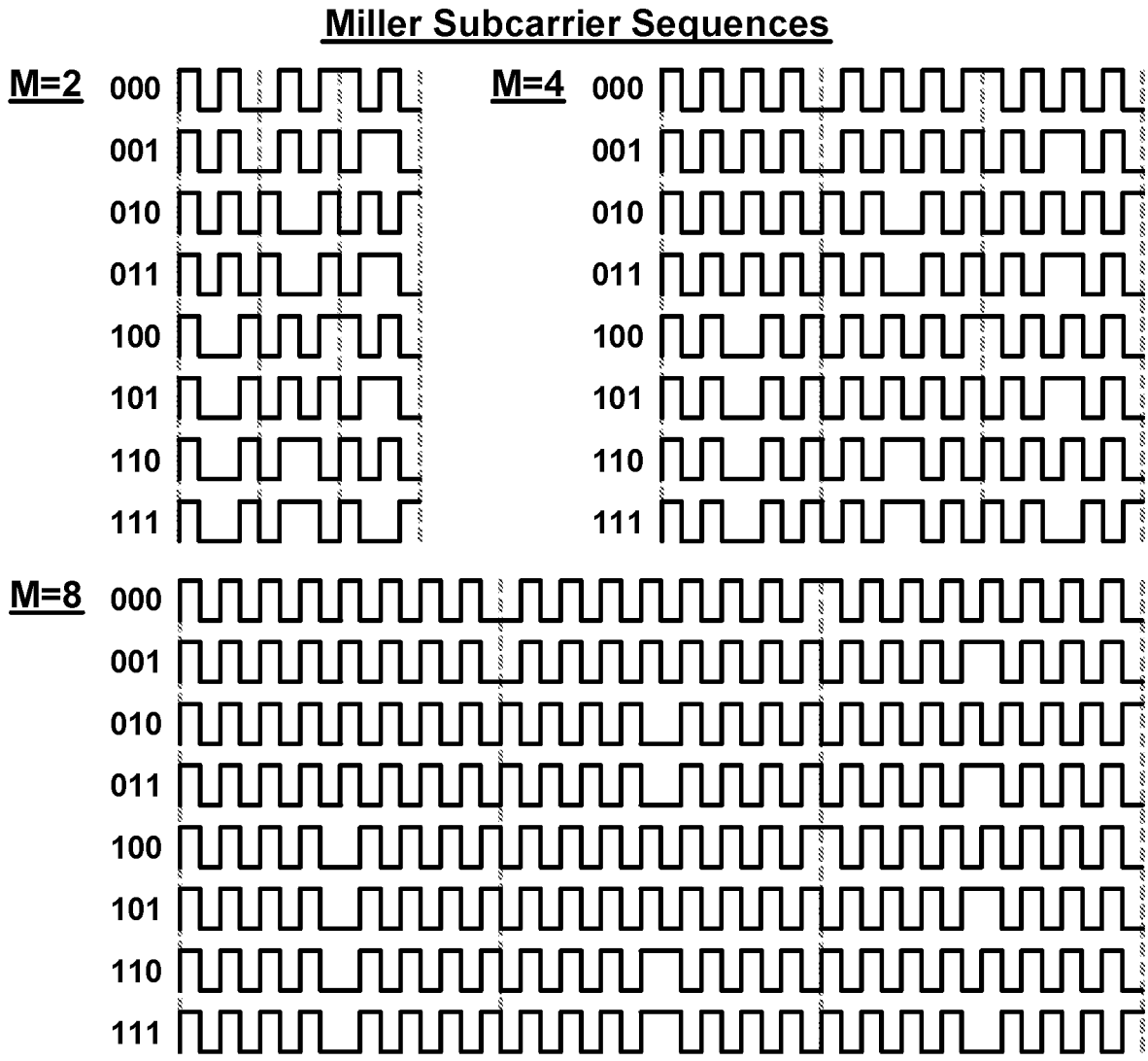


Figure 6.13 – Subcarrier sequences

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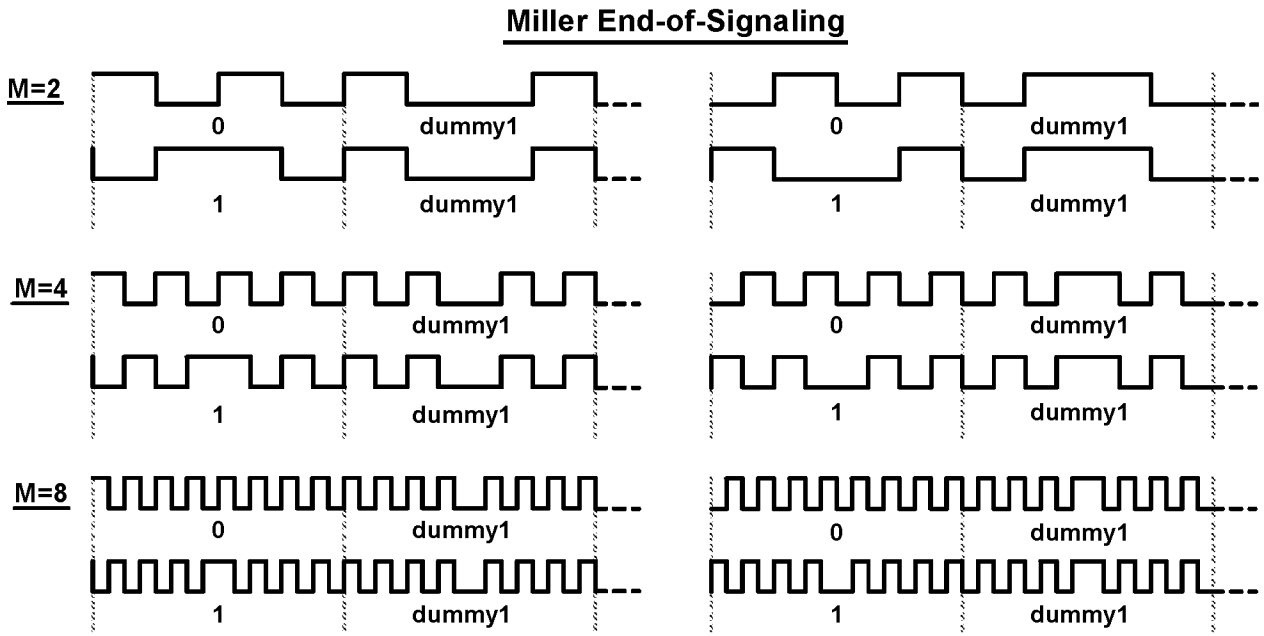


Figure 6.14 – Terminating subcarrier transmissions

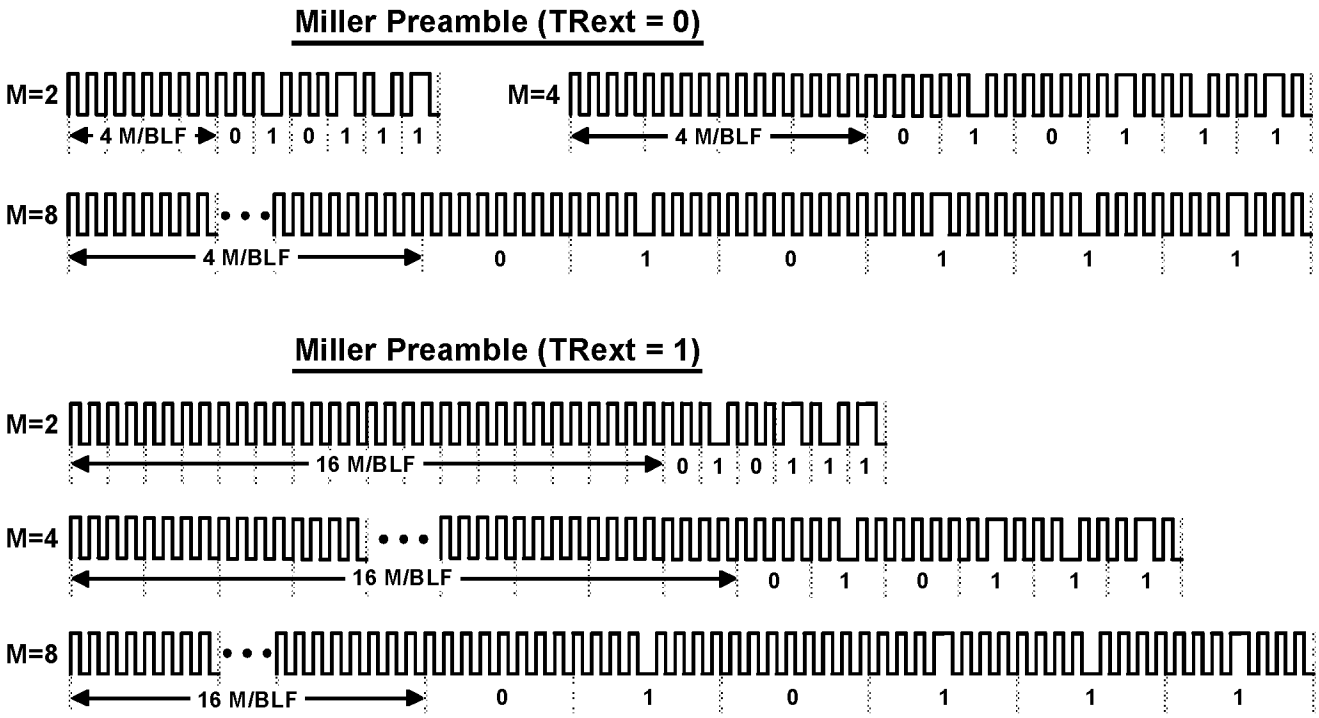


Figure 6.15 – Subcarrier T=>R preamble

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6.3.1.3.3 Tag supported Tari values and backscatter link rates

Tags shall support all R=>T Tari values in the range of 6.25μs to 25μs, over all parameters allowed by 6.3.1.2.3.

Tags shall support the T=>R link frequencies and tolerances specified in Table 6.9 and the T=>R data rates specified in Table 6.10. The frequency-variation requirement in Table 6.9 includes both frequency drift and short-term frequency variation during Tag response to an Interrogator command. The *Query* command that initiates an inventory round specifies DR in Table 6.9 and M in Table 6.10; the preamble that precedes the *Query* specifies TRcal. BLF is computed using Eq. (1). These four parameters together define the backscatter frequency, modulation type (FM0 or Miller), and T=>R data rate for the round (see also 6.3.1.2.8).

6.3.1.3.4 Tag power-up timing

Tags energized by an Interrogator shall be capable of receiving and acting on Interrogator commands within a period not exceeding the maximum settling-time interval specified in Table 6.6 or Table 6.8, as appropriate (i.e. by the end of T_s or T_{hs}, respectively).

6.3.1.3.5 Minimum operating field strength and backscatter strength

For a Tag certified to this protocol, the Tag manufacturer shall specify:

1. free-space sensitivity,

Table 6.9 – Tag-to-Interrogator link frequencies

DR: Divide Ratio	TRcal[1] (μs +/– 1%)	BLF: Link Frequency (kHz)	Frequency Tolerance FT (nominal temp)	Frequency Tolerance FT (extended temp)	Frequency variation during backscatter
64/3	33.3	640	+ / – 15%	+ / – 15%	+ / – 2.5%
	33.3 < TRcal < 66.7	320 < BLF < 640	+ / – 22%	+ / – 22%	+ / – 2.5%
	66.7	320	+ / – 10%	+ / – 15%	+ / – 2.5%
	66.7 < TRcal < 83.3	256 < BLF < 320	+ / – 12%	+ / – 15%	+ / – 2.5%
	83.3	256	+ / – 10%	+ / – 10%	+ / – 2.5%
	83.3 < TRcal ≤ 133.3	160 ≤ BLF < 256	+ / – 10%	+ / – 12%	+ / – 2.5%
	133.3 < TRcal ≤ 200	107 ≤ BLF < 160	+ / – 7%	+ / – 7%	+ / – 2.5%
	200 < TRcal ≤ 225	95 ≤ BLF < 107	+ / – 5%	+ / – 5%	+ / – 2.5%
8	17.2 ≤ TRcal < 25	320 < BLF ≤ 465	+ / – 19%	+ / – 19%	+ / – 2.5%
	25	320	+ / – 10%	+ / – 15%	+ / – 2.5%
	25 < TRcal < 31.25	256 < BLF < 320	+ / – 12%	+ / – 15%	+ / – 2.5%
	31.25	256	+ / – 10%	+ / – 10%	+ / – 2.5%
	31.25 < TRcal < 50	160 < BLF < 256	+ / – 10%	+ / – 10%	+ / – 2.5%
	50	160	+ / – 7%	+ / – 7%	+ / – 2.5%
	50 < TRcal ≤ 75	107 ≤ BLF < 160	+ / – 7%	+ / – 7%	+ / – 2.5%
	75 < TRcal ≤ 200	40 ≤ BLF < 107	+ / – 4%	+ / – 4%	+ / – 2.5%

Note 1: Allowing two different TRcal values (with two different DR values) to specify the same BLF offers flexibility in specifying Tari and RTcal.

Table 6.10 – Tag-to-Interrogator data rates

M: Number of subcarrier cycles per symbol	Modulation type	Data rate (kbps)
1	FM0 baseband	BLF
2	Miller subcarrier	BLF/2
4	Miller subcarrier	BLF/4
8	Miller subcarrier	BLF/8

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2. minimum backscattered modulated power (ASK modulation) or change in radar cross-section or equivalent (phase modulation), and
3. the manufacturer's normal operating conditions,

for the Tag mounted on one or more manufacturer-selected materials.

6.3.1.4 Transmission order

The transmission order for all R=>T and T=>R communications shall be most-significant bit (MSB) first.

Within each message, the most-significant word shall be transmitted first.

Within each word, the MSB shall be transmitted first.

6.3.1.5 Cyclic-redundancy check (CRC)

A CRC is a cyclic-redundancy check that a Tag uses to ensure the validity of certain R=>T commands, and an Interrogator uses to ensure the validity of certain backscattered T=>R replies. This protocol uses two CRC types: (i) a CRC-16, and (ii) a CRC-5. Annex F describes both CRC types.

To generate a CRC-16 a Tag or Interrogator shall first generate the CRC-16 precursor shown in Table 6.11, and then take the ones-complement of the generated precursor to form the CRC-16.

A Tag or Interrogator shall verify the integrity of a received message that uses a CRC-16. The Tag or Interrogator may use one of the methods described in Annex F to verify the CRC-16.

At power-up, a Tag calculates and saves into memory a 16-bit StoredCRC. During inventory, a Tag may backscatter either this StoredCRC, or a 16-bit PacketCRC that the Tag calculates dynamically. See 6.3.2.1.2.1.

Tags shall append a CRC-16 to those replies that use a CRC-16 — see 6.3.2.11 for command-specific replies.

To generate a CRC-5 an Interrogator shall use the definition in Table 6.12.

A Tag shall verify the integrity of a received message that uses a CRC-5. The Tag may use the method described in Annex F to verify a CRC-5.

Interrogators shall append the appropriate CRC to R=>T transmissions as specified in Table 6.18.

6.3.1.6 Link timing

Figure 6.16 illustrates R=>T and T=>R link timing. The figure (not drawn to scale) defines Interrogator interactions with a Tag population. Table 6.13 shows the timing requirements for Figure 6.16, while 6.3.2.11 describes the commands. Tags and Interrogators shall meet all timing requirements shown in Table 6.13. RTcal is defined in 6.3.1.2.8; T_{pri} is the T=>R link period (T_{pri} = 1 / BLF). As described in 6.3.1.2.8, an Interrogator shall use a fixed R=>T link rate for the duration of an inventory round; prior to changing the R=>T link rate, an Interrogator shall transmit CW for a minimum of 8 RTcal.

Table 6.11 – CRC-16 precursor

CRC-16 precursor				
CRC Type	**Length**	**Polynomial**	**Preset**	**Residue**
ISO/IEC 13239	16 bits	$x^{16} + x^{12} + x^5 + 1$	$FFFF_h$	$1D0F_h$

Table 6.12 – CRC-5 definition. See also Annex F

CRC-5 Definition				
CRC Type	**Length**	**Polynomial**	**Preset**	**Residue**
—	5 bits	$x^5 + x^3 + 1$	01001_2	00000_2

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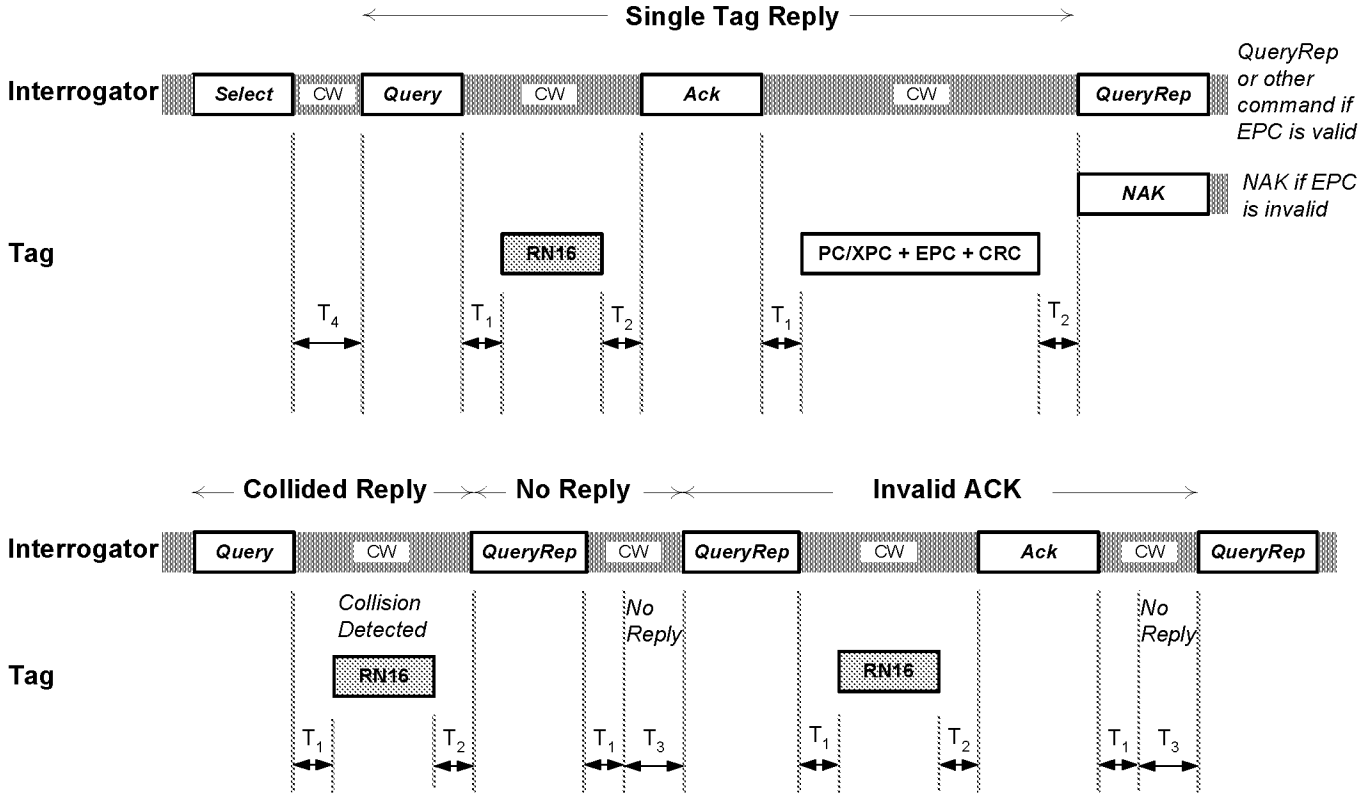


Figure 6.16 – Link timing

Table 6.13 – Link timing parameters

Parameter	Minimum	Nominal	Maximum	Description
T_1	MAX(RTcal,10T_{pri}) × (1 – |FT|) – 2μs	MAX(RTcal,10T_{pri})	MAX(RTcal,10T_{pri}) × (1 + |FT|) + 2μs	Time from Interrogator transmission to Tag response (specifically, the time from the last rising edge of the last bit of the Interrogator transmission to the first rising edge of the Tag response), measured at the Tag's antenna terminals
T_2	3.0T_{pri}		20.0T_{pri}	Interrogator response time required if a Tag is to demodulate the Interrogator signal, measured from the end of the last (dummy) bit of the Tag response to the first falling edge of the Interrogator transmission
T_3	0.0T_{pri}			Time an Interrogator waits, after T_1, before it issues another command
T_4	2.0 RTcal			Minimum time between Interrogator commands

The following items apply to the requirements specified in Table 6.13:

1. T_{pri} denotes either the commanded period of an FM0 symbol or the commanded period of a single subcarrier cycle, as appropriate.
2. A Tag may exceed the maximum value for T_1 when responding to commands that write to memory — see, for example, 6.3.2.11.3.3.
3. The maximum value for T_2 shall apply only to Tags in the **reply** or **acknowledged** states (see 6.3.2.4.3 and 6.3.2.4.4). For a Tag in the **reply** or **acknowledged** states, if T_2 expires (i.e. reaches its maximum value):
   - Without the Tag receiving a valid command, the Tag shall transition to the **arbitrate** state (see 6.3.2.4.2),
   - During the reception of a valid command, the Tag shall execute the command,
   - During the reception of an invalid command, the Tag shall transition to **arbitrate** upon determining that the command is invalid.

   In all other states the maximum value for T_2 shall be unrestricted. A Tag shall be allowed a tolerance of $20.0T_{pri} \leq T_{2(max)} \leq 32T_{pri}$ in determining whether T_2 has expired. "Invalid command" is defined in 6.3.2.11.
4. An Interrogator may transmit a new command prior to interval T_2 (i.e. during a Tag response). In this case the responding Tag is not required to demodulate or otherwise act on the new command, and may undergo a power-on reset.
5. FT is the frequency tolerance specified in Table 6.9
6. T_1+T_3 shall not be less than T_4.

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6.3.2 Tag selection, inventory, and access

Tag selection, inventory, and access may be viewed as the lowest level in the data link layer of a layered network communication system.

6.3.2.1 Tag memory

Tag memory shall be logically separated into four distinct banks, each of which may comprise zero or more memory words. A logical memory map is shown in Figure 6.17. The memory banks are:

Reserved memory shall contain the kill and and/or access passwords, if passwords are implemented on the Tag. The kill password shall be stored at memory addresses 00_h to $1F_h$; the access password shall be stored at memory addresses 20_h to $3F_h$. See 6.3.2.1.1.

EPC memory shall contain a StoredCRC at memory addresses 00_h to $0F_h$, a StoredPC at addresses 10_h to $1F_h$, a code (such as an EPC, and hereafter referred to as an EPC) that identifies the object to which the Tag is or will be attached beginning at address 20_h, and if the Tag implements Extended Protocol Control (XPC) then either one or two XPC word(s) beginning at address 210_h. See 6.3.2.1.2.

TID memory shall contain an 8-bit ISO/IEC 15963 allocation class identifier at memory locations 00_h to 07_h. TID memory shall contain sufficient identifying information above 07_h for an Interrogator to uniquely identify the custom commands and/or optional features that a Tag supports. See 6.3.2.1.3.

User memory is optional. See 6.3.2.1.4.

The logical addressing of all memory banks shall begin at zero (00_h). The physical memory map is vendor-specific. Commands that access memory have a MemBank parameter that selects the bank, and an address parameter, specified using the EBV format described in Annex A, to select a particular memory location within that bank. When Tags backscatter memory contents, this backscatter shall fall on word boundaries (except in the case of a truncated reply – see 6.3.2.11.1.1).

MemBank is defined as follows:

- 00_2 Reserved
- 01_2 EPC
- 10_2 TID
- 11_2 User

Operations in one logical memory bank shall not access memory locations in another bank.

Memory writes, detailed in 6.3.2.9, involve the transfer of 16-bit words from Interrogator to Tag. A *Write* command writes 16 bits (i.e. one word) at a time, using link cover-coding to obscure the data during R=>T transmission. The optional *BlockWrite* command writes one or more 16-bit words at a time, without link cover-coding. The optional *BlockErase* command erases one or more 16-bit words at a time. A *Write*, *BlockWrite*, or *BlockErase* shall not alter a Tag's killed status regardless of the memory address (whether valid or invalid) specified in the command.

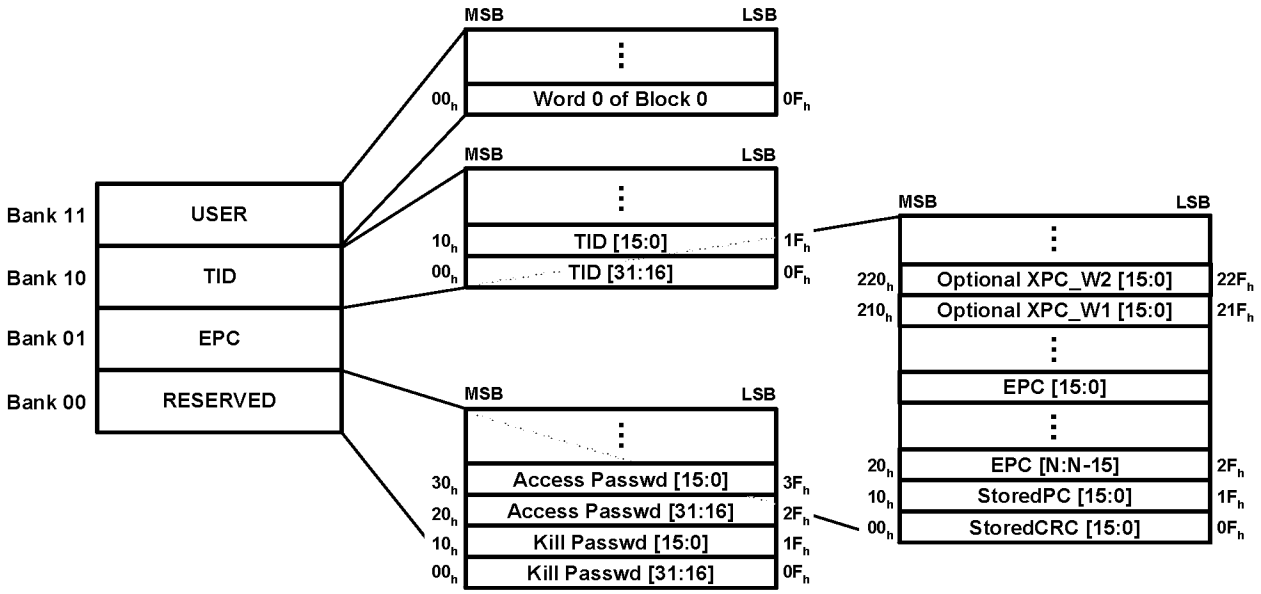


Figure 6.17 – Logical memory map

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Interrogators may lock, permanently lock, unlock, or permanently unlock the kill password, access password, EPC memory, TID memory, and User memory, thereby preventing or allowing subsequent changes (as appropriate). A Tag may optionally have its User memory partitioned into blocks; if it does, then an Interrogator may permanently lock these individual blocks. Recommissioning may alter the memory locking and/or permalocking. See 6.3.2.9 for a description of memory locking and unlocking, and 6.3.2.10 for a description of Tag recommissioning. If the kill and/or access passwords are locked they are usable by only the *Kill* and *Access* commands, respectively, and are rendered both unwriteable and unreadable by any other command. Locking or permanently locking the EPC, TID, or User memory banks, or permanently locking blocks within the User memory bank, renders the locked memory location unwriteable but leaves it readable.

6.3.2.1.1 Reserved Memory

Reserved memory contains the kill (see 6.3.2.1.1.1) and/or access (see 6.3.2.1.1.2) passwords, if passwords are implemented on the Tag. If a Tag does not implement the kill and/or access password(s), the Tag shall logically operate as though it has zero-valued password(s) that are permanently read/write locked (see 6.3.2.11.3.5), and the corresponding physical memory locations in Reserved memory need not exist.

6.3.2.1.1.1 Kill password

The kill password is a 32-bit value stored in Reserved memory 00_h to $1F_h$, MSB first. The default (unprogrammed) value shall be zero. An Interrogator may use the kill password to (1) recommission a Tag, and/or (2) kill a Tag and render it nonresponsive thereafter. A Tag shall not execute a recommissioning or kill operation if its kill password is zero. A Tag that does not implement a kill password operates as if it has a zero-valued kill password that is permanently read/write locked.

6.3.2.1.1.2 Access password

The access password is a 32-bit value stored in Reserved memory 20_h to $3F_h$, MSB first. The default (unprogrammed) value shall be zero. A Tag with a nonzero access password shall require an Interrogator to issue this password before transitioning to the **secured** state. A Tag that does not implement an access password operates as if it has a zero-valued access password that is permanently read/write locked

6.3.2.1.2 EPC Memory

EPC memory contains a StoredCRC at memory addresses 00_h to $0F_h$, a StoredPC at 10_h to $1F_h$, an EPC beginning at 20_h, and if a Tag implements recommissioning then a first XPC word (XPC_W1) at 210_h to $21F_h$ and an optional second XPC word (XPC_W2) at 220_h to $22F_h$. Higher-class Tags may implement an XPC_W1 and an XPC_W2 without implementing recommissioning. The StoredCRC, StoredPC, EPC, and XPC word or words shall be stored MSB first (i.e. the EPC's MSB is stored in location 20_h).

The StoredCRC is described in 6.3.2.1.2.1.

The StoredPC, as described in 6.3.2.1.2.2, is subdivided into an EPC length field in memory locations 10_h to 14_h, a User-memory indicator (UMI) in location 15_h, an XPC_W1 indicator (XI) in location 16_h, and a Numbering System Identifier (NSI) in locations 17_h to $1F_h$.

The EPC is a code that identifies the object to which a Tag is affixed. The EPC for EPCglobal™ Applications is described in 6.3.2.1.2.3; the EPC for non-EPCglobal™ Applications is described in 6.3.2.1.2.4. Interrogators may issue a *Select* command that includes all or part of the EPC in the mask. Interrogators may issue an *ACK* command to cause a Tag to backscatter its EPC. Under certain circumstances the Tag may truncate its backscattered EPC (see 6.3.2.11.1.1). An Interrogator may issue a *Read* command to read all or part of the EPC.

6.3.2.1.2.1 CRC-16 (StoredCRC and PacketCRC)

All Tags shall implement a StoredCRC. Tags that support XPC functionality shall also implement a PacketCRC.

At power-up a Tag shall calculate a CRC-16 over (a) the StoredPC and (b) the EPC specified by the EPC length field in the StoredPC (see 6.3.2.1.2.2) and shall map the calculated CRC-16 into EPC memory 00_h to $0F_h$, MSB first. This CRC is denoted the StoredCRC. Because the StoredPC and EPC comprise an integer number of EPC-memory words, a Tag calculates this StoredCRC on word boundaries. Although Tags include the XI value in the StoredPC in their StoredCRC calculation, regardless of XI value a Tag shall omit XPC_W1 and XPC_W2 from the calculation. A Tag shall finish its StoredCRC calculation and memory mapping by the end of interval T_s or T_{hs} (as appropriate) in Figure 6.3 or Figure 6.5, respectively. Interrogators may issue a *Select* command that includes all or part of the StoredCRC in Mask. Interrogators may issue a *Read* command to instruct a Tag to backscatter its StoredCRC. A Tag shall not recalculate this StoredCRC for a truncated reply (see 6.3.2.11.1.1).

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Table 6.14 – Tag data and CRC-16 backscattered in response to an *ACK* command

XI	XEB	Truncation	Tag Backscatter			
			PC	XPC	EPC	CRC-16
0	0	Deasserted	StoredPC	None	Full	StoredCRC or PacketCRC
0	0	Asserted	00000_2	None	Truncated	StoredCRC
0	1	Deasserted	Invalid[1]			
0	1	Asserted	Invalid[1]			
1	0	Deasserted	PacketPC	XPC_W1	Full	PacketCRC
1	0	Asserted	00000_2	None	Truncated	StoredCRC
1	1	Deasserted	PacketPC	Both XPC_W1 and XPC_W2	Full	PacketCRC
1	1	Asserted	00000_2	None	Truncated	StoredCRC

Note 1: XI is the bitwise logical OR of the 16 bits of XPC_W1, and XEB is the MSB (bit F_h) of XPC_W1, so if XEB=1 then XI=1.

In response to an *ACK* command a Tag backscatters a protocol-control (PC) word (either StoredPC or PacketPC – see 6.3.2.1.2.2), optional XPC word or words (see 6.3.2.1.2.5), EPC (see 6.3.2.1.2.3 and 6.3.2.1.2.4), and a CRC-16 that protects the backscattered data. The CRC-16 shall be either (a) the StoredCRC or, alternatively, (b) a PacketCRC that the Tag shall calculate dynamically over the backscattered PC word, optional XPC word or words, and EPC. Whether a Tag backscatters its StoredCRC or a PacketCRC shall be as defined in Table 6.14, depending on the Tag's XI value and whether truncation (see 6.3.2.11.1.1) is asserted or deasserted.

Tags that do not support XPC functionality may, but are not required to, implement a PacketCRC.

A Tag shall backscatter its CRC MSB first, regardless of the CRC type.

If XI is asserted then a Tag's PacketCRC is different from its StoredCRC.

As required by 6.3.1.5 an Interrogator shall verify, using a Tag's backscattered CRC-16, the integrity of a received PC word, optional XPC word or words, and EPC.

6.3.2.1.2.2 Protocol-control (PC) word (StoredPC and PacketPC)

All Tags shall implement a StoredPC whose fields, comprising EPC length, a UMI, an XI, and an NSI, shall be as defined below. Tags that support XPC functionality shall also implement a PacketPC that differs from the StoredPC in its EPC length field. The type of PC (StoredPC or PacketPC) that a Tag backscatters in response to an *ACK* shall be as defined in Table 6.14.

The StoredPC shall be located in EPC memory at addresses 10_h to $1F_h$, with bit values defined as follows:

- Bits 10_h – 14_h: EPC length field. The length of the EPC, in words:
  - 00000_2: Zero words.
  - 00001_2: One word (addresses 20_h to $2F_h$ in EPC memory).
  - 00010_2: Two words (addresses 20_h to $3F_h$ in EPC memory).
    - •
    - •
    - •
  - 11111_2: 31 words (addresses 20_h to $20F_h$ in EPC memory).

  If a Tag does not support XPC functionality then the maximum value of the EPC length field in the StoredPC shall be 11111_2 (allows a 496-bit EPC), as shown above. If a Tag supports XPC functionality then the maximum value of the EPC length field in the StoredPC shall be 11101_2 (allows a 464-bit EPC). A Tag that supports XPC functionality shall ignore a *Write* or *BlockWrite* command to the StoredPC if the EPC length field exceeds 11101_2, and shall instead backscatter an error code (see Annex I).

- Bit 15_h: A User-memory indicator (UMI). If bit 15_h is deasserted then the Tag either does not implement User memory or User memory contains no information. If bit 15_h is asserted then User memory contains information. A Tag may implement the UMI using Method 1 or Method 2 described below, unless the Tag implements block permalocking and/or recommissioning, in which case the Tag shall use Method 1.

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- Method 1: The Tag computes the UMI. At power-up, and prior to calculating its StoredCRC (see 6.3.2.1.2.1), a Tag shall compute the logical OR of bits 03_h to 07_h of User memory and map the computed value into bit 15_h. A Tag shall use this computed UMI value in its StoredCRC calculation. If an Interrogator modifies any of bits 03_h to 07_h of User memory then the Tag shall recompute and remap its UMI into bit 15_h. If recommissioning renders User memory inaccessible (see 6.3.2.10) then the Tag shall deassert and remap its UMI into bit 15_h. After remapping the UMI the StoredCRC may be incorrect until the Interrogator power cycles the Tag. The UMI shall not be directly writeable by an Interrogator — when an Interrogator writes the StoredPC the Tag shall ignore the data value that the Interrogator provides for bit 15_h.
- Method 2: An Interrogator writes the UMI. If an Interrogator writes a zero value into bits 03_h to 07_h of User memory then the Interrogator shall deassert bit 15_h. If an Interrogator writes a nonzero value into 03_h to 07_h of User memory then the Interrogator shall assert bit 15_h. If an Interrogator locks or permalocks EPC memory then the Interrogator shall also lock or permalock, respectively, the word located at address 00_h of User memory, and vice versa. This latter requirement ensures that a condition in which User memory previously contained data but was subsequently erased does not cause a Tag to wrongly indicate the presence of User memory, and vice versa.

- Bit 16_h: An XPC_W1 indicator (XI). If bit 16_h is deasserted then the Tag either does not implement an XPC_W1 or the XPC_W1 is zero-valued, in which case the Tag shall backscatter its StoredPC or PacketPC, but not an XPC_W1, in response to an *ACK* (see Table 6.14). If bit 16_h is asserted then the Tag implements an XPC_W1 and one or more bits of XPC_W1 have nonzero values. In this latter case the Tag shall backscatter its XPC_W1 immediately after the StoredPC or PacketPC during inventory.

  If a Tag implements an XPC_W1 then at power-up, and prior to calculating its StoredCRC (see 6.3.2.1.2.1), the Tag shall compute the bitwise logical OR of its XPC_W1 and map the computed value into bit 16_h (i.e. into the XI). A Tag shall use this computed XI value in its StoredCRC calculation. If an Interrogator recommissions the Tag (see 6.3.2.10) then the Tag shall recompute and remap its XI into bit 16_h after recommissioning. After recomputing the XI the StoredCRC may be incorrect until the Interrogator power cycles the Tag. The XI bit shall not be directly writeable by an Interrogator — when an Interrogator writes the StoredPC the Tag shall ignore the data value that the Interrogator provides for bit 16_h.

- Bits 17_h – $1F_h$: A numbering system identifier (NSI). The MSB of the NSI is stored in memory location 17_h. If bit 17_h contains a logical 0, then the application is referred to as an EPCglobal™ Application and bits 18_h – $1F_h$ shall be as defined in the EPCglobal™ Tag Data Standards. If bit 17_h contains a logical 1, then the application is referred to as a non-EPCglobal™ Application and bits 18_h – $1F_h$ shall contain the entire AFI defined in ISO/IEC 15961. The default value for bits 18_h – $1F_h$ is 00000000_2.

The default (unprogrammed) StoredPC value shall be 0000_h.

If an Interrogator changes the EPC length (via a memory write operation), and if it wishes the Tag to subsequently backscatter the new EPC length, then it must write a new EPC length field into the Tag's StoredPC. Note: After changing the EPC length field an Interrogator should power-cycle the Tag to ensure a correct StoredCRC.

A Tag shall backscatter an error code (see Annex I) if an Interrogator attempts to write an EPC length field that the Tag does not support.

The PacketPC differs from the StoredPC in its EPC length field, which a Tag shall adjust to match the length of the backscattered data that follow the PC word. Specifically, if XI is asserted but XEB is not asserted then the Tag backscatters an XPC_W1 before the EPC, so the Tag shall add one to (i.e. increment) its EPC length field. If both XI and XEB are asserted then the Tag backscatters both an XPC_W1 and an XPC_W2 before the EPC, so the Tag shall add two to (i.e. double increment) its EPC length field. Because Tags that support XPC functionality have a maximum EPC length field of 11101_2, double incrementing will increase the value to 11111_2. A Tag shall not, under any circumstances, allow its EPC length field to roll over to 00000_2. Note that incrementing or double incrementing the EPC length field does not alter the values stored in bits 10_h – 14_h of EPC memory; rather, a Tag increments the EPC length field in the backscattered PacketPC but leaves the memory contents unaltered.

Tags that do not support XPC functionality need not implement a PacketPC.

If an Interrogator that does not support an XPC_W1 receives a Tag reply with XI asserted then the Interrogator shall treat the Tag's reply as though its CRC-16 integrity check had failed.

If an Interrogator that does not support an XPC_W2 receives a Tag reply with XEB asserted then the Interrogator shall treat the Tag's reply as though its CRC-16 integrity check had failed.

During truncated replies a Tag substitutes 00000_2 for the PC word — see Table 6.14 and 6.3.2.11.1.1.

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6.3.2.1.2.3 EPC for an EPCglobal™ Application

The EPC structure for an EPCglobal™ Application shall be as defined in the EPCglobal™ Tag Data Standards.

6.3.2.1.2.4 EPC for a non-EPCglobal™ Application

The EPC structure for a non-EPCglobal™ Application shall be as defined in ISO/IEC 15961.

6.3.2.1.2.5 Extended Protocol Control (XPC) word or words (optional)

A Tag may implement an XPC_W1 logically located at addresses 210_h to $21F_h$ of EPC memory. If a Tag implements an XPC_W1 then it may additionally implement an XPC_W2 logically located at address 220_h to $22F_h$ of EPC memory. A Tag shall not implement an XPC_W2 without also implementing an XPC_W1. If implemented, these XPC words shall be exactly 16 bits in length and are stored MSB first. If a Tag does not support one or both of these optional XPC words then the specified memory locations need not exist.

A Tag shall not implement any non-XPC memory element at EPC memory locations 210_h to $22F_h$, inclusive. This requirement shall apply both to Tags that support an XPC word or words and to those that do not.

If a Tag supports recommissioning (see 6.3.2.10) then it shall implement an XPC_W1.

If a Tag implements an XPC_W2 then, at power-up, the Tag shall compute the bitwise logical OR of the XPC_W2 and map the computed value into bit 210_h of EPC memory (i.e. into the most significant bit of XPC_W1). Bit 210_h is denoted the XPC Extension Bit (XEB). If a Tag does not implement an XPC_W2 then the XEB shall be zero.

The remainder of this section 6.3.2.1.2.5 assumes that a Tag implements an XPC_W1 and an XPC_W2.

When this document refers to the 3 least-significant-bits (LSBs) of XPC_W1 it specifically means locations $21D_h$, $21E_h$, and $21F_h$ of EPC memory. The 3 LSBs of XPC_W1 indicate whether and how a Tag was recommissioned.

For virgin Class-1 Tags the 3 LSBs of XPC_W1 shall be zero-valued. A Tag writes a nonzero value to one or more of these 3 LSBs during Tag recommissioning (see 6.3.2.10). For Class-1 Tags all the other bits in XPC_W1, namely EPC memory locations 210_h to $21C_h$, inclusive, as well as all the bits in XPC_W2, shall be RFU and zero-valued. Tag vendors and end users shall not use these RFU bits for proprietary purposes.

The 3 LSBs of XPC_W1 are not writeable using a *Write* or *BlockWrite*, nor erasable using a *BlockErase*. They can only be asserted by a *Kill* command, meaning that the Tag asserts these bits upon receiving a valid *Kill* command sequence with asserted recommissioning bits (see 6.3.2.11.3.4). A Tag shall not modify the 3 LSBs of XPC_W1 except during Tag recommissioning.

If a Class-1 Tag receives a *Write*, *BlockWrite*, or *BlockErase* command that attempts to write to XPC_W1 or to XPC_W2 it responds with an error code (see Annex I).

An Interrogator may issue a *Select* command (see 6.3.2.11.1) with a Mask that covers all or part of XPC_W1 and/or XPC_W2. For example, Mask may have the value 000_2 for the 3 LSBs of XPC_W1, in which case recommissioned Tags will be non-matching, as will Tags that do not implement recommissioning; only recommissionable Tags that have not yet been recommissioned will be matching.

An Interrogator may read a Tag's XPC_W1 and XPC_W2 using a *Read* command (see 6.3.2.11.3.2).

Bit E_h of XPC_W1 (EPC memory location 211_h) is reserved for use as a protocol functionality indicator. See 2.4.

The following encoding provides a general mapping between the 3 XPC_W1 LSBs and a Tag's recommissioned status. Table 6.15 provides a detailed mapping between these 3 LSBs and a Tag's recommissioned status:

- **An asserted LSB** (EPC memory location $21F_h$) indicates that block permalocking has been disabled, and any blocks of User memory that were previously block permalocked are no longer block permalocked. An asserted LSB also indicates that the *BlockPermalock* command has been disabled. If a Tag did not implement block permalocking prior to recommissioning then block permalocking shall remain disabled.
- **An asserted 2SB** (EPC memory location $21E_h$) indicates that User memory has been rendered inaccessible. The 2SB has precedence over the LSB — if both are asserted then User memory is inaccessible.
- **An asserted 3SB** (EPC memory location $21D_h$) indicates that the Tag has unlocked its EPC, TID, and User memory banks. The Tag has also write-unlocked its kill and access passwords, and rendered the kill and access passwords permanently unreadable regardless of the values of the Tag's lock bits (see 6.3.2.11.3.5). If an Interrogator subsequently attempts to read the Tag's kill or access passwords the Tag backscatters an error code (see Annex I). Note that portions or banks of Tag memory, if factory set and locked, may not be unlockable regardless of recommissioning. Note also that an Interrogator may subsequently re-lock any memory banks that have been unlocked by recommissioning.

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Table 6.15 – XPC_W1 LSBs and a Tag's recommissioned status

LSBs of XPC_W1	Tag Status	Notes
000	1. The Tag has not been recommissioned	1. A Class-1 Tag's XI bit is deasserted
001	1. Block permalocking has been disabled, and any blocks of User memory that were previously block permalocked are no longer block permalocked 2. The *BlockPermalock* command has been disabled	1. The lock bits are the sole determinant of the User memory bank's lock status (see 6.3.2.11.3.5)
010	1. The User memory bank has been rendered inaccessible 2. A Tag whose XPC_W1 LSBs are 010 acts identically to one whose XPC_W1 LSBs are 011	1. The Tag deasserts its UMI bit 2. User memory is inaccessible, so block permalocking and the *BlockPermalock* command are disabled
011	1. The User memory bank has been rendered inaccessible 2. A Tag whose XPC_W1 LSBs are 011 acts identically to one whose XPC_W1 LSBs are 010	1. The Tag deasserts its UMI bit 2. User memory is inaccessible, so block permalocking and the *BlockPermalock* command are disabled
100	1. The EPC, TID, and User memory banks have been unlocked 2. The kill and access passwords have been write-unlocked 3. The kill and access passwords have been rendered permanently unreadable, regardless of the status of the Tag's lock bits (see 6.3.2.11.3.5)	1. If the Tag supports block permalocking then the *BlockPermalock* command remains enabled 2. Any blocks of User memory that were previously block permalocked remain block permalocked, and vice versa 3. Portions or banks of Tag memory, if factory set and locked, may not be unlockable regardless of recommissioning 4. If an Interrogator attempts to read the Tag's kill or access passwords the Tag responds by backscattering an error code (see Annex I) 5. The kill and/or access passwords, as well as one or more memory blocks and/or banks, may be changed and/or relocked after recommissioning
101	1. Block permalocking has been disabled, and any blocks of User memory that were previously block permalocked are no longer block permalocked 2. The *BlockPermalock* command has been disabled 3. The EPC, TID, and User memory banks have been unlocked 4. The kill and access passwords have been write-unlocked 5. The kill and access passwords have been rendered permanently unreadable, regardless of the status of the Tag's lock bits (see 6.3.2.11.3.5)	1. The lock bits are the sole determinant of the User memory bank's lock status (see 6.3.2.11.3.5) 2. Portions or banks of Tag memory, if factory set and locked, may not be unlockable regardless of recommissioning 3. If an Interrogator attempts to read the Tag's kill or access passwords the Tag responds by backscattering an error code (see Annex I) 4. The kill and/or access passwords, as well as one or more memory blocks and/or banks, may be changed and/or relocked after recommissioning
110	1. The EPC and TID memory banks have been unlocked 2. The kill and access passwords have been write-unlocked 3. The kill and access passwords have been rendered permanently unreadable, regardless of the status of the Tag's lock bits (see 6.3.2.11.3.5) 4. The User memory bank has been rendered inaccessible 5. A Tag whose XPC_W1 LSBs are 110 acts identically to one whose XPC_W1 LSBs are 111	1. Portions or banks of Tag memory, if factory set and locked, may not be unlockable regardless of recommissioning 2. If an Interrogator attempts to read the Tag's kill or access passwords the Tag responds by backscattering an error code (see Annex I) 3. The kill and/or access passwords, as well as one or more memory blocks and/or banks, may be changed and/or relocked after recommissioning 4. The Tag deasserts its UMI bit 5. User memory is inaccessible, so block permalocking and the *BlockPermalock* command are disabled
111	1. The EPC and TID memory banks have been unlocked 2. The kill and access passwords have been write-unlocked 3. The kill and access passwords have been rendered permanently unreadable, regardless of the status of the Tag's lock bits (see 6.3.2.11.3.5) 4. The User memory bank has been rendered inaccessible 5. A Tag whose XPC_W1 LSBs are 111 acts identically to one whose XPC_W1 LSBs are 110	1. Portions or banks of Tag memory, if factory set and locked, may not be unlockable regardless of recommissioning 2. If an Interrogator attempts to read the Tag's kill or access passwords the Tag responds by backscattering an error code (see Annex I) 3. The kill and/or access passwords, as well as one or more memory blocks and/or banks, may be changed and/or relocked after recommissioning 4. The Tag deasserts its UMI bit 5. User memory is inaccessible, so block permalocking and the *BlockPermalock* command are disabled

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6.3.2.1.3 TID Memory

TID memory locations 00_h to 07_h shall contain one of two ISO/IEC 15963 class-identifier values — either $E0_h$ or $E2_h$. TID memory locations above 07_h shall be defined according to the registration authority defined by this class-identifier value and shall contain, at a minimum, sufficient identifying information for an Interrogator to uniquely identify the custom commands and/or optional features that a Tag supports. TID memory may also contain Tag- and vendor-specific data (for example, a Tag serial number).

Note: The Tag manufacturer assigns the class-identifier value (i.e. $E0_h$ or $E2_h$), for which ISO/IEC 15963 defines the registration authorities. The class-identifier does not specify the Application. If the class identifier is $E0_h$, TID memory locations 08_h to $0F_h$ contain an 8-bit manufacturer identifier, TID memory locations 10_h to $3F_h$ contain a 48-bit Tag serial number (assigned by the Tag manufacturer), the composite 64-bit Tag ID (i.e. TID memory 00_h to $3F_h$) is unique among all classes of Tags defined in ISO/IEC 15693, and TID memory is permalocked at the time of manufacture. If the class identifier is $E2_h$, TID memory location 08_h to 13_h contain a 12-bit Tag mask-designer identifier (obtainable from the registration authority), TID memory locations 14_h to $1F_h$ contain a vendor-defined 12-bit Tag model number, and the usage of TID memory locations above $1F_h$ is defined in the EPCglobal™ Tag Data Standards.

6.3.2.1.4 User Memory

A Tag may contain User memory. User memory allows user-specific data storage.

If a Tag's User memory has not yet been programmed then the 5 LSBs of the first byte of User memory (i.e. memory addresses 03_h to 07_h) shall have the default value 00000_2.

During recommissioning an Interrogator may instruct a Tag to render its User memory inaccessible, causing the entire memory bank to become unreadable, unwriteable, and unselectable. A Tag with inaccessible User memory shall function as though its User memory bank no longer exists.

6.3.2.1.4.1 User memory for an EPCglobal™ Application

If User memory is included on a Tag then its encoding shall be as defined in the EPCglobal™ Tag Data Standards.

6.3.2.1.4.2 User memory for a non-EPCglobal™ Application

If User memory is included on a Tag then its encoding shall be as defined in ISO/IEC 15961 and ISO/IEC 15962.

6.3.2.2 Sessions and inventoried flags

Interrogators shall support and Tags shall provide 4 sessions (denoted S0, S1, S2, and S3). Tags shall participate in one and only one session during an inventory round. Two or more Interrogators can use sessions to independently inventory a common Tag population. The sessions concept is illustrated in Figure 6.18.

Tags shall maintain an independent **inventoried** flag for each session. Each of the four **inventoried** flags has two values, denoted *A* and *B*. At the beginning of each and every inventory round an Interrogator chooses to inventory either *A* or *B* Tags in one of the four sessions. Tags participating in an inventory round in one session shall neither use nor modify the **inventoried** flag for a different session. The **inventoried** flags are the only resource a Tag provides separately and independently to a given session; all other Tag resources are shared among sessions.

After singulating a Tag an Interrogator may issue a command that causes the Tag to invert its **inventoried** flag for that session (i.e. $A \rightarrow B$ or $B \rightarrow A$).

The following example illustrates how two Interrogators can use sessions and **inventoried** flags to independently and completely inventory a common Tag population, on a time-interleaved basis:

- Interrogator #1 powers-on, then
  - It initiates an inventory round during which it singulates *A* Tags in session S2 to *B,*
  - It powers off.
- Interrogator #2 powers-on, then
  - It initiates an inventory round during which it singulates *B* Tags in session S3 to *A,*
  - It powers off.

This process repeats until Interrogator #1 has placed all Tags in session S2 into *B*, after which it inventories the Tags in session S2 from *B* back to *A*. Similarly, Interrogator #2 places all Tags in session S3 into *A*, after which it inventories the Tags in session S3 from *A* back to *B*. By this multi-step procedure each Interrogator can independently inventory all Tags in its field, regardless of the initial state of their **inventoried** flags.

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A Tag's **inventoried** flags shall have the persistence times shown in Table 6.16. A Tag shall power-up with its **inventoried** flags set as follows:

- The S0 **inventoried** flag shall be set to *A*.
- The S1 **inventoried** flag shall be set to either *A* or *B*, depending on its stored value, unless the flag was set longer in the past than its persistence time, in which case the Tag shall power-up with its S1 **inventoried** flag set to *A*. Because the S1 **inventoried** flag is not automatically refreshed, it may revert from *B* to *A* even when the Tag is powered.
- The S2 **inventoried** flag shall be set to either *A* or *B*, depending on its stored value, unless the Tag has lost power for a time greater than its persistence time, in which case the Tag shall power-up with the S2 **inventoried** flag set to *A*.
- The S3 **inventoried** flag shall be set to either *A* or *B*, depending on its stored value, unless the Tag has lost power for a time greater than its persistence time, in which case the Tag shall power-up with its S3 **inventoried** flag set to *A*.

A Tag shall set any of its inventoried flags to either *A* or *B* in 2 ms or less, regardless of the initial flag value. A Tag shall refresh its S2 and S3 flags while powered, meaning that every time a Tag loses power its S2 and S3 **inventoried** flags shall have the persistence times shown in Table 6.16.

A Tag shall not change the value of its S1 **inventoried** flag from *B* to *A*, as the result of a persistence timeout, while the Tag is participating in an inventory round, is in the midst of being inventoried, or is in the midst of being accessed. If a Tag's S1 flag persistence time expires during an inventory round then the Tag shall change the flag to *A* only (i) as instructed by an Interrogator (e.g. by a *QueryAdjust* or *QueryRep* with matching session at the end of an inventory or access operation), or (ii) at the end of the round (e.g. upon receiving a *Select* or *Query*). In case (i), if the Tag's S1 flag persistence time expires while the Tag is in the midst of being inventoried or accessed then the Tag shall change the flag to *A* at the end of the inventory or access operation. In case (ii), the Tag shall invert its S1 flag prior to evaluating the *Select* or *Query*.

6.3.2.3 Selected flag

Tags shall implement a selected flag, **SL**, which an Interrogator may assert or deassert using a *Select* command. The Sel parameter in the *Query* command allows an Interrogator to inventory Tags that have **SL** either asserted or deasserted (i.e. **SL** or ~**SL**), or to ignore the flag and inventory Tags regardless of their **SL** value. **SL** is not associated with any particular session; **SL** may be used in any session, and is common to all sessions.

A Tag's **SL** flag shall have the persistence times shown in Table 6.16. A Tag shall power-up with its **SL** flag either asserted or deasserted, depending on the stored value, unless the Tag has lost power for a time greater than the **SL** persistence time, in which case the Tag shall power-up with its **SL** flag deasserted (set to ~**SL**). A Tag shall be capable of asserting or deasserting its **SL** flag in 2 ms or less, regardless of the initial flag value. A Tag shall refresh its **SL** flag when powered, meaning that every time a Tag loses power its **SL** flag shall have the persistence times shown in Table 6.16.

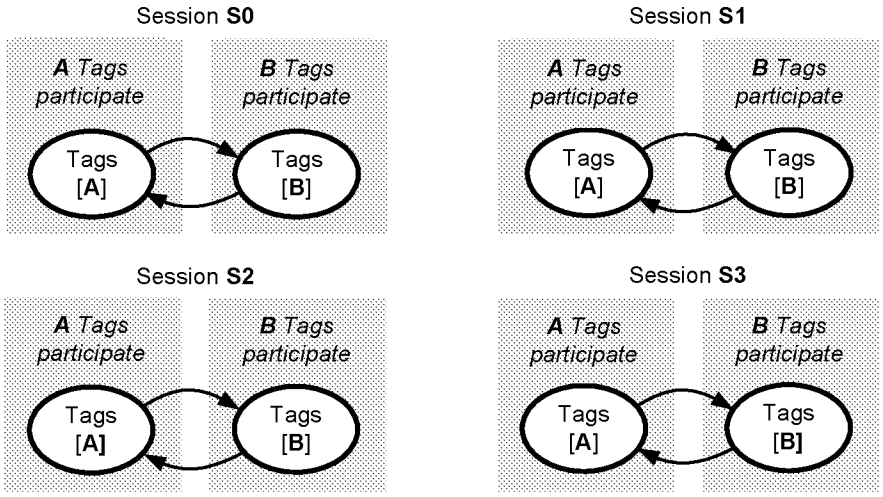


Figure 6.18 – Session diagram

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Table 6.16 – Tag flags and persistence values

Flag	Required persistence
S0 **inventoried** flag	Tag energized: Indefinite Tag not energized: None
S1 **inventoried** flag[1]	Tag energized: Nominal temperature range: 500ms < persistence < 5s Extended temperature range: Not specified Tag not energized: Nominal temperature range: 500ms < persistence < 5s Extended temperature range: Not specified
S2 **inventoried** flag[1]	Tag energized: Indefinite Tag not energized: Nominal temperature range: 2s < persistence Extended temperature range: Not specified
S3 **inventoried** flag[1]	Tag energized: Indefinite Tag not energized: Nominal temperature range: 2s < persistence Extended temperature range: Not specified
Selected (**SL**) flag[1]	Tag energized: Indefinite Tag not energized: Nominal temperature range: 2s < persistence Extended temperature range: Not specified

Note 1: For a randomly chosen and sufficiently large Tag population, 95% of the Tag persistence times shall meet the persistence requirement, with a 90% confidence interval.

6.3.2.4 Tag states and slot counter

Tags shall implement the states and the slot counter shown in Figure 6.19. Annex B shows the associated state-transition tables; Annex C shows the associated command-response tables.

6.3.2.4.1 Ready state

Tags shall implement a **ready** state. **Ready** can be viewed as a "holding state" for energized Tags that are neither killed nor currently participating in an inventory round. Upon entering an energizing RF field a Tag that is not killed shall enter **ready**. The Tag shall remain in **ready** until it receives a *Query* command (see 6.3.2.11.2.1) whose inventoried parameter (for the session specified in the *Query*) and sel parameter match its current flag values. Matching Tags shall draw a *Q*-bit number from their RNG (see 6.3.2.5), load this number into their slot counter, and transition to the **arbitrate** state if the number is nonzero, or to the **reply** state if the number is zero. If a Tag in any state except **killed** loses power it shall return to **ready** upon regaining power.

6.3.2.4.2 Arbitrate state

Tags shall implement an **arbitrate** state. **Arbitrate** can be viewed as a "holding state" for Tags that are participating in the current inventory round but whose slot counters (see 6.3.2.4.8) hold nonzero values. A Tag in **arbitrate** shall decrement its slot counter every time it receives a *QueryRep* command (see 6.3.2.11.2.3) whose session parameter matches the session for the inventory round currently in progress, and it shall transition to the **reply** state and backscatter an RN16 when its slot counter reaches 0000_h. Tags that return to **arbitrate** (for example, from the **reply** state) with a slot value of 0000_h shall decrement their slot counter from 0000_h to $7FFF_h$ at the next *QueryRep* (with matching session) and, because their slot value is now nonzero, shall remain in **arbitrate**.

6.3.2.4.3 Reply state

Tags shall implement a **reply** state. Upon entering **reply** a Tag shall backscatter an RN16. If the Tag receives a valid acknowledgement (*ACK*) it shall transition to the **acknowledged** state, backscattering the reply shown in Table 6.14. If the Tag fails to receive an *ACK* within time $T_{2(max)}$, or receives an invalid *ACK* or an *ACK* with an erroneous RN16, it shall return to **arbitrate**. Tag and Interrogator shall meet all timing requirements specified in Table 6.13.

6.3.2.4.4 Acknowledged state

Tags shall implement an **acknowledged** state. A Tag in **acknowledged** may transition to any state except **killed**,

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depending on the received command (see Figure 6.19). If a Tag in the **acknowledged** state receives a valid *ACK* containing the correct RN16 it shall re-backscatter the reply shown in Table 6.14. If a Tag in the **acknowledged** state fails to receive a valid command within time $T_{2(max)}$ it shall return to **arbitrate**. Tag and Interrogator shall meet all timing requirements specified in Table 6.13.

6.3.2.4.5 Open state

Tags shall implement an **open** state. A Tag in the **acknowledged** state whose access password is nonzero shall transition to **open** upon receiving a *Req_RN* command, backscattering a new RN16 (denoted handle) that the Interrogator shall use in subsequent commands and the Tag shall use in subsequent replies. Tags in the **open** state can execute all access commands except *Lock* and *BlockPermalock*. A Tag in **open** may transition to any state except **acknowledged**, depending on the received command (see Figure 6.19). If a Tag in the **open** state receives a valid *ACK* containing the correct handle it shall re-backscatter the reply shown in Table 6.14. Tag and Interrogator shall meet all timing requirements specified in Table 6.13 except $T_{2(max)}$; in the **open** state the maximum delay between Tag response and Interrogator transmission is unrestricted.

6.3.2.4.6 Secured state

Tags shall implement a **secured** state. A Tag in the **acknowledged** state whose access password is zero shall transition to **secured** upon receiving a *Req_RN* command, backscattering a new RN16 (denoted handle) that the Interrogator shall use in subsequent commands and the Tag shall use in subsequent replies. A Tag in the **open** state whose access password is nonzero shall transition to **secured** upon receiving a valid *Access* command sequence, maintaining the same handle that it previously backscattered when it transitioned from the **acknowledged** state to the **open** state. Tags in the **secured** state can execute all access commands. A Tag in **secured** may transition to any state except **open** or **acknowledged**, depending on the received command (see Figure 6.19). If a Tag in the **secured** state receives a valid *ACK* containing the correct handle it shall re-backscatter the reply shown in Table 6.14. Tag and Interrogator shall meet all timing requirements specified in Table 6.13 except $T_{2(max)}$; in the **secured** state the maximum delay between Tag response and Interrogator transmission is unrestricted.

6.3.2.4.7 Killed state

Tags shall implement a **killed** state. A Tag in either the **open** or **secured** states shall enter the **killed** state upon receiving a valid *Kill* command sequence (see 6.3.2.11.3.4) with a valid nonzero kill password, zero-valued Recom bits (see 6.3.2.10), and valid handle. If a Tag does not implement recommissioning then it treats nonzero Recom bits as though Recom = 0. *Kill* permanently disables a Tag. Upon entering the **killed** state a Tag shall notify the Interrogator that the kill operation was successful, and shall not respond to an Interrogator thereafter. Killed Tags shall remain in the **killed** state under all circumstances, and shall immediately enter killed upon subsequent power-ups. Killing a Tag is irreversible.

6.3.2.4.8 Slot counter

Tags shall implement a 15-bit slot counter. Upon receiving a *Query* or *QueryAdjust* command a Tag shall preload into its slot counter a value between 0 and 2^Q–1, drawn from the Tag's RNG (see 6.3.2.5). *Q* is an integer in the range (0, 15). A *Query* specifies *Q*; a *QueryAdjust* may modify *Q* from the prior *Query*.

Tags in the **arbitrate** state decrement their slot counter every time they receive a *QueryRep* with matching session, transitioning to the **reply** state and backscattering an RN16 when their slot counter reaches 0000_h. Tags whose slot counter reached 0000_h, who replied, and who were not acknowledged (including Tags that responded to an original *Query* and were not acknowledged) shall return to **arbitrate** with a slot value of 0000_h and shall decrement this slot value from 0000_h to $7FFF_h$ at the next *QueryRep*. The slot counter shall be capable of continuous counting, meaning that, after the slot counter rolls over to $7FFF_h$ it begins counting down again, thereby effectively preventing subsequent replies until the Tag loads a new random value into its slot counter. See also Annex J.

6.3.2.5 Tag random or pseudo-random number generator

Tags shall implement a random or pseudo-random number generator (RNG). The RNG shall meet the following randomness criteria independent of the strength of the energizing field, the R=>T link rate, and the data stored in the Tag (including but not limited to the StoredPC, XPC word or words, EPC, and StoredCRC). Tags shall generate 16-bit random or pseudo-random numbers (RN16) using the RNG, and shall have the ability to extract *Q*-bit subsets from an RN16 to preload the Tag's slot counter (see 6.3.2.4.8). Tags shall have the ability to temporarily store at least two RN16s while powered, to use, for example, as a handle and a 16-bit cover-code during password transactions (see Figure 6.23 or Figure 6.25).

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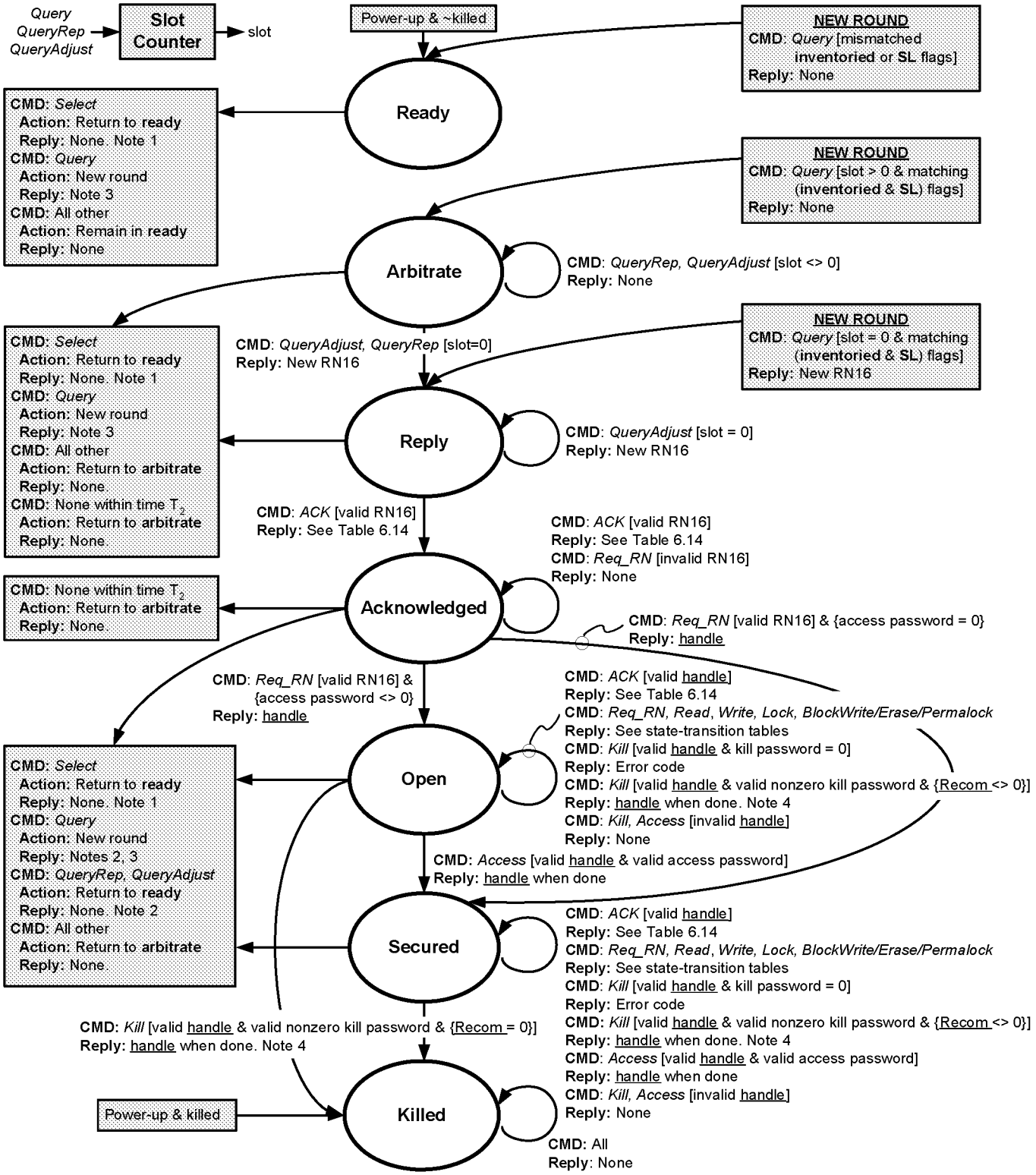


Figure 6.19 – Tag state diagram

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Probability of a single RN16: The probability that any RN16 drawn from the RNG has value RN16 = *j*, for any *j*, shall be bounded by $0.8/2^{16} < P(RN16 = j) < 1.25/2^{16}$.

Probability of simultaneously identical sequences: For a Tag population of up to 10,000 Tags, the probability that any two or more Tags simultaneously generate the same sequence of RN16s shall be less than 0.1%, regardless of when the Tags are energized.

Probability of predicting an RN16: An RN16 drawn from a Tag's RNG 10ms after the end of T_r in Figure 6.3 shall not be predictable with a probability greater than 0.025% if the outcomes of prior draws from the RNG, performed under identical conditions, are known.

This protocol recommends that Interrogators wait 10ms after T_r in Figure 6.3 or T_{hr} in Figure 6.5 before issuing passwords to Tags.

6.3.2.6 Managing Tag populations

Interrogators manage Tag populations using the three basic operations shown in Figure 6.20. Each of these operations comprises one or more commands. The operations are defined as follows:

a) **Select:** The process by which an Interrogator selects a Tag population for inventory and access. Interrogators may use one or more *Select* commands to select a particular Tag population prior to inventory.

b) **Inventory:** The process by which an Interrogator identifies Tags. An Interrogator begins an inventory round by transmitting a *Query* command in one of four sessions. One or more Tags may reply. The Interrogator detects a single Tag reply and requests the PC word, optional XPC word or words, EPC, and CRC-16 from the Tag. An inventory round operates in one and only one session at a time. Annex E shows an example of an Interrogator inventorying and accessing a single Tag.

c) **Access:** The process by which an Interrogator transacts with (reads from or writes to) individual Tags. An individual Tag must be uniquely identified prior to access. Access comprises multiple commands, some of which employ one-time-pad based cover-coding of the R=>T link.

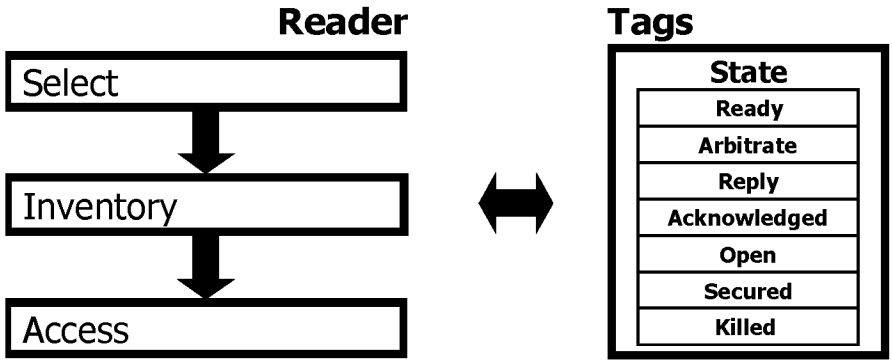


Figure 6.20 – Interrogator/Tag operations and Tag state

6.3.2.7 Selecting Tag populations

The selection process employs a single command, *Select*, which an Interrogator may apply successively to select a particular Tag population based on user-defined criteria, enabling union (U), intersection (∩), and negation (~) based Tag partitioning. Interrogators perform U and ∩ operations by issuing successive *Select* commands. *Select* can assert or deassert a Tag's **SL** flag, or it can set a Tag's **inventoried** flag to either *A* or *B* in any one of the four sessions. *Select* contains the parameters Target, Action, MemBank, Pointer, Length, Mask, and Truncate.

- Target and Action indicate whether and how a *Select* modifies a Tag's **SL** or **inventoried** flag, and in the case of the **inventoried** flag, for which session. A *Select* that modifies **SL** shall not modify **inventoried**, and vice versa.
- MemBank specifies if the mask applies to EPC, TID, or User memory. *Select* commands apply to a single memory bank. Successive *Selects* may apply to different memory banks.
- Pointer, Length, and Mask: Pointer and Length describe a memory range. Mask, which must be Length bits long, contains a bit string that a Tag compares against the specified memory range.
- Truncate specifies whether a Tag backscatters its entire EPC, or only that portion of the EPC immediately

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following Mask. Truncated EPCs are always followed by the Tag's StoredCRC (see Table 6.14). A Tag does not recalculate its StoredCRC for a truncated reply.

By issuing multiple identical *Select* commands an Interrogator can asymptotically single out all Tags matching the selection criteria even though Tags may undergo short-term RF fades.

A *Query* command uses **inventoried** and **SL** to decide which Tags participate in an inventory. Interrogators may inventory and access **SL** or ~**SL** Tags, or they may choose to ignore the **SL** flag entirely.

6.3.2.8 Inventorying Tag populations

The inventory command set includes *Query*, *QueryAdjust*, *QueryRep*, *ACK*, and *NAK. Query* initiates an inventory round and decides which Tags participate in the round ("inventory round" is defined in 4.1).

Query contains a slot-count parameter *Q*. Upon receiving a *Query* participating Tags pick a random value in the range (0, 2^Q-1), inclusive, and load this value into their slot counter. Tags that pick a zero transition to the **reply** state and reply immediately. Tags that pick a nonzero value transition to the **arbitrate** state and await a *QueryAdjust* or a *QueryRep* command. Assuming that a single Tag replies, the query-response algorithm proceeds as follows:

a) The Tag backscatters an RN16 as it enters **reply**,
b) The Interrogator acknowledges the Tag with an *ACK* containing this same RN16,
c) The acknowledged Tag transitions to the **acknowledged** state, backscattering the reply shown in Table 6.14,
d) The Interrogator issues a *QueryAdjust* or *QueryRep,* causing the identified Tag to invert its **inventoried** flag (i.e. *A*→*B* or *B*→*A*) and transition to **ready**, and potentially causing another Tag to initiate a query-response dialog with the Interrogator, starting in step (a), above.

If the Tag fails to receive the *ACK* in step (b) within time T_2 (see Figure 6.16), or receives the *ACK* with an erroneous RN16, it returns to **arbitrate**.

If multiple Tags reply in step (a) but the Interrogator, by detecting and resolving collisions at the waveform level, can resolve an RN16 from one of the Tags, the Interrogator can *ACK* the resolved Tag. Unresolved Tags receive erroneous RN16s and return to **arbitrate** without backscattering the reply shown in Table 6.14.

If the Interrogator sends a valid *ACK* (i.e. an *ACK* containing the correct RN16) to the Tag in the **acknowledged** state, the Tag re-backscatters the reply shown in Table 6.14.

At any point the Interrogator may issue a *NAK*, in response to which all Tags in the inventory round that receive the *NAK* return to **arbitrate** without changing their **inventoried** flag.

After issuing a *Query* to initiate an inventory round, the Interrogator typically issues one or more *QueryAdjust* or *QueryRep* commands. *QueryAdjust* repeats a previous *Query* and may increment or decrement *Q*, but does not introduce new Tags into the round. *QueryRep* repeats a previous *Query* without changing any parameters and without introducing new Tags into the round. An inventory round can contain multiple *QueryAdjust* or *QueryRep* commands. At some point the Interrogator will issue a new *Query*, thereby starting a new inventory round.

Tags in the **arbitrate** or **reply** states that receive a *QueryAdjust* first adjust *Q* (increment, decrement, or leave unchanged), then pick a random value in the range (0, 2^Q-1), inclusive, and load this value into their slot counter. Tags that pick zero transition to the **reply** state and reply immediately. Tags that pick a nonzero value transition to the **arbitrate** state and await a *QueryAdjust* or a *QueryRep* command.

Tags in the **arbitrate** state decrement their slot counter every time they receive a *QueryRep*, transitioning to the **reply** state and backscattering an RN16 when their slot counter reaches 0000_h. Tags whose slot counter reached 0000_h, who replied, and who were not acknowledged (including Tags that responded to the original *Query* and were not acknowledged) return to **arbitrate** with a slot value of 0000_h and decrement this slot value from 0000_h to $7FFF_h$ at the next *QueryRep*, thereby effectively preventing subsequent replies until the Tag loads a new random value into its slot counter.

Although Tag inventory is based on a random protocol, the *Q*-parameter affords network control by allowing an Interrogator to regulate the probability of Tag responses. *Q* is an integer in the range (0,15); thus, the associated Tag-response probabilities range from $2^0 = 1$ to $2^{-15} = 0.000031$.

Annex D describes an exemplary Interrogator algorithm for choosing *Q*.

The scenario outlined above assumed a single Interrogator operating in a single session. However, as described

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in 6.3.2.2, an Interrogator can inventory a Tag population in one of four sessions. Furthermore, as described in 6.3.2.11.2, the *Query*, *QueryAdjust*, and *QueryRep* commands each contain a session parameter. How a Tag responds to these commands varies with the command, session parameter, and Tag state, as follows:

- *Query*: A *Query* command starts an inventory round and chooses the session for the round. Tags in any state except **killed** execute a *Query*, starting a new round in the specified session and transitioning to **ready**, **arbitrate**, or **reply**, as appropriate (see Figure 6.19).
  - If a Tag in the **acknowledged**, **open**, or **secured** states receives a *Query* whose session parameter matches the prior session it inverts its **inventoried** flag (i.e. $A \rightarrow B$ or $B \rightarrow A$) for the session before it evaluates whether to transition to **ready**, **arbitrate**, or **reply**.
  - If a Tag in the **acknowledged**, **open**, or **secured** states receives a *Query* whose session parameter does not match the prior session it leaves its **inventoried** flag for the prior session unchanged as it evaluates whether to transition to **ready**, **arbitrate**, or **reply**.
- *QueryAdjust, QueryRep*: Tags in any state except **ready** or **killed** execute a *QueryAdjust* or *QueryRep* command if, and only if, (i) the session parameter in the command matches the session parameter in the *Query* that started the round, and (ii) the Tag is not in the middle of a *Kill* or *Access* command sequence (see 6.3.2.11.3.4 or 6.3.2.11.3.6, respectively). Tags ignore a *QueryAdjust* or *QueryRep* with mismatched session.
  - If a Tag in the **acknowledged**, **open**, or **secured** states receives a *QueryAdjust* or *QueryRep* whose session parameter matches the session parameter in the prior *Query*, and the Tag is not in the middle of a *Kill* or *Access* command sequence (see 6.3.2.11.3.4 or 6.3.2.11.3.6, respectively), it inverts its **inventoried** flag (i.e. $A \rightarrow B$ or $B \rightarrow A$) for the current session then transitions to **ready**.

To illustrate an inventory operation, consider a specific example: Assume a population of 64 powered Tags in the **ready** state. An Interrogator first issues a *Select* to select a subpopulation of Tags. Assume that 16 Tags match the selection criteria. Further assume that 12 of the 16 selected Tags have their **inventoried** flag set to *A* in session S0. The Interrogator issues a *Query* specifying (**SL**, *Q* = 4, S0**,** *A*). Each of the 12 Tags picks a random number in the range (0,15) and loads the value into its slot counter. Tags that pick a zero respond immediately. The *Query* has 3 possible outcomes:

a) **No Tags reply:** The Interrogator may issue another *Query*, or it may issue a *QueryAdjust* or *QueryRep*.

b) **One Tag replies** (see Figure 6.21): The Tag transitions to the **reply** state and backscatters an RN16. The Interrogator acknowledges the Tag by sending an *ACK*. If the Tag receives the *ACK* with a correct RN16 it backscatters the reply shown in Table 6.14 and transitions to the **acknowledged** state. If the Tag receives the *ACK* with an incorrect RN16 it transitions to **arbitrate**. Assuming a successful *ACK*, the Interrogator may either access the acknowledged Tag or issue a *QueryAdjust* or *QueryRep* with matching session parameter to invert the Tag's **inventoried** flag from $A \rightarrow B$ and send the Tag to **ready** (a *Query* with matching prior-round session parameter will also invert the **inventoried** flag from $A \rightarrow B$).

c) **Multiple Tags reply:** The Interrogator observes a backscattered waveform comprising multiple RN16s. It may try to resolve the collision and issue an *ACK*; not resolve the collision and issue a *QueryAdjust, QueryRep*, or *NAK*; or quickly identify the collision and issue a *QueryAdjust* or *QueryRep* before the collided Tags have finished backscattering. In the latter case the collided Tags, not observing a valid reply within T_2 (see Figure 6.16), return to **arbitrate** and await the next *Query* or *QueryAdjust* command.

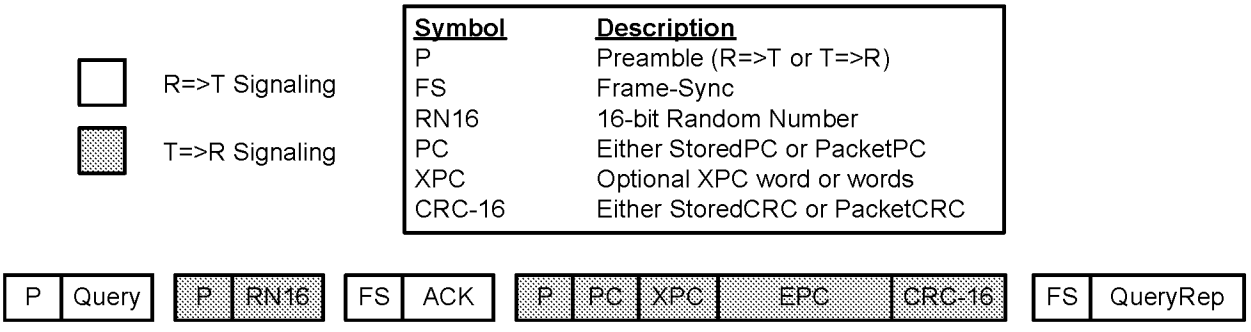


Figure 6.21 – One Tag reply

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Table 6.17 – Access commands and Tag states in which they are permitted

Command	State			Remark
	Acknowledged	Open	Secured	
Req_RN	permitted	permitted	permitted	–
Read	–	permitted	permitted	–
Write	–	permitted	permitted	requires prior *Req_RN*
Kill	–	permitted	permitted	requires prior *Req_RN*
Lock	–	–	permitted	–
Access	–	permitted	permitted	optional command; requires prior *Req_RN*
BlockWrite	–	permitted	permitted	optional command
BlockErase	–	permitted	permitted	optional command
BlockPermalock	–	–	permitted	optional command

6.3.2.9 Accessing individual Tags

After acknowledging a Tag, an Interrogator may choose to access it. The access command set comprises *Req_RN, Read, Write*, *Kill*, *Lock*, *Access*, *BlockWrite*, *BlockErase*, and *BlockPermalock*. Tags execute access commands in the states shown in Table 6.17.

An Interrogator accesses a Tag in the **acknowledged** state as follows:

Step 1. The Interrogator issues a *Req_RN* to the acknowledged Tag.

Step 2. The Tag generates and stores a new RN16 (denoted handle), backscatters the handle, and transitions to the **open** state if its access password is nonzero, or to the **secured** state if its access password is zero. The Interrogator may now issue further access commands.

All access commands issued to a Tag in the **open** or **secured** states include the Tag's handle as a parameter in the command. When in either of these two states, Tags verify that the handle is correct prior to executing an access command, and ignore access commands with an incorrect handle. The handle value is fixed for the entire duration of a Tag access.

Tags in the **open** state can execute all access commands except *Lock* and *BlockPermalock*. Tags in the **secured** state can execute all access commands. A Tag's response to an access command includes, at a minimum, the Tag's handle; the response may include other information as well (for example, the result of a *Read* operation).

An Interrogator may issue an *ACK* to a Tag in the **open** or **secured** states, causing the Tag to backscatter the reply shown in Table 6.14.

Interrogator and Tag can communicate indefinitely in the **open** or **secured** states. The Interrogator may terminate the communications at any time by issuing a *Query*, *QueryAdjust*, *QueryRep*, or a *NAK*. The Tag's response to a *Query*, *QueryAdjust*, or *QueryRep* is described in 6.3.2.8. A *NAK* causes all Tags in the inventory round to return to **arbitrate** without changing their **inventoried** flag.

The *Write*, *Kill*, and *Access* commands send 16-bit words (either data or half-passwords) from Interrogator to Tag. These commands use one-time-pad based link cover-coding to obscure the word being transmitted, as follows:

Step 1. The Interrogator issues a *Req_RN,* to which the Tag responds by backscattering a new RN16. The Interrogator then generates a 16-bit ciphertext string comprising a bit-wise EXOR of the 16-bit word to be transmitted with this new RN16, both MSB first, and issues the command with this ciphertext string as a parameter.

Step 2. The Tag decrypts the received ciphertext string by performing a bit-wise EXOR of the received 16-bit ciphertext string with the original RN16.

If an Interrogator issues a command containing cover-coded data or a half-password and fails to receive a response from the Tag, the Interrogator may reissue the command unchanged. If the Interrogator issues a command with new data or new half-password, then the Interrogator shall first issue a *Req_RN* to obtain a new RN16 and shall use this new RN16 for the cover-coding.

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To reduce security risks, this specification recommends that (1) Tags use unique kill passwords, and (2) memory writes be performed in a secure location.

The *BlockWrite* command (see 6.3.2.11.3.7) communicates multiple 16-bit words from Interrogator to Tag. Unlike *Write*, *BlockWrite* does not use link cover-coding.

A Tag responds to a command that writes to or erases memory (i.e. *Write*, *Kill*, *Lock*, *BlockWrite*, *BlockErase*, and *BlockPermalock* with Read/Lock=1 (see 6.3.2.11.3.9)) by backscattering its handle, indicating that the operation was successful, or by backscattering an error code (see Annex I), indicating that the operation was unsuccessful. The Tag reply uses the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. the Tag replies as if TRext=1 regardless of the TRext value specified in the *Query* command that initiated the inventory round). See 6.3.2.11.3 for detailed descriptions of a Tag's reply to each particular access command.

Issuing an access password to a Tag is a multi-step procedure described in 6.3.2.11.3.6 and outlined in Figure 6.25.

Tag memory may be unlocked or locked. The lock status may be changeable or permalocked (i.e. permanently unlocked or permanently locked). Recommissioning the Tag may change the lock status, even if the memory was previously permalocked. An Interrogator may write to unlocked memory from either the **open** or **secured** states. An Interrogator may write to locked memory that is not permalocked from the **secured** state only. See 6.3.2.10, 6.3.2.11.3.5, 6.3.2.11.3.9, Table 6.43, and Table 6.50 for a detailed description of memory lock, permalock, recommissioning, and the Tag state required to modify memory.

This protocol recommends that Interrogators avoid powering-off while a Tag is in the **reply**, **acknowledged**, **open** or **secured** states. Rather, Interrogators should end their dialog with a Tag before powering off, leaving the Tag in either the **ready** or **arbitrate** state.

6.3.2.10 Killing or recommissioning a Tag

Killing or recommissioning a Tag is a multi-step procedure, described in 6.3.2.11.3.4 and shown in Figure 6.23, in which an Interrogator sends two successive *Kill* commands to a Tag. The first *Kill* command contains the first half of the kill password, and the second *Kill* command contains the second half. Each *Kill* command also contains 3 RFU/Recom bits. In the first *Kill* command these bits are RFU and zero valued; in the second *Kill* command they are called *recommissioning* (or Recom) bits and may be nonzero valued. The procedures for killing or recommissioning a Tag are identical, except that the recommissioning bits in the second *Kill* command are zero when killing a Tag dead and are nonzero when recommissioning it. Regardless of the intended operation, a Tag shall not kill or recommission itself without first receiving the correct kill password by the procedure shown in Figure 6.23.

If a Tag does not implement recommissioning then it shall ignore the recommissioning bits and treat them as though they were zero, meaning that, if the Tag receives a properly formatted *Kill* command sequence with the correct kill password it shall kill itself dead regardless of the values of the recommissioning bits. The remainder of this section 6.3.2.10 assumes that a Tag implements recommissioning.

Upon receiving a properly formatted *Kill* command sequence with the correct kill password and one or more nonzero recommissioning bits, a Tag shall assert those LSBs of its XPC_W1 that are asserted in the recommissioning bits (for example, if a Tag receives 100_2 for the recommissioning bits then it asserts the 3SB of its XPC_W1). The XPC_W1 LSBs shall be one-time-writeable, meaning that they cannot be deasserted after they are asserted. By storing the Tag's recommissioned status in the XPC_W1 a subsequent reader can know how the Tag was recommissioned (see Table 6.15). A Tag shall perform the following operations based on the recommissioning bit values it receives (see also 6.3.2.1.2.5):

- **Asserted LSB:** The Tag shall disable block permalocking and unlock any blocks of User memory that were previously permalocked. The Tag shall disable support for the *BlockPermalock* command. If the Tag did not implement block permalocking prior to recommissioning then block permalocking shall remain disabled. The lock status of User memory shall be determined solely by the lock bits (see 6.3.2.11.3.5).
- **Asserted 2SB:** The Tag shall render its User memory inaccessible, causing the entire memory bank to become unreadable, unwriteable, and unselectable (i.e. the Tag functions as though its User memory bank no longer exists).The 2SB has precedence over the LSB — if both are asserted then User memory is inaccessible.
- **Asserted 3SB:** The Tag shall unlock its EPC, TID, and User memory banks, regardless of whether these banks were locked or permalocked. Portions of User memory that were block permalocked shall remain block permalocked, and vice versa, unless the LSB is also asserted, in which case the Tag shall unlock its permalocked blocks. The Tag shall write-unlock its kill and access passwords, and shall render the kill

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and access passwords permanently unreadable regardless of the values of the Tag's lock bits (see 6.3.2.11.3.5). If an Interrogator subsequently attempts to read the Tag's kill or access passwords the Tag shall backscatter an error code (see Annex I). A Tag that receives a subsequent *Lock* command with pwd-read/write=0 shall lock or permalock the indicated password(s) in the writeable state, but the passwords shall still remain unreadable.

A Tag shall not execute any of the above recommissioning operations more than once. As one example, a Tag does not allow any of its memory banks to be unlocked more than once by recommissioning.

A Tag may execute multiple *Kill* command sequences, depending on the nature and ordering of the operations specified in these command sequences. Specifically:

- A Tag that is killed dead shall not allow a subsequent recommissioning.
- A previously recommissioned Tag that receives a properly formatted *Kill* command sequence with the correct kill password and Recom = 000_2 shall be killed dead.
- A Tag that receives a properly formatted *Kill* command sequence with the correct kill password but with redundant recommissioning bits (for example, the recommissioning bits are 100_2 but the Tag's XPC_W1 already contains 100_2) shall not perform the requested recommissioning operation again. Instead, the Tag shall merely verify that its XPC_W1 contains the asserted values and respond affirmatively to the Interrogator. An Interrogator may choose to send a *Kill* sequence with redundant recommissioning bits if, for example, it had sent a prior *Kill* sequence but did not observe an affirmative response from the Tag.
- A Tag that receives a properly formatted *Kill* command sequence with the correct kill password and with newly asserted recommissioning bits shall perform the recommissioning operation indicated by the newly asserted bits, responding affirmatively to the reader when done. A Tag shall compute the logical OR of the LSBs of its current XPC_W1 and the recommissioning bits, and shall store the resulting value into its XPC_W1. For example, if a Tag whose XPC_W1 LSBs are 100_2 receives a *Kill* command sequence whose recommissioning bits are 010_2, the Tag renders its User memory bank inaccessible and stores 110_2 into its XPC_W1 LSBs.

An Interrogator may subsequently re-lock any of the memory banks or passwords that have been unlocked by recommissioning.

Portions or entire banks of Tag memory, if factory locked, may not be unlockable by recommissioning. An Interrogator may determine whether a Tag supports recommissioning, and if so which (if any) memory portions are not recommissionable, by reading the Tag's TID memory prior to recommissioning.

A Tag that does not implement a kill password, or a Tag whose kill password is zero, shall not execute a kill or recommissioning operation. Such a Tag shall respond with an error code (as shown in Figure 6.23) to a *Kill* command sequence regardless of the RFU or recommissioning bit settings.

A Tag shall accept all eight possible combinations of the 3 recommissioning bits, executing those portions that it is capable of executing, ignoring those it cannot, and responding affirmatively to the Interrogator when done. Several examples of operations that a Tag may be incapable or partially capable of executing are:

- A Tag that does not have User memory cannot unlock it
- A Tag that does not implement an Access password cannot unlock it for writing
- A Tag in which a portion of TID memory is factory locked cannot unlock this portion

6.3.2.11 Interrogator commands and Tag replies

Interrogator-to-Tag commands shall have the format shown in Table 6.18.

- *QueryRep* and *ACK* have 2-bit command codes beginning with 0_2.
- *Query*, *QueryAdjust*, and *Select* have 4-bit command codes beginning with 10_2.
- All other base commands have 8-bit command codes beginning with 110_2.
- All extended commands have 16-bit command codes beginning with 1110_2.
- *QueryRep*, *ACK*, *Query*, *QueryAdjust,* and *NAK* have the unique command lengths shown in Table 6.18. No other commands shall have these lengths. If a Tag receives one of these commands with an incorrect length it shall ignore the command.
- *Query, QueryAdjust*, and *QueryRep* contain a session parameter.
- *Query* is protected by a CRC-5, shown in Table 6.12 and detailed in Annex F.

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- *Select*, *Req_RN*, *Read*, *Write*, *Kill*, *Lock*, *Access*, *BlockWrite*, *BlockErase*, and *BlockPermalock* are protected by a CRC-16, defined in 6.3.1.5 and detailed in Annex F.
- R=>T commands begin with either a preamble or a frame-sync, as described in 6.3.1.2.8. The command-code lengths specified in Table 6.18 do not include the preamble or frame-sync.
- Tags shall ignore invalid commands. In general, "invalid" means a command that (1) is incorrect given the current Tag state, (2) is unsupported by the Tag, (3) has incorrect parameters, (4) has a CRC error, (5) specifies an incorrect session, or (6) is in any other way not recognized or not executable by the Tag. The actual definition of "invalid" is state-specific and defined, for each Tag state, in Annex B and Annex C.

Table 6.18 – Commands

Command	Code	Length (bits)	Mandatory?	Protection
QueryRep	**0**0	4	Yes	Unique command length
ACK	**0**1	18	Yes	Unique command length
Query	**10**00	22	Yes	Unique command length and a CRC-5
QueryAdjust	**10**01	9	Yes	Unique command length
Select	**10**10	> 44	Yes	CRC-16
Reserved for future use	**10**11	–	–	–
NAK	**11**000000	8	Yes	Unique command length
Req_RN	**11**000001	40	Yes	CRC-16
Read	**11**000010	> 57	Yes	CRC-16
Write	**11**000011	> 58	Yes	CRC-16
Kill	**11**000100	59	Yes	CRC-16
Lock	**11**000101	60	Yes	CRC-16
Access	**11**000110	56	No	CRC-16
BlockWrite	**11**000111	> 57	No	CRC-16
BlockErase	**11**001000	> 57	No	CRC-16
BlockPermalock	**11**001001	> 66	No	CRC-16
Reserved for future use	**11**001010 … **11**011111	–	–	–
Reserved for custom commands	**1110**0000 00000000 … **1110**0000 11111111	–	–	Manufacturer specified
Reserved for proprietary commands	**1110**0001 00000000 … **1110**0001 11111111	–	–	Manufacturer specified
Reserved for future use	**1110**0010 00000000 … **1110**1111 11111111	–	–	–

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6.3.2.11.1 Select commands

The Select command set comprises a single command: *Select*.

6.3.2.11.1.1 *Select* (mandatory)

Select selects a particular Tag population based on user-defined criteria, enabling union (U), intersection (∩), and negation (~) based Tag partitioning. Interrogators perform U and ∩ operations by issuing successive *Select* commands. *Select* can assert or deassert a Tag's **SL** flag, which applies across all four sessions, or it can set a Tag's **inventoried** flag to either *A* or *B* in any one of the four sessions.

Interrogators and Tags shall implement the *Select* command shown in Table 6.19. Target shall indicate whether the *Select* modifies a Tag's **SL** or **inventoried** flag, and in the case of the **inventoried** flag, for which session. Action shall elicit the Tag response shown in Table 6.20. The criteria for determining whether a Tag is matching or non-matching are specified in the MemBank, Pointer, Length and Mask fields. Truncate indicates whether a Tag's backscattered reply shall be truncated to include only those EPC and StoredCRC bits that follow Mask. *Select* passes the following parameters from Interrogator to Tags:

- Target indicates whether the *Select* command modifies a Tag's **SL** flag or its **inventoried** flag, and in the case of **inventoried** it further specifies one of four sessions. A *Select* command that modifies **SL** does not modify **inventoried**, and vice versa. Class-1 Tags shall ignore *Select* commands whose Target is 101_2, 110_2, or 111_2.
- Action indicates whether matching Tags assert or deassert **SL**, or set their **inventoried** flag to *A* or to *B*. Tags conforming to the contents of the MemBank, Pointer, Length, and Mask fields are considered matching. Tags not conforming to the contents of these fields are considered non-matching.
- MemBank specifies whether Mask applies to EPC, TID, or User memory. *Select* commands shall apply to a single memory bank. Successive *Selects* may apply to different banks. MemBank shall not specify Reserved memory; if a Tag receives a *Select* specifying MemBank = 00_2 it shall ignore the *Select*. MemBank parameter value 00_2 is reserved for future use (RFU).
- Pointer, Length, and Mask: Pointer and Length describe a memory range. Pointer references a memory bit address (Pointer is not restricted to word boundaries) and uses EBV formatting (see Annex A). Length is 8 bits, allowing Masks from 0 to 255 bits in length. Mask, which is Length bits long, contains a bit string that a Tag compares against the memory location that begins at Pointer and ends Length bits later. If Pointer and Length reference a memory location that does not exist on the Tag then the Tag shall consider the *Select* to be non-matching. If Length is zero then all Tags shall be considered matching, unless Pointer references a memory location that does not exist on the Tag or Truncate=1 and Pointer is outside the EPC specified in the StoredPC, in which case the Tag shall consider the *Select* to be non-matching.
- Truncate: If an Interrogator asserts Truncate, and if a subsequent *Query* specifies Sel=10 or Sel=11, then a matching Tag shall truncate its reply to an *ACK* to that portion of the EPC immediately following Mask, followed by the StoredCRC. If an Interrogator asserts Truncate, it shall assert it:
  - in the last *Select* that the Interrogator issues prior to sending a *Query*,
  - only if the *Select* has Target = 100_2, and
  - only if Mask ends in the EPC.

  These constraints *do not* preclude an Interrogator from issuing multiple *Select* commands that target the **SL** and/or **inventoried** flags. They *do* require that an Interrogator that is requesting Tags to truncate their replies assert Truncate in the last *Select*, and that this last *Select* targets the **SL** flag. Tags shall power-up with Truncate deasserted.

  Tags shall decide whether to truncate their backscattered EPC on the basis of the most recently received *Select*. If a Tag receives a *Select* with Truncate=1 but Target<>100_2 the Tag shall ignore the *Select*. If a Tag receives a *Select* in which Truncate=1 but MemBank<>01, the Tag shall consider the *Select* to be invalid. If a Tag receives a *Select* in which Truncate=1, MemBank=01, but Mask ends outside the EPC specified in the StoredPC, the Tag shall consider the *Select* to be non-matching.

  A Tag shall preface a truncated reply with five leading zeros (00000_2) inserted between the preamble and the truncated reply. Specifically, when truncating its replies a Tag backscatters 00000_2, then the portion of its EPC following Mask, and then its StoredCRC. See Table 6.14.

  A Tag does not recalculate its StoredCRC for a truncated reply.

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Mask may end at the last bit of the EPC, in which case a truncating Tag shall backscatter 00000_2 followed by its StoredCRC.

Truncated replies never include an XPC_W1 or an XPC_W2, because Mask must end in the EPC.

A recommissioned Tag shall not truncate its replies. A recommissioned Tag that receives a *Select* with Truncate=1 shall evaluate the *Select* normally, but when replying to a subsequent *ACK* it shall backscatter its PacketPC, XPC_W1, optionally its XPC_W2 (if XEB is asserted), an EPC whose length is as specified in the EPC length field in the StoredPC, and its PacketCRC.

Interrogators can use a *Select* command to reset all Tags in a session to **inventoried** state *A*, by issuing a *Select* with Action = 000_2 and a Length value of zero.

Because a Tag stores its StoredPC and StoredCRC in EPC memory, a *Select* command may select on them. Because a Tag computes its PacketPC and PacketCRC dynamically and does not store them in memory, a *Select* command is unable to select on them.

Because a Tag may compute its PC and/or CRC dynamically, its response to a *Select* command whose Pointer, Length, and Mask include the StoredPC or StoredCRC may produce unexpected behavior. Specifically, a Tag's backscattered reply may appear to not match Mask even though the Tag's behavior indicates matching, and vice versa. For example, suppose an Interrogator sends a *Select* to match a 00100_2 EPC length field in the StoredPC. Further assume that a Tag matches, but has an asserted XI. The Tag will dynamically increment its EPC length field to 00101_2 when responding to an *ACK*, and will backscatter this incremented value in the PacketPC. The Tag was matching, but the backscattered EPC length field appears to be non-matching.

Interrogators shall prepend a *Select* with a frame-sync (see 6.3.1.2.8). The CRC-16 that protects a *Select* is calculated over the first command-code bit to the Truncate bit.

Tags shall not reply to a *Select*.

Table 6.19 – *Select* command

	Command	Target	Action	MemBank	Pointer	Length	Mask	Truncate	CRC-16
# of bits	4	3	3	2	EBV	8	Variable	1	16
description	1010	000: **Inventoried** (S0) 001: **Inventoried** (S1) 010: **Inventoried** (S2) 011: **Inventoried** (S3) 100: **SL** 101: RFU 110: RFU 111: RFU	See Table 6.20	00: RFU 01: EPC 10: TID 11: User	Starting Mask address	Mask length (bits)	Mask value	0: Disable truncation 1: Enable truncation	

Table 6.20 – Tag response to Action parameter

Action	Matching	Non-Matching
000	assert **SL** or **inventoried** → *A*	deassert **SL** or **inventoried** → *B*
001	assert **SL** or **inventoried** → *A*	do nothing
010	do nothing	deassert **SL** or **inventoried** → *B*
011	negate **SL** or (*A* → *B*, *B* → *A*)	do nothing
100	deassert **SL** or **inventoried** → *B*	assert **SL** or **inventoried** → *A*
101	deassert **SL** or **inventoried** → *B*	do nothing
110	do nothing	assert **SL** or **inventoried** → *A*
111	do nothing	negate **SL** or (*A* → *B*, *B* → *A*)

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6.3.2.11.2 Inventory commands

The inventory command set comprises *Query*, *QueryAdjust, QueryRep, ACK*, and *NAK*.

6.3.2.11.2.1 *Query* (mandatory)

Interrogators and Tags shall implement the *Query* command shown in Table 6.21. *Query* initiates and specifies an inventory round. *Query* includes the following fields:

- DR (TRcal divide ratio) sets the T=>R link frequency as described in 6.3.1.2.8 and Table 6.9.
- M (cycles per symbol) sets the T=>R data rate and modulation format as shown in Table 6.10.
- TRext chooses whether the T=>R preamble is prepended with a pilot tone as described in 6.3.1.3.2.2 and 6.3.1.3.2.4; however, a Tag's reply to access commands that write to memory (i.e. *Write*, *Kill*, *Lock*, *BlockWrite*, *BlockErase*, and *BlockPermalock*) always uses a pilot tone regardless of the value of TRext.
- Sel chooses which Tags respond to the *Query* (see 6.3.2.11.1.1 and 6.3.2.8).
- Session chooses a session for the inventory round (see 6.3.2.8).
- Target selects whether Tags whose **inventoried** flag is *A* or *B* participate in the inventory round. Tags may change their inventoried flag from *A* to *B* (or vice versa) as a result of being singulated.
- Q sets the number of slots in the round (see 6.3.2.8).

Interrogators shall prepend a *Query* with a preamble (see 6.3.1.2.8).

The CRC-5 that protects a *Query* is calculated over the first command-code bit to the last Q bit. If a Tag receives a *Query* with a CRC-5 error it shall ignore the command.

Upon receiving a *Query*, Tags with matching Sel and Target shall pick a random value in the range (0, $2^{Q}-1$), inclusive, and shall load this value into their slot counter. If a Tag, in response to the *Query*, loads its slot counter with zero, then its reply to a *Query* shall be as shown in Table 6.22; otherwise the Tag shall remain silent.

A *Query* may initiate an inventory round in a new session, or in the prior session. If a Tag in the **acknowledged**, **open**, or **secured** states receives a *Query* whose session parameter matches the prior session it shall invert its **inventoried** flag (i.e. *A*→*B* or *B*→*A*) for the session before it evaluates whether to transition to **ready**, **arbitrate**, or **reply**. If a Tag in the **acknowledged**, **open**, or **secured** states receives a *Query* whose session parameter does not match the prior session it shall leave its **inventoried** flag for the prior session unchanged when beginning the new round.

Tags shall support all DR and M values specified in Table 6.9 and Table 6.10, respectively.

Tags in any state other than **killed** shall execute a *Query* command, starting a new round in the specified session and transitioning to **ready**, **arbitrate**, or **reply**, as appropriate (see Figure 6.19). Tags in the **killed** state shall ignore a *Query*.

Table 6.21 – *Query* command

	Command	DR	M	TRext	Sel	Session	Target	Q	CRC-5
# of bits	4	1	2	1	2	2	1	4	5
description	1000	0: DR=8 1: DR=64/3	00: M=1 01: M=2 10: M=4 11: M=8	0: No pilot tone 1: Use pilot tone	00: All 01: All 10: ~**SL** 11: **SL**	00: S0 01: S1 10: S2 11: S3	0: *A* 1: *B*	0–15	

Table 6.22 – Tag reply to a *Query* command

	Response
# of bits	16
description	RN16

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6.3.2.11.2.2 *QueryAdjust* (mandatory)

Interrogators and Tags shall implement the *QueryAdjust* command shown in Table 6.23. *QueryAdjust* adjusts *Q* (i.e. the number of slots in an inventory round – see 6.3.2.8) without changing any other round parameters.

QueryAdjust includes the following fields:

- Session corroborates the session number for the inventory round (see 6.3.2.8 and 6.3.2.11.2.1). If a Tag receives a *QueryAdjust* whose session number is different from the session number in the *Query* that initiated the round it shall ignore the command.
- UpDn determines whether and how the Tag adjusts *Q*, as follows:

  110: Increment *Q* (i.e. *Q* = *Q* + 1).

  000: No change to *Q.*

  011: Decrement *Q* (i.e. *Q* = *Q* – 1).

  If a Tag receives a *QueryAdjust* with an UpDn value different from those specified above it shall ignore the command. If a Tag whose *Q* value is 15 receives a *QueryAdjust* with UpDn = 110 it shall change UpDn to 000 prior to executing the command; likewise, if a Tag whose *Q* value is 0 receives a *QueryAdjust* with UpDn = 011 it shall change UpDn to 000 prior to executing the command.

Tags shall maintain a running count of the current *Q* value. The initial *Q* value is specified in the *Query* command that started the inventory round; one or more subsequent *QueryAdjust* commands may modify *Q*.

A *QueryAdjust* shall be prepended with a frame-sync (see 6.3.1.2.8).

Upon receiving a *QueryAdjust* Tags first update *Q*, then pick a random value in the range (0, $2^{Q}-1$), inclusive, and load this value into their slot counter. If a Tag, in response to the *QueryAdjust*, loads its slot counter with zero, then its reply to a *QueryAdjust* shall be shown in Table 6.24; otherwise, the Tag shall remain silent. Tags shall respond to a *QueryAdjust* only if they received a prior *Query*.

Tags in any state except **ready** or **killed** shall execute a *QueryAdjust* command if, and only if, (i) the session parameter in the command matches the session parameter in the *Query* that started the round, and (ii) the Tag is not in the middle of a *Kill* or *Access* command sequence (see 6.3.2.11.3.4 or 6.3.2.11.3.6, respectively).

Tags in the **acknowledged**, **open**, or **secured** states that receive a *QueryAdjust* whose session parameter matches the session parameter in the prior *Query*, and who are not in the middle of a *Kill* or *Access* command sequence (see 6.3.2.11.3.4 or 6.3.2.11.3.6, respectively), shall invert their **inventoried** flag (i.e. *A*→*B* or *B*→*A*, as appropriate) for the current session and transition to **ready**.

Table 6.23 – *QueryAdjust* command

	Command	Session	UpDn
# of bits	4	2	3
description	1001	00: S0 01: S1 10: S2 11: S3	110: *Q* = *Q* + 1 000: No change to *Q* 011: *Q* = *Q* – 1

Table 6.24 – Tag reply to a *QueryAdjust* command

	Response
# of bits	16
description	RN16

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6.3.2.11.2.3 *QueryRep* (mandatory)

Interrogators and Tags shall implement the *QueryRep* command shown in Table 6.25. *QueryRep* instructs Tags to decrement their slot counters and, if slot = 0 after decrementing, to backscatter an RN16 to the Interrogator.

QueryRep includes the following field:

- Session corroborates the session number for the inventory round (see 6.3.2.8 and 6.3.2.11.2.1). If a Tag receives a *QueryRep* whose session number is different from the session number in the *Query* that initiated the round it shall ignore the command.

A *QueryRep* shall be prepended with a frame-sync (see 6.3.1.2.8).

If a Tag, in response to the *QueryRep*, decrements its slot counter and the decremented slot value is zero, then its reply to a *QueryRep* shall be as shown in Table 6.26; otherwise the Tag shall remain silent. Tags shall respond to a *QueryRep* only if they received a prior *Query*.

Tags in any state except **ready** or **killed** shall execute a *QueryRep* command if, and only if, (i) the session parameter in the command matches the session parameter in the *Query* that started the round, and (ii) the Tag is not in the middle of a *Kill* or *Access* command sequence (see 6.3.2.11.3.4 or 6.3.2.11.3.6, respectively).

Tags in the **acknowledged**, **open**, or **secured** states that receive a *QueryRep* whose session parameter matches the session parameter in the prior *Query*, and who are not in the middle of a *Kill* or *Access* command sequence (see 6.3.2.11.3.4 or 6.3.2.11.3.6, respectively), shall invert their **inventoried** flag (i.e. $A \rightarrow B$ or $B \rightarrow A$, as appropriate) for the current session and transition to **ready**.

Table 6.25 – *QueryRep* command

	Command	Session
# of bits	2	2
description	00	00: S0 01: S1 10: S2 11: S3

Table 6.26 – Tag reply to a *QueryRep* command

	Response
# of bits	16
description	RN16

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6.3.2.11.2.4 *ACK* (mandatory)

Interrogators and Tags shall implement the *ACK* command shown in Table 6.27. An Interrogator sends an *ACK* to acknowledge a single Tag. *ACK* echoes the Tag's backscattered RN16.

If an Interrogator issues an *ACK* to a Tag in the **reply** or **acknowledged** states, then the echoed RN16 shall be the RN16 that the Tag previously backscattered as it transitioned from the **arbitrate** state to the **reply** state. If an Interrogator issues an *ACK* to a Tag in the **open** or **secured** states, then the echoed RN16 shall be the Tag's handle (see 6.3.2.11.3.1).

An *ACK* shall be prepended with a frame-sync (see 6.3.1.2.8).

The Tag reply to a successful *ACK* shall be as shown in Table 6.28. As described in 6.3.2.11.1.1, the reply may be truncated, in which case the Tag reply is 00000_2 followed by the truncated EPC followed by the StoredCRC. A Tag that receives an *ACK* with an incorrect RN16 or an incorrect handle (as appropriate) shall return to **arbitrate** without responding, unless the Tag is in **ready** or **killed**, in which case it shall ignore the *ACK* and remain in its present state.

If a Tag does not support XPC functionality then the maximum length of its backscattered EPC is 496 bits. If a Tag supports XPC functionality then the maximum length of its backscattered EPC is reduced by two words to accommodate the XPC_W1 and optional XPC_W2, so is 464 bits. See 6.3.2.1.2.2. In either case a Tag's reply to an *ACK* shall not exceed 528 bits in length.

Table 6.27 – *ACK* command

	Command	RN
# of bits	2	16
description	01	Echoed RN16 or handle

Table 6.28 – Tag reply to a successful *ACK* command

	Response
# of bits	21 to 528
description	See Table 6.14

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6.3.2.11.2.5 *NAK* (mandatory)

Interrogators and Tags shall implement the *NAK* command shown in Table 6.29. Any Tag that receives a *NAK* shall return to the **arbitrate** state without changing its **inventoried** flag, unless the Tag is in **ready** or **killed**, in which case it shall ignore the *NAK* and remain in its current state.

A *NAK* shall be prepended with a frame-sync (see 6.3.1.2.8).

Tags shall not reply to a *NAK*.

Table 6.29 – *NAK* command

	Command
# of bits	8
description	11000000

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6.3.2.11.3 Access commands

The set of access commands comprises *Req_RN, Read, Write*, *Kill*, *Lock*, *Access*, *BlockWrite*, *BlockErase*, and *BlockPermalock*. As described in 6.3.2.9, Tags execute *Req_RN* from the **acknowledged**, **open**, or **secured** states. Tags execute *Read*, *Write*, *BlockWrite*, and *BlockErase* from the **secured** state; if allowed by the lock status of the memory location being accessed, they may also execute these commands from the **open** state. Tags execute *Access* and *Kill* from the **open** or **secured** states. Tags execute *Lock* and *BlockPermalock* only from the **secured** state.

All access commands issued to a Tag in the **open** or **secured** states include the Tag's handle as a parameter in the command. When in either of these two states, Tags shall verify that the handle is correct prior to executing an access command, and shall ignore access commands with an incorrect handle. The handle value is fixed for the entire duration of a Tag access.

A Tag's reply to all access commands that read or write memory (i.e. *Read, Write*, *Kill*, *Lock*, *BlockWrite*, *BlockErase*, and *BlockPermalock*) includes a 1-bit header. Header=0 indicates that the operation was successful and the reply is valid; header=1 indicates that the operation was unsuccessful and the reply is an error code.

A Tag's reply to all access commands that write to memory (i.e. *Write*, *Kill*, *Lock*, *BlockWrite*, *BlockErase*, and *BlockPermalock* with Read/Lock=1 (see 6.3.2.11.3.9) shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. the Tag shall reply as if TRext=1 regardless of the TRext value specified in the *Query* command that initiated the inventory round).

After an Interrogator writes to a Tag's StoredPC or EPC, or changes bits 03_h to 07_h of User memory from zero to a nonzero value (or vice versa), or recommissions the Tag, the StoredCRC may be incorrect until the Interrogator powers-down and then re-powers-up its energizing RF field, because a Tag calculates its StoredCRC at power-up.

If an Interrogator attempts to write to EPC memory locations 00_h to $0F_h$ (i.e. to the StoredCRC) using a *Write*, *BlockWrite*, or *BlockErase* command the Tag shall ignore the command and respond with an error code (see Annex I for error-code definitions and for the reply format).

If an Interrogator attempts to write to EPC memory locations 210_h to $22F_h$ (i.e. to the XPC_W1 or XPC_W2) of a Class-1 Tag using a *Write*, *BlockWrite*, or *BlockErase* command the Tag shall ignore the command and respond with an error code (see Annex I for error-code definitions and for the reply format).

If an Interrogator attempts to write to a memory bank or password that is permalocked unwriteable, or to a memory bank or password that is locked unwriteable and the Tag is not in the **secured** state, or to a memory block that is permalocked, using a *Write*, *BlockWrite*, or *BlockErase* command, or if a portion of the Data in a *Write* command overlaps a permalocked memory block, the Tag shall ignore the command and respond with an error code (see Annex I for error-code definitions and for the reply format).

Req_RN, Read, Write, *Kill*, and *Lock* are required commands; *Access*, *BlockWrite*, *BlockErase*, and *BlockPermalock* are optional. Tags shall ignore optional access commands that they do not support.

See Annex K for an example of a data-flow exchange during which an Interrogator accesses a Tag and reads its kill password.

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6.3.2.11.3.1 *Req_RN* (mandatory)

Interrogators and Tags shall implement the *Req_RN* command shown in Table 6.30. *Req_RN* instructs a Tag to backscatter a new RN16. Both the Interrogator's command, and the Tag's response, depend on the Tag's state:

- **Acknowledged** state: When issuing a *Req_RN* command to a Tag in the **acknowledged** state, an Interrogator shall include the Tag's last backscattered RN16 as a parameter in the *Req_RN*. The *Req_RN* command is protected by a CRC-16 calculated over the command bits and the RN16. If the Tag receives the *Req_RN* with a valid CRC-16 and a valid RN16 it shall generate and store a new RN16 (denoted handle), backscatter this handle, and transition to the **open** or **secured** state. The choice of ending state depends on the Tag's access password, as follows:
  - Access password <> 0: Tag transitions to **open** state.
  - Access password = 0: Tag transitions to **secured** state.

  If the Tag receives the *Req_RN* command with a valid CRC-16 but an invalid RN16 it shall ignore the *Req_RN* and remain in the **acknowledged** state.
- **Open** or **secured** states: When issuing a *Req_RN* command to a Tag in the **open** or **secured** states, an Interrogator shall include the Tag's handle as a parameter in the *Req_RN*. The *Req_RN* command is protected by a CRC-16 calculated over the command bits and the handle. If the Tag receives the *Req_RN* with a valid CRC-16 and a valid handle it shall generate and backscatter a new RN16. If the Tag receives the *Req_RN* with a valid CRC-16 but an invalid handle it shall ignore the *Req_RN*. In either case the Tag shall remain in its current state (**open** or **secured**, as appropriate).

If an Interrogator wishes to ensure that only a single Tag is in the **acknowledged** state it may issue a *Req_RN*, causing the Tag or Tags to each backscatter a handle and transition to the **open** or **secured** state (as appropriate). The Interrogator may then issue an *ACK* with handle as a parameter. Tags that receive an *ACK* with an invalid handle shall return to **arbitrate** (Note: If a Tag receives an *ACK* with an invalid handle it returns to **arbitrate**, whereas if it receives an access command with an invalid handle it ignores the command).

The first bit of the backscattered RN16 shall be denoted the MSB; the last bit shall be denoted the LSB.

A *Req_RN* shall be prepended with a frame-sync (see 6.3.1.2.8).

The Tag reply to a *Req_RN* shall be as shown in Table 6.31. The RN16 or handle are protected by a CRC-16.

Table 6.30 – *Req_RN* command

	Command	RN	CRC-16
# of bits	8	16	16
description	11000001	Prior RN16 or handle	

Table 6.31 – Tag reply to a *Req_RN* command

	RN	CRC-16
# of bits	16	16
description	handle or new RN16	

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6.3.2.11.3.2 *Read* (mandatory)

Interrogators and Tags shall implement the *Read* command shown in Table 6.33. *Read* allows an Interrogator to read part or all of a Tag's Reserved, EPC, TID, or User memory. *Read* has the following fields:

- MemBank specifies whether the *Read* accesses Reserved, EPC, TID, or User memory. *Read* commands shall apply to a single memory bank. Successive *Reads* may apply to different banks.
- WordPtr specifies the starting word address for the memory read, where words are 16 bits in length. For example, WordPtr = 00_h specifies the first 16-bit memory word, WordPtr = 01_h specifies the second 16-bit memory word, etc. WordPtr uses EBV formatting (see Annex A).
- WordCount specifies the number of 16-bit words to be read. If WordCount = 00_h the Tag shall backscatter the contents of the chosen memory bank starting at WordPtr and ending at the end of the bank, unless MemBank = 01_2, in which case the Tag shall backscatter the memory contents specified in Table 6.32.

Table 6.32 – Tag backscatter when WordCount=00_h and MemBank=01_2

WordPtr Memory Address	Tag Implements XPC_W1?	Tag Implements XPC_W2?	What the Tag Backscatters
Within the StoredCRC, StoredPC, or the EPC specified by bits 10_h–14_h of the StoredPC	Don't care	Don't care	EPC memory starting at WordPtr and ending at the EPC length specified by bits 10_h–14_h of the StoredPC
Within physical EPC memory but above the EPC specified by bits 10_h–14_h of the StoredPC	No	N/A. See note 1	EPC memory starting at WordPtr and ending at the end of physical EPC memory
Within physical EPC memory but above the EPC specified by bits 10_h–14_h of the StoredPC	Yes	No	EPC memory starting at WordPtr and ending at the end of physical EPC memory. Includes the XPC_W1 if WordPtr is less than or equal to 210_h and physical EPC memory extends to or above address 210_h
Within physical EPC memory but above the EPC specified by bits 10_h–14_h of the StoredPC	Yes	Yes	EPC memory starting at WordPtr and ending at the end of physical EPC memory. Includes the XPC_W1 and XPC_W2 if WordPtr is less than or equal to 210_h and physical EPC memory extends to or above address 210_h. Includes the XPC_W2 if WordPtr is equal to 220_h and physical EPC memory extends to or above 220_h.
210_h. Above physical EPC memory	No	N/A. See note 1	Error code
210_h. Above physical EPC memory	Yes	No	XPC_W1
210_h. Above physical EPC memory	Yes	Yes	XPC_W1 and XPC_W2
220_h. Above physical EPC memory	No	N/A. See note 1	Error code
220_h. Above physical EPC memory	Yes	No	Error code
220_h. Above physical EPC memory	Yes	Yes	XPC_W2
Not 210_h or 220_h. Above physical EPC memory.	Don't care	Don't care	Error code

Note 1: If a Tag does not implement an XPC_W1 then it does not implement an XPC_W2. See 6.3.2.1.2.5.

The *Read* command also includes the Tag's handle and a CRC-16. The CRC-16 is calculated over the first command-code bit to the last handle bit.

If a Tag receives a *Read* with a valid CRC-16 but an invalid handle it shall ignore the *Read* and remain in its current state (**open** or **secured**, as appropriate).

A *Read* shall be prepended with a frame-sync (see 6.3.1.2.8).

If all of the memory words specified in a *Read* exist and none are read-locked, the Tag reply to the *Read* shall be as shown in Table 6.34. The Tag responds by backscattering a header (a 0-bit), the requested memory words, and its handle. The reply includes a CRC-16 calculated over the 0-bit, memory words, and handle.

If a one or more of the memory words specified in the *Read* command either do not exist or are read-locked, the Tag shall backscatter an error code, within time T_1 in Table 6.13, rather than the reply shown in Table 6.34 (see Annex I for error-code definitions and for the reply format).

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Table 6.33 – ***Read*** command

	Command	MemBank	WordPtr	WordCount	RN	CRC-16
# of bits	8	2	EBV	8	16	16
description	11000010	00: Reserved 01: EPC 10: TID 11: User	Starting address pointer	Number of words to read	handle	

Table 6.34 – Tag reply to a successful ***Read*** command

	Header	Memory Words	RN	CRC-16
# of bits	1	Variable	16	16
description	0	Data	handle	

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6.3.2.11.3.3 *Write* (mandatory)

Interrogators and Tags shall implement the *Write* command shown in Table 6.35. *Write* allows an Interrogator to write a word in a Tag's Reserved, EPC, TID, or User memory. *Write* has the following fields:

- MemBank specifies whether the *Write* occurs in Reserved, EPC, TID, or User memory.
- WordPtr specifies the word address for the memory write, where words are 16 bits in length. For example, WordPtr = 00_h specifies the first 16-bit memory word, WordPtr = 01_h specifies the second 16-bit memory word, etc. WordPtr uses EBV formatting (see Annex A).
- Data contains a 16-bit word to be written. Before each and every *Write* the Interrogator shall first issue a *Req_RN* command; the Tag responds by backscattering a new RN16. The Interrogator shall cover-code the data by EXORing it with this new RN16 prior to transmission.

The *Write* command also includes the Tag's handle and a CRC-16. The CRC-16 is calculated over the first command-code bit to the last handle bit.

If a Tag in the **open** or **secured** states receives a *Write* with a valid CRC-16 but an invalid handle, or it receives a *Write* before which the immediately preceding command was not a *Req_RN*, it shall ignore the *Write* and remain in its current state.

A *Write* shall be prepended with a frame-sync (see 6.3.1.2.8).

After issuing a *Write* an Interrogator shall transmit CW for the lesser of T_{REPLY} or 20ms, where T_{REPLY} is the time between the Interrogator's *Write* command and the Tag's backscattered reply. An Interrogator may observe several possible outcomes from a *Write*, depending on the success or failure of the Tag's memory-write operation:

- **The *Write* succeeds:** After completing the *Write* a Tag shall backscatter the reply shown in Table 6.36 and Figure 6.22 comprising a header (a 0-bit), the Tag's handle, and a CRC-16 calculated over the 0-bit and handle. If the Interrogator observes this reply within 20 ms then the *Write* completed successfully.
- **The Tag encounters an error:** The Tag shall backscatter an error code during the CW period rather than the reply shown in Table 6.36 (see Annex I for error-code definitions and for the reply format).
- **The *Write* does not succeed:** If the Interrogator does not observe a reply within 20ms then the *Write* did not complete successfully. The Interrogator may issue a *Req_RN* command (containing the Tag's handle) to verify that the Tag is still in the Interrogator's field, and may reissue the *Write* command.

Upon receiving a valid *Write* command a Tag shall write the commanded Data into memory. The Tag's reply to a *Write* shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. a Tag shall reply as if TRext=1 regardless of the TRext value in the *Query* that initiated the round).

Table 6.35 – *Write* command

	Command	MemBank	WordPtr	Data	RN	CRC-16
# of bits	8	2	EBV	16	16	16
description	11000011	00: Reserved 01: EPC 10: TID 11: User	Address pointer	RN16 ⊗ word to be written	handle	

Table 6.36 – Tag reply to a successful *Write* command

	Header	RN	CRC-16
# of bits	1	16	16
description	0	handle	

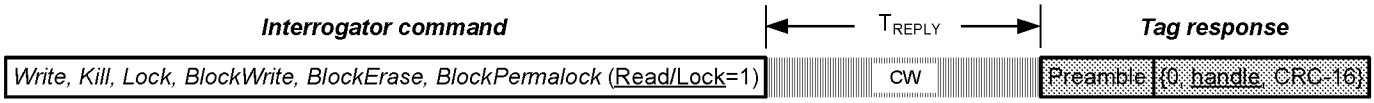


Figure 6.22 – Successful *Write* sequence

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6.3.2.11.3.4 *Kill* (mandatory)

Interrogators and Tags shall implement the *Kill* command shown in Table 6.37 and Table 6.38. *Kill* allows an Interrogator to permanently disable a Tag. *Kill* also allows an Interrogator to recommission recommissionable Tags.

To kill or recommission a Tag, an Interrogator shall follow the multi-step procedure outlined in Figure 6.23. Briefly, the Interrogator issues two *Kill* commands, the first containing the 16 MSBs of the Tag's kill password EXORed with an RN16, and the second containing the 16 LSBs of the Tag's kill password EXORed with a different RN16. Each EXOR operation shall be performed MSB first (i.e. the MSB of each half-password shall be EXORed with the MSB of its respective RN16). Just prior to issuing each *Kill* command the Interrogator first issues a *Req_RN* to obtain a new RN16.

Tags shall incorporate the necessary logic to successively accept two 16-bit subportions of a 32-bit kill password. Interrogators shall not intersperse commands other than *Req_RN* between the two successive *Kill* commands. If a Tag, after receiving a first *Kill*, receives any valid command other than *Req_RN* before the second *Kill* it shall return to **arbitrate**, unless the intervening command is a *Query*, in which case the Tag shall execute the *Query* (inverting its **inventoried** flag if the session parameter in the *Query* matches the prior session).

Kill contains 3 RFU/Recom bits. In the first *Kill* command these bits are RFU. Interrogators shall set them to 000_2 when communicating with Class-1 Tags, and Class-1 Tags shall ignore them. Higher-class Tags may use these bits to expand the functionality of the *Kill* command. As described in 6.3.2.10, in the second *Kill* command these bits are called *recommissioning* (or Recom) bits and may be nonzero. The procedures for killing or recommissioning a Tag are identical, except that the recommissioning bits in the second *Kill* command are zero when killing a Tag and are nonzero when recommissioning it. Regardless of the intended operation, a Tag does not kill or recommission itself without first receiving the correct kill password by the procedure shown in Figure 6.23.

If a Tag does not implement recommissioning then it ignores the recommissioning bits and treats them as though they were zero, meaning that, if the Tag receives a properly formatted *Kill* command sequence with the correct kill password it kills itself dead regardless of the values of the recommissioning bits.

Tag's whose kill password is zero do not execute a kill or a recommissioning operation; if such a Tag receives a *Kill* command it ignores the command and backscatters an error code (see Figure 6.23).

The Tag reply to the first *Kill* command shall be as shown in Table 6.39. The reply shall use the TRext value specified in the *Query* command that initiated the round.

After issuing the second *Kill* command an Interrogator shall transmit CW for the lesser of T_{REPLY} or 20ms, where T_{REPLY} is the time between the Interrogator's second *Kill* command and the Tag's backscattered reply. An Interrogator may observe several possible outcomes from a *Kill* command sequence, depending on the success or failure of the Tag's kill or recommissioning operation:

- **The *Kill* or recommissioning succeeds:** After completing the operation the Tag shall backscatter the reply shown in Table 6.40 and Figure 6.22 comprising a header (a 0-bit), the Tag's handle, and a CRC-16 calculated over the 0-bit and handle. If the Interrogator observes this reply within 20 ms then the operation completed successfully. If the Tag is killed dead then immediately after this reply the Tag shall render itself silent and shall not respond to an Interrogator thereafter.
- **The Tag encounters an error:** The Tag shall backscatter an error code during the CW period rather than the reply shown in Table 6.40 (see Annex I for error-code definitions and for the reply format).
- **The *Kill* or recommissioning does not succeed:** If the Interrogator does not observe a reply within 20ms then the operation did not complete successfully. The Interrogator may issue a *Req_RN* (containing the Tag's handle) to verify that the Tag is still in the Interrogator's field, and may reinitiate the multi-step kill procedure outlined in Figure 6.23.

A *Kill* shall be prepended with a frame-sync (see 6.3.1.2.8).

Upon receiving a valid *Kill* command sequence a Tag shall render itself killed or recommissioned, as appropriate. The Tag's reply to the second *Kill* command shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. a Tag shall reply as if TRext=1 regardless of the TRext value in the *Query* that initiated the round).

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Table 6.37 – First *Kill* command

	Command	Password	RFU/Recom	RN	CRC-16
# of bits	8	16	3	16	16
description	11000100	(½ kill password) ⊗ RN16	000_2	handle	

Table 6.38 – Second *Kill* command

	Command	Password	RFU/Recom	RN	CRC-16
# of bits	8	16	3	16	16
description	11000100	(½ kill password) ⊗ RN16	Recommissioning bits	handle	

Table 6.39 – Tag reply to the first *Kill* command

	RN	CRC-16
# of bits	16	16
description	handle	

Table 6.40 – Tag reply to a successful *Kill* procedure

	Header	RN	CRC-16
# of bits	1	16	16
description	0	handle	

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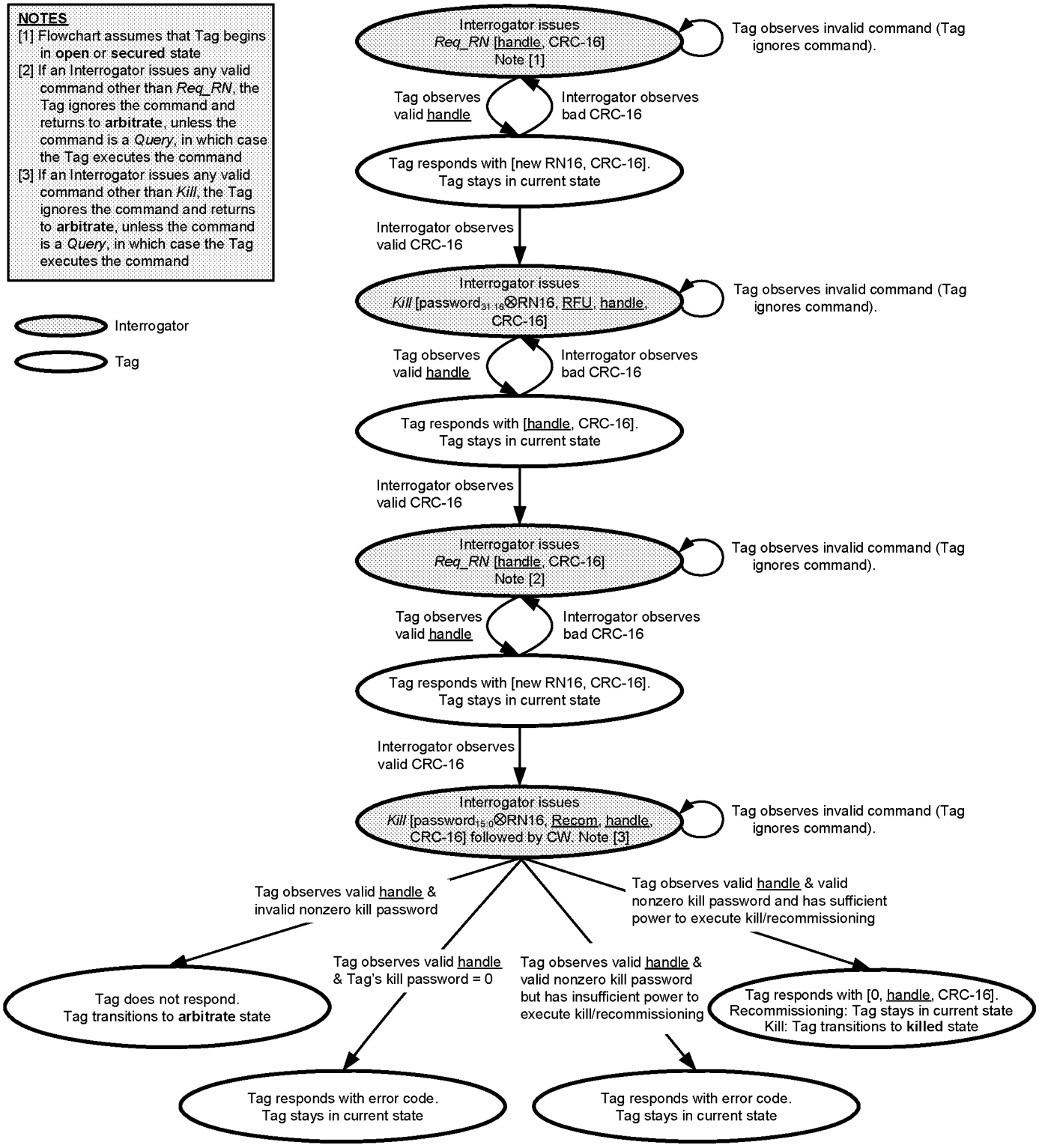


Figure 6.23 – *Kill* procedure

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6.3.2.11.3.5 *Lock* (mandatory)

Interrogators and Tags shall implement the *Lock* command shown in Table 6.41 and Figure 6.24. Only Tags in the **secured** state shall execute a *Lock* command. *Lock* allows an Interrogator to:

- Lock individual passwords, thereby preventing or allowing subsequent reads and writes of that password,
- Lock individual memory banks, thereby preventing or allowing subsequent writes to that bank, and
- Permalock (make permanently unchangeable) the lock status for a password or memory bank.

Lock contains a 20-bit payload defined as follows:

- The first 10 payload bits are Mask bits. A Tag shall interpret these bit values as follows:
  - Mask = 0: Ignore the associated Action field and retain the current lock setting.
  - Mask = 1: Implement the associated Action field and overwrite the current lock setting.
- The last 10 payload bits are Action bits. A Tag shall interpret these bit values as follows:
  - Action = 0: Deassert lock for the associated memory location.
  - Action = 1: Assert lock or permalock for the associated memory location.

The functionality of the various Action fields is described in Table 6.43.

The payload of a *Lock* command shall always be 20 bits in length.

If an Interrogator issues a *Lock* command whose Mask and Action fields attempt to change the lock status of a nonexistent memory bank or nonexistent password, the Tag shall ignore the entire *Lock* command and instead backscatter an error code (see Annex I).

The *Lock* command differs from the optional *BlockPermalock* command in that *Lock* reversibly or permanently locks a password or an entire EPC, TID, or User memory bank in a writeable or unwriteable state, whereas *BlockPermalock* permanently locks blocks of User memory in an unwriteable state. Table 6.50 specifies how a Tag shall react to a *Lock* command that follows a prior *BlockPermalock* command, or vice versa.

Permalock bits, once asserted, cannot be deasserted except by recommissioning the Tag (see 6.3.2.10). If a Tag receives a *Lock* whose payload attempts to deassert a previously asserted permalock bit, the Tag shall ignore the *Lock* and backscatter an error code (see Annex I). If a Tag receives a *Lock* whose payload attempts to reassert a previously asserted permalock bit, the Tag shall ignore this particular Action field and implement the remainder of the *Lock* payload, unless the Tag has been recommissioned and the corresponding memory location is no longer permalocked, in which case the Tag shall reassert the permalock bit.

A Tag's lock bits cannot be read directly; they can be inferred by attempting to perform other memory operations.

All Tags shall implement memory locking, and all Tags shall implement the *Lock* command. However, Tags need not support all the Action fields shown in Figure 6.24, depending on whether the password location or memory bank associated with an Action field exists and is lockable and/or unlockable. Specifically, if a Tag receives a *Lock* it cannot execute because one or more of the passwords or memory banks do not exist, or one or more of the Action fields attempt to change a permalocked value, or one or more of the passwords or memory banks are either not lockable or not unlockable, the Tag shall ignore the entire *Lock* and instead backscatter an error code (see Annex I). The only exception to this general rule relates to Tags whose only lock functionality is to permanently lock **all** memory (i.e. all memory banks and all passwords) at once; these Tags shall execute a *Lock* whose payload is $FFFFF_h$, and shall backscatter an error code for any payload other than $FFFFF_h$.

A *Lock* shall be prepended with a frame-sync (see 6.3.1.2.8).

After issuing a *Lock* an Interrogator shall transmit CW for the lesser of T_{REPLY} or 20ms, where T_{REPLY} is the time between the Interrogator's *Lock* command and the Tag's backscattered reply. An Interrogator may observe several possible outcomes from a *Lock*, depending on the success or failure of the Tag's memory-write operation:

- **The *Lock* succeeds:** After completing the *Lock* the Tag shall backscatter the reply shown in Table 6.42 and Figure 6.22 comprising a header (a 0-bit), the Tag's handle, and a CRC-16 calculated over the 0-bit and handle. If the Interrogator observes this reply within 20 ms then the *Lock* completed successfully.
- **The Tag encounters an error:** The Tag shall backscatter an error code during the CW period rather than the reply shown in Table 6.42 (see Annex I for error-code definitions and for the reply format).
- **The *Lock* does not succeed:** If the Interrogator does not observe a reply within 20ms then the *Lock* did not complete successfully. The Interrogator may issue a *Req_RN* command (containing the Tag's handle) to verify that the Tag is still in the Interrogator's field, and may reissue the *Lock*.

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Upon receiving a valid *Lock* command a Tag shall perform the commanded lock operation. The Tag's reply to a *Lock* shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. a Tag shall reply as if TRext=1 regardless of the TRext value in the *Query* that initiated the round).

Table 6.41 – *Lock* command

	Command	Payload	RN	CRC-16
# of bits	8	20	16	16
description	11000101	Mask and Action Fields	handle	

Table 6.42 – Tag reply to a *Lock* command

	Header	RN	CRC-16
# of bits	1	16	16
description	0	handle	



Masks and Associated Action Fields

	Kill pwd		Access pwd		EPC memory		TID memory		User memory	
	19	18	17	16	15	14	13	12	11	10
Mask	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write
	9	8	7	6	5	4	3	2	1	0
Action	pwd read/ write	perma lock	pwd read/ write	perma lock	pwd write	perma lock	pwd write	perma lock	pwd write	perma lock

Figure 6.24 – *Lock* payload and usage

Table 6.43 – *Lock* Action-field functionality

pwd-write	permalock	Description
0	0	Associated memory bank is writeable from either the **open** or **secured** states.
0	1	Associated memory bank is permanently writeable from either the **open** or **secured** states and may never be locked.
1	0	Associated memory bank is writeable from the **secured** state but not from the **open** state.
1	1	Associated memory bank is not writeable from any state.
pwd-read/write	**permalock**	**Description**
0	0	Associated password location is readable and writeable from either the **open** or **secured** states.
0	1	Associated password location is permanently readable and writeable from either the **open** or **secured** states and may never be locked.
1	0	Associated password location is readable and writeable from the **secured** state but not from the **open** state.
1	1	Associated password location is not readable or writeable from any state.

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6.3.2.11.3.6 *Access* (optional)

Interrogators and Tags may implement an *Access* command; if they do, the command shall be as shown in Table 6.44. *Access* causes a Tag with a nonzero-valued access password to transition from the **open** to the **secured** state (a Tag with a zero-valued access password is never in the **open** state — see Figure 6.19) or, if the Tag is already in the **secured** state, to remain in **secured**.

To access a Tag, an Interrogator shall follow the multi-step procedure outlined in Figure 6.25. Briefly, an Interrogator issues two *Access* commands, the first containing the 16 MSBs of the Tag's access password EXORed with an RN16, and the second containing the 16 LSBs of the Tag's access password EXORed with a different RN16. Each EXOR operation shall be performed MSB first (i.e. the MSB of each half-password shall be EXORed with the MSB of its respective RN16). Just prior to issuing each *Access* command the Interrogator first issues a *Req_RN* to obtain a new RN16.

Tags shall incorporate the necessary logic to successively accept two 16-bit subportions of a 32-bit access password. Interrogators shall not intersperse commands other than *Req_RN* between the two successive *Access* commands. If a Tag, after receiving a first *Access*, receives any valid command other than *Req_RN* before the second *Access* it shall return to **arbitrate**, unless the intervening command is a *Query*, in which case the Tag shall execute the *Query* (inverting its **inventoried** flag if the session parameter in the *Query* matches the prior session).

An *Access* shall be prepended with a frame-sync (see 6.3.1.2.8).

The Tag reply to an *Access* command shall be as shown in Table 6.45. If the *Access* is the first in the sequence, then the Tag backscatters its handle to acknowledge that it received the command. If the *Access* is the second in the sequence and the entire received 32-bit access password is correct, then the Tag backscatters its handle to acknowledge that it has executed the command successfully and has transitioned to the **secured** state; otherwise the Tag does not reply and returns to **arbitrate**. The reply includes a CRC-16 calculated over the handle.

Table 6.44 – *Access* command

	Command	Password	RN	CRC-16
# of bits	8	16	16	16
description	11000110	(½ access password) ⊗ RN16	handle	

Table 6.45 – Tag reply to an *Access* command

	RN	CRC-16
# of bits	16	16
description	handle	

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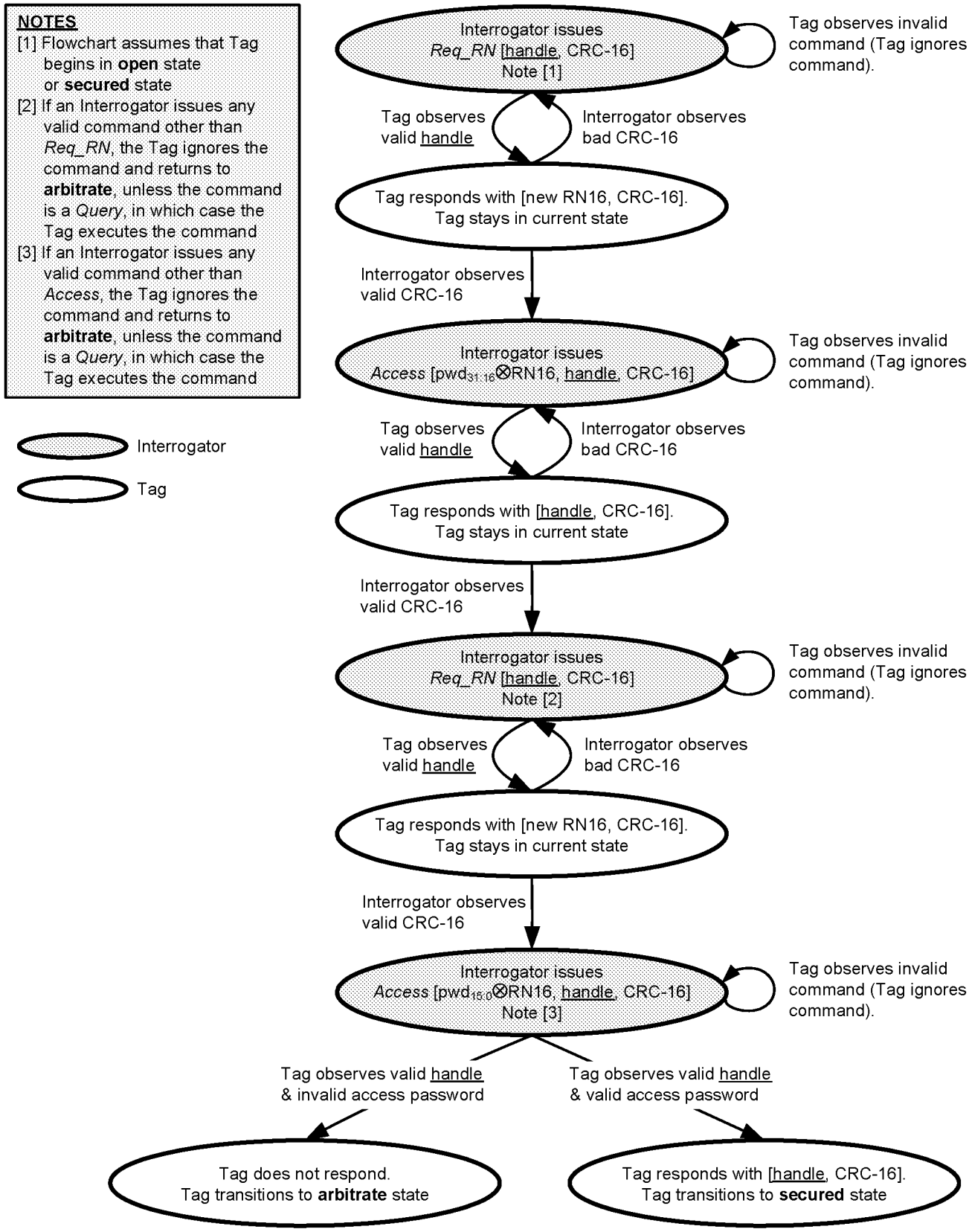


Figure 6.25 – *Access* procedure

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6.3.2.11.3.7 *BlockWrite* (optional)

Interrogators and Tags may implement a *BlockWrite* command; if they do, they shall implement it as shown in Table 6.46. *BlockWrite* allows an Interrogator to write multiple words in a Tag's Reserved, EPC, TID, or User memory using a single command. *BlockWrite* has the following fields:

- MemBank specifies whether the *BlockWrite* occurs in Reserved, EPC, TID, or User memory. *BlockWrite* commands shall apply to a single memory bank. Successive *BlockWrites* may apply to different banks.
- WordPtr specifies the starting word address for the memory write, where words are 16 bits in length. For example, WordPtr = 00_h specifies the first 16-bit memory word, WordPtr = 01_h specifies the second 16-bit memory word, etc. WordPtr uses EBV formatting (see Annex A).
- WordCount specifies the number of 16-bit words to be written. If WordCount = 00_h the Tag shall ignore the *BlockWrite*. If WordCount = 01_h the Tag shall write a single data word.
- Data contains the 16-bit words to be written, and shall be 16×WordCount bits in length. Unlike a *Write*, the data in a *BlockWrite* are not cover-coded, and an Interrogator need not issue a *Req_RN* before issuing a *BlockWrite*.

The *BlockWrite* command also includes the Tag's handle and a CRC-16. The CRC-16 is calculated over the first command-code bit to the last handle bit.

If a Tag receives a *BlockWrite* with a valid CRC-16 but an invalid handle it shall ignore the *BlockWrite* and remain in its current state (**open** or **secured**, as appropriate).

A *BlockWrite* shall be prepended with a frame-sync (see 6.3.1.2.8).

After issuing a *BlockWrite* an Interrogator shall transmit CW for the lesser of T_{REPLY} or 20ms, where T_{REPLY} is the time between the Interrogator's *BlockWrite* command and the Tag's backscattered reply. An Interrogator may observe several possible outcomes from a *BlockWrite*, depending on the success or failure of the Tag's memory-write operation:

- **The *BlockWrite* succeeds:** After completing the *BlockWrite* a Tag shall backscatter the reply shown in Table 6.47 and Figure 6.22 comprising a header (a 0-bit), the Tag's handle, and a CRC-16 calculated over the 0-bit and handle. If the Interrogator observes this reply within 20 ms then the *BlockWrite* completed successfully.
- **The Tag encounters an error:** The Tag shall backscatter an error code during the CW period rather than the reply shown in Table 6.47 (see Annex I for error-code definitions and for the reply format).
- **The *BlockWrite* does not succeed:** If the Interrogator does not observe a reply within 20ms then the *BlockWrite* did not complete successfully. The Interrogator may issue a *Req_RN* command (containing the Tag's handle) to verify that the Tag is still in the Interrogator's field, and may reissue the *BlockWrite*.

Upon receiving a valid *BlockWrite* command a Tag shall write the commanded Data into memory. The Tag's reply to a *BlockWrite* shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. a Tag shall reply as if TRext=1 regardless of the TRext value in the *Query* that initiated the round).

Table 6.46 – *BlockWrite* command

	Command	MemBank	WordPtr	WordCount	Data	RN	CRC-16
# of bits	8	2	EBV	8	Variable	16	16
description	11000111	00: Reserved 01: EPC 10: TID 11: User	Starting address pointer	Number of words to write	Data to be written	handle	

Table 6.47 – Tag reply to a successful *BlockWrite* command

	Header	RN	CRC-16
# of bits	1	16	16
description	0	handle	

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6.3.2.11.3.8 *BlockErase* (optional)

Interrogators and Tags may implement a *BlockErase* command; if they do, they shall implement it as shown in Table 6.48. *BlockErase* allows an Interrogator to erase multiple words in a Tag's Reserved, EPC, TID, or User memory using a single command. *BlockErase* has the following fields:

- MemBank specifies whether the *BlockErase* occurs in Reserved, EPC, TID, or User memory. *BlockErase* commands shall apply to a single memory bank. Successive *BlockErases* may apply to different banks.
- WordPtr specifies the starting word address for the memory erase, where words are 16 bits in length. For example, WordPtr = 00_h specifies the first 16-bit memory word, WordPtr = 01_h specifies the second 16-bit memory word, etc. WordPtr uses EBV formatting (see Annex A).
- WordCount specifies the number of 16-bit words to be erased. If WordCount = 00_h the Tag shall ignore the *BlockErase*. If WordCount = 01_h the Tag shall erase a single data word.

The *BlockErase* command also includes the Tag's handle and a CRC-16. The CRC-16 is calculated over the first command-code bit to the last handle bit.

If a Tag receives a *BlockErase* with a valid CRC-16 but an invalid handle it shall ignore the *BlockErase* and remain in its current state (**open** or **secured**, as appropriate).

A *BlockErase* shall be prepended with a frame-sync (see 6.3.1.2.8).

After issuing a *BlockErase* an Interrogator shall transmit CW for the lesser of T_{REPLY} or 20ms, where T_{REPLY} is the time between the Interrogator's *BlockErase* command and the Tag's backscattered reply. An Interrogator may observe several possible outcomes from a *BlockErase*, depending on the success or failure of the Tag's memory-erase operation:

- **The *BlockErase* succeeds:** After completing the *BlockErase* a Tag shall backscatter the reply shown in Table 6.49 and Figure 6.22 comprising a header (a 0-bit), the Tag's handle, and a CRC-16 calculated over the 0-bit and handle. If the Interrogator observes this reply within 20 ms then the *BlockErase* completed successfully.
- **The Tag encounters an error:** The Tag shall backscatter an error code during the CW period rather than the reply shown in Table 6.49 (see Annex I for error-code definitions and for the reply format).
- **The *BlockErase* does not succeed:** If the Interrogator does not observe a reply within 20ms then the *BlockErase* did not complete successfully. The Interrogator may issue a *Req_RN* command (containing the Tag's handle) to verify that the Tag is still in the Interrogator's field, and may reissue the *BlockErase*.

Upon receiving a valid *BlockErase* command a Tag shall erase the commanded memory words. The Tag's reply to a *BlockErase* shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. a Tag shall reply as if TRext=1 regardless of the TRext value in the *Query* that initiated the round).

Table 6.48 – *BlockErase* command

	Command	MemBank	WordPtr	WordCount	RN	CRC-16
# of bits	8	2	EBV	8	16	16
description	11001000	00: Reserved 01: EPC 10: TID 11: User	Starting address pointer	Number of words to erase	handle	

Table 6.49 – Tag reply to a successful *BlockErase* command

	Header	RN	CRC-16
# of bits	1	16	16
description	0	handle	

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6.3.2.11.3.9 *BlockPermalock* (optional)

Interrogators and Tags may implement a *BlockPermalock* command; if they do, they shall implement it as shown in Table 6.51. *BlockPermalock* allows an Interrogator to:

- Permalock one or more blocks (individual sub-portions) in a Tag's User memory, or
- Read the permalock status of the memory blocks in a Tag's User memory.

A single *BlockPermalock* command can permalock between 0 and 4080 blocks of User memory. The block size is vendor-defined. The memory blocks need not be contiguous.

Only Tags in the **secured** state shall execute a *BlockPermalock* command.

The *BlockPermalock* command differs from the *Lock* command in that *BlockPermalock* permanently locks blocks of User memory in an unwriteable state, whereas *Lock* reversibly or permanently locks a password or an entire memory bank in a writeable or unwriteable state. Table 6.50 specifies how a Tag shall react to a *BlockPermalock* command (with Read/Lock = 1) that follows a prior *Lock* command, or vice versa.

Table 6.50 – Precedence for *Lock* and *BlockPermalock* commands

<table>
<tr><th colspan="3">First Command</th><th colspan="3">Second Command</th><th>Tag Action and Response to 2nd Command</th></tr>
<tr><td rowspan="5">Lock</td><td>pwd-write</td><td>permalock</td><td rowspan="5" colspan="3">BlockPermalock (Read/Lock = 1)</td><td></td></tr>
<tr><td>0</td><td>0</td><td>Permalock the blocks indicated by Mask; respond as described in this section 6.3.2.11.3.9</td></tr>
<tr><td>0</td><td>1</td><td>Reject the BlockPermalock; respond with an error code</td></tr>
<tr><td>1</td><td>0</td><td>Permalock the blocks indicated by Mask; respond as described in this section 6.3.2.11.3.9</td></tr>
<tr><td>1</td><td>1</td><td>Permalock the blocks indicated by Mask; respond as described in this section 6.3.2.11.3.9</td></tr>
<tr><td rowspan="5" colspan="3">BlockPermalock (Read/Lock = 1)</td><td rowspan="5">Lock</td><td>pwd-write</td><td>permalock</td><td></td></tr>
<tr><td>0</td><td>0</td><td>Implement the Lock, but do not un-permalock any blocks that were previously permalocked; respond as described in 6.3.2.11.3.5</td></tr>
<tr><td>0</td><td>1</td><td>Reject the Lock; respond with an error code</td></tr>
<tr><td>1</td><td>0</td><td>Implement the Lock, but do not un-permalock any blocks that were previously permalocked; respond as described in 6.3.2.11.3.5</td></tr>
<tr><td>1</td><td>1</td><td>Implement the Lock; respond as described in 6.3.2.11.3.5</td></tr>
</table>

The *BlockPermalock* command has the following fields:

- MemBank specifies whether the *BlockPermalock* applies to EPC, TID, or User memory. *BlockPermalock* commands shall apply to a single memory bank. Successive *BlockPermalocks* may apply to different memory banks. Class-1 Tags shall only execute a *BlockPermalock* command if MemBank = 11 (User memory); if a Class-1 Tag receives a *BlockPermalock* with MemBank<>11 it shall ignore the command and instead backscatter an error code (see Annex I), remaining in the **secured** state. Higher-class Tags may use the other MemBank values to expand the functionality of the *BlockPermalock* command.
- Read/Lock specifies whether a Tag backscatters the permalock status of, or permalocks, one or more blocks within the memory bank specified by MemBank. A Tag shall interpret the Read/Lock bit as follows:
  - Read/Lock = 0: A Tag shall backscatter the permalock status of blocks in the specified memory bank, starting from the memory block located at BlockPtr and ending at the memory block located at BlockPtr+(16×BlockRange)–1. A Tag shall backscatter a "0" if the memory block corresponding to that bit is not permalocked and a "1" if the block is permalocked. An Interrogator omits Mask from the *BlockPermalock* command when Read/Lock = 0.
  - Read/Lock = 1: A Tag shall permalock those blocks in the specified memory bank that are specified by Mask, starting at BlockPtr and ending at BlockPtr+(16×BlockRange)–1.

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- BlockPtr specifies the starting address for Mask, in units of 16 blocks. For example, BlockPtr = 00_h indicates block 0, BlockPtr = 01_h indicates block 16, BlockPtr = 02_h indicates block 32. BlockPtr uses EBV formatting (see Annex A).
- BlockRange specifies the range of Mask, starting at BlockPtr and ending (16×BlockRange)–1 blocks later. If BlockRange = 00_h then a Tag shall ignore the *BlockPermalock* command and instead backscatter an error code (see Annex I), remaining in the **secured** state.
- Mask specifies which memory blocks a Tag permalocks. Mask depends on the Read/Lock bit as follows:
  - Read/Lock = 0: The Interrogator shall omit Mask from the *BlockPermalock* command.
  - Read/Lock = 1: The Interrogator shall include a Mask of length 16×BlockRange bits in the *BlockPermalock* command. The Mask bits shall be ordered from lower-order block to higher (i.e. if BlockPtr = 00_h then the leading Mask bit refers to block 0). The Tag shall interpret each bit of Mask as follows:
    - Mask bit = 0: Retain the current permalock setting for the corresponding memory block.
    - Mask bit = 1: Permalock the corresponding memory block. If a block is already permalocked then the Tag shall retain the current permalock setting. A memory block, once permalocked, cannot be un-permalocked except by recommissioning the Tag (see 6.3.2.10).

The following example illustrates the usage of Read/Lock, BlockPtr, BlockRange, and Mask:

- If Read/Lock=1, BlockPtr=01_h, and BlockRange=01_h the Tag operates on sixteen blocks starting at block 16 and ending at block 31, permalocking those blocks whose corresponding bits are asserted in Mask.

The *BlockPermalock* command contains 8 RFU bits. Interrogators shall set these bits to 00_h when communicating with Class-1 Tags. If a Class-1 Tag receives a *BlockPermalock* command containing nonzero RFU bits it shall ignore the command and instead backscatter an error code (see Annex I), remaining in the **secured** state. Higher-class Tags may use these bits to expand the functionality of the *BlockPermalock* command.

The *BlockPermalock* command also includes the Tag's handle and a CRC-16. The CRC-16 is calculated over the first command-code bit to the last handle bit. If a Tag receives a *BlockPermalock* with a valid CRC-16 but an invalid handle it shall ignore the *BlockPermalock* and remain in the **secured** state.

If a Tag receives a *BlockPermalock* command that it cannot execute because User memory does not exist, or in which the LSB and/or the 2SB of a Tag's XPC_W1 is/are asserted (see Table 6.15), or in which one of the asserted Mask bits references a non-existent block, then the Tag shall ignore the *BlockPermalock* command and instead backscatter an error code (see Annex I), remaining in the **secured** state. A Tag shall treat as invalid a *BlockPermalock* command in which Read/Lock=0 but Mask is not omitted, or a *BlockPermalock* command in which Read/Lock=1 but Mask has a length that is not equal to 16×BlockRange bits (see 6.3.2.11 for the definition of an "invalid" command).

Certain Tags, depending on the Tag manufacturer's implementation, may be unable to execute a *BlockPermalock* command with certain BlockPtr and BlockRange values, in which case the Tag shall ignore the *BlockPermalock* command and instead backscatter an error code (see Annex I), remaining in the **secured** state. Because a Tag contains information in its TID memory that an Interrogator can use to uniquely identify the optional features that the Tag supports (see 6.3.2.1.3), this specification recommends that Interrogators read a Tag's TID memory prior to issuing a *BlockPermalock* command.

If an Interrogator issues a *BlockPermalock* command in which BlockPtr and BlockRange specify one or more nonexistent blocks, but Mask only asserts permalocking on existent blocks, then the Tag shall execute the command.

A *BlockPermalock* shall be prepended with a frame-sync (see 6.3.1.2.8).

After issuing a *BlockPermalock* command an Interrogator shall transmit CW for the lesser of T_{REPLY} or 20ms, where T_{REPLY} is the time between the Interrogator's *BlockPermalock* and the Tag's backscattered reply. An Interrogator may observe several possible outcomes from a *BlockPermalock* command, depending on the value of the Read/Lock bit in the command and, if Read/Lock = 1, the success or failure of the Tag's memory-lock operation:

- **Read/Lock = 0 and the Tag is able to execute the command:** The Tag shall backscatter the reply shown in Table 6.52, within time T_1 in Table 6.13, comprising a header (a 0-bit), the requested permalock bits, the Tag's handle, and a CRC-16 calculated over the 0-bit, permalock bits, and handle. The Tag's reply shall use the preamble specified by the TRext value in the *Query* that initiated the round.

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Table 6.51 – ***BlockPermalock*** command

	Command	RFU	Read/Lock	MemBank	BlockPtr	BlockRange	Mask	RN	CRC-16
# of bits	8	8	1	2	EBV	8	Variable	16	16
description	11001001	00_h	0: Read 1: Permalock	00: RFU 01: EPC 10: TID 11: User	Mask starting address, specified in units of 16 blocks	Mask range, specified in units of 16 blocks	0: Retain current permalock setting 1: Assert permalock	handle	

Table 6.52 – Tag reply to a successful ***BlockPermalock*** command with Read/Lock = 0

	Header	Data	RN	CRC-16
# of bits	1	Variable	16	16
description	0	Permalock bits	handle	

Table 6.53 – Tag reply to a successful ***BlockPermalock*** command with Read/Lock = 1

	Header	RN	CRC-16
# of bits	1	16	16
description	0	handle	

- **Read/Lock = 0 and the Tag is unable to execute the command:** the Tag shall backscatter an error code, within time T_1 in Table 6.13, rather than the reply shown in Table 6.52 (see Annex I for error-code definitions and for the reply format). The Tag's reply shall use the preamble specified by the TRext value in the *Query* that initiated the round. An example of an unexecutable command is a Class-1 Tag receiving a *BlockPermalock* with MemBank<>11.
- **Read/Lock = 1 and The *BlockPermalock* succeeds:** After completing the *BlockPermalock* the Tag shall backscatter the reply shown in Table 6.53 comprising a header (a 0-bit), the Tag's handle, and a CRC-16 calculated over the 0-bit and handle. If the Interrogator observes this reply within 20 ms then the *BlockPermalock* completed successfully. The Tag's reply shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. the Tag shall reply as if TRext=1 regardless of the TRext value in the *Query* that initiated the round).
- **Read/Lock = 1 and the Tag encounters an error:** The Tag shall backscatter an error code during the CW period rather than the reply shown in Table 6.53 (see Annex I for error-code definitions and for the reply format). The Tag's reply shall use the extended preamble shown in Figure 6.11 or Figure 6.15, as appropriate (i.e. the Tag shall reply as if TRext=1 regardless of the TRext value in the *Query* that initiated the round).
- **Read/Lock = 1 and the *BlockPermalock* does not succeed:** If the Interrogator does not observe a reply within 20ms then the *BlockPermalock* did not complete successfully. The Interrogator may issue a *Req_RN* command (containing the Tag's handle) to verify that the Tag is still in the Interrogator's field, and may reissue the *BlockPermalock*.

Upon receiving a valid and executable *BlockPermalock* command a Tag shall perform the commanded operation, unless the Tag does not support block permalocking, in which case it shall ignore the command.

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7. Intellectual property rights intrinsic to this specification

Attention is drawn to the possibility that some of the elements of this specification may be the subject of patent and/or other intellectual-property rights. EPCglobal shall not be held responsible for identifying any or all such patent or intellectual-property rights.

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Annex A
(normative)
Extensible bit vectors (EBV)

An *extensible bit vector* (EBV) is a data structure with an extensible data range.

An EBV is an array of *blocks*. Each block contains a single extension bit followed by a specific number of data bits. If B represents the total number of bits in one block, then a block contains B – 1 data bits. Although a general EBV may contain blocks of varying lengths, Tags and Interrogators manufactured according to this specification shall use blocks of length 8 bits (EBV-8).

The data value represented by an EBV is simply the bit string formed by the data bits as read from left-to-right, ignoring the extension bits.

Tags and Interrogators shall use the EBV-8 word format specified in Table A.1.

Table A.1 – EBV-8 word format

	0	0	0000000				
	1	0	0000001				
$2^7 - 1$	127	0	1111111				
2^7	128	1	0000001	0	0000000		
$2^{14} - 1$	16383	1	1111111	0	1111111		
2^{14}	16384	1	0000001	1	0000000	0	0000000

Because each block has 7 data bits available, the EBV-8 can represent numeric values between 0 and 127 with a single block. To represent the value 128, the extension bit is set to 1 in the first block, and a second block is appended to the EBV-8. In this manner, an EBV-8 can represent arbitrarily large values.

This specification uses EBV-8 values to represent memory addresses and mask lengths.

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Annex B
(normative)
State-transition tables

State-transition tables B.1 to B.7 shall define a Tag's response to Interrogator commands. The term "handle" used in the state-transition tables is defined in 6.3.2.4.5; error codes are defined in Table I.2; "slot" is the slot-counter output shown in Figure 6.19 and detailed in Annex J; "–" in the "Action" column means that a Tag neither modifies its **SL** or **inventoried** flags nor backscatters a reply.

B.1 Present state: Ready

Table B.1 – Ready state-transition table

Command	Condition	Action	Next State
Query[1]	slot=0; matching **inventoried** & **SL** flags	backscatter new RN16	**reply**
	slot<>0; matching **inventoried** & **SL** flags	–	**arbitrate**
	otherwise	–	**ready**
QueryRep	all	–	**ready**
QueryAdjust	all	–	**ready**
ACK	all	–	**ready**
NAK	all	–	**ready**
Req_RN	all	–	**ready**
Select	all	assert or deassert **SL**, or set **inventoried** to *A* or *B*	**ready**
Read	all	–	**ready**
Write	all	–	**ready**
Kill	all	–	**ready**
Lock	all	–	**ready**
Access	all	–	**ready**
BlockWrite	all	–	**ready**
BlockErase	all	–	**ready**
BlockPermalock	all	–	**ready**
Invalid[2]	all	–	**ready**

1: *Query* starts a new round and may change the session. *Query* also instructs a Tag to load a new random value into its slot counter.

2: "Invalid" shall mean an erroneous command, an unsupported command, a command with invalid parameters, a command with a CRC error, or any other command either not recognized or not executable by the Tag.

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B.2 Present state: Arbitrate

Table B.2 – Arbitrate state-transition table

Command	Condition	Action	Next State
Query [1,2]	slot=0; matching **inventoried** & **SL** flags	backscatter new RN16	**reply**
	slot<>0; matching **inventoried** & **SL** flags	–	**arbitrate**
	otherwise	–	**ready**
QueryRep	slot=0 after decrementing slot counter	backscatter new RN16	**reply**
	slot<>0 after decrementing slot counter	–	**arbitrate**
QueryAdjust [2]	slot=0	backscatter new RN16	**reply**
	slot<>0	–	**arbitrate**
ACK	all	–	**arbitrate**
NAK	all	–	**arbitrate**
Req_RN	all	–	**arbitrate**
Select	all	assert or deassert **SL**, or set **inventoried** to *A* or *B*	**ready**
Read	all	–	**arbitrate**
Write	all	–	**arbitrate**
Kill	all	–	**arbitrate**
Lock	all	–	**arbitrate**
Access	all	–	**arbitrate**
Erase	all	–	**arbitrate**
BlockWrite	all	–	**arbitrate**
BlockErase	all	–	**arbitrate**
BlockPermalock	all	–	**arbitrate**
Invalid [3]	all	–	**arbitrate**

1: *Query* starts a new round and may change the session.

2: *Query* and *QueryAdjust* instruct a Tag to load a new random value into its slot counter.

3: "Invalid" shall mean an erroneous command, an unsupported command, a command with invalid parameters, a command with a CRC error, a command (other than a *Query*) with a session parameter not matching that of the inventory round currently in progress, or any other command either not recognized or not executable by the Tag.

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B.3 Present state: Reply

Table B.3 – Reply state-transition table

Command	Condition	Action	Next State
Query [1,2]	slot=0; matching **inventoried** & **SL** flags	backscatter new RN16	**reply**
	slot<>0; matching **inventoried** & **SL** flags	–	**arbitrate**
	otherwise	–	**ready**
QueryRep	all	–	**arbitrate**
QueryAdjust [2]	slot=0	backscatter new RN16	**reply**
	slot<>0	–	**arbitrate**
ACK	valid RN16	see Table 6.14	**acknowledged**
	invalid RN16	–	**arbitrate**
NAK	all	–	**arbitrate**
Req_RN	all	–	**arbitrate**
Select	all	assert or deassert **SL**, or set **inventoried** to *A* or *B*	**ready**
Read	all	–	**arbitrate**
Write	all	–	**arbitrate**
Kill	all	–	**arbitrate**
Lock	all	–	**arbitrate**
Access	all	–	**arbitrate**
BlockWrite	all	–	**arbitrate**
BlockErase	all	–	**arbitrate**
BlockPermalock	all	–	**arbitrate**
T_2 timeout	See Figure 6.16 and Table 6.13	–	**arbitrate**
Invalid [3]	all	–	**reply**

1: *Query* starts a new round and may change the session.

2: *Query* and *QueryAdjust* instruct a Tag to load a new random value into its slot counter.

3: "Invalid" shall mean an erroneous command, an unsupported command, a command with invalid parameters, a command with a CRC error, a command (other than a *Query*) with a session parameter not matching that of the inventory round currently in progress, or any other command either not recognized or not executable by the Tag.

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B.4 Present state: Acknowledged

Table B.4 – Acknowledged state-transition table

Command	Condition	Action	Next State
Query[1]	slot=0; matching **inventoried**[2] & **SL** flags	backscatter new RN16; transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**reply**
	slot<>0; matching **inventoried**[2] & **SL** flags	transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**arbitrate**
	otherwise	transition **inventoried** from *A*→*B* or *B*→*A* if and only if new session matches prior session	**ready**
QueryRep	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
QueryAdjust	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
ACK	valid RN16	see Table 6.14	**acknowledged**
	invalid RN16	–	**arbitrate**
NAK	all	–	**arbitrate**
Req_RN	valid RN16 & access password<>0	backscatter handle	**open**
	valid RN16 & access password=0	backscatter handle	**secured**
	invalid RN16	–	**acknowledged**
Select	all	assert or deassert **SL**, or set **inventoried** to *A* or *B*	**ready**
Read	all	–	**arbitrate**
Write	all	–	**arbitrate**
Kill	all	–	**arbitrate**
Lock	all	–	**arbitrate**
Access	all	–	**arbitrate**
BlockWrite	all	–	**arbitrate**
BlockErase	all	–	**arbitrate**
Block-Permalock	all	–	**arbitrate**
T_2 timeout	See Figure 6.16 and Table 6.13	–	**arbitrate**
Invalid[3]	all	–	**acknowledged**

1: *Query* starts a new round and may change the session. *Query* also instructs a Tag to load a new random value into its slot counter.

2: As described in 6.3.2.8, a Tag transitions its **inventoried** flag prior to evaluating the condition.

3: "Invalid" shall mean an erroneous command, an unsupported command, a command with invalid parameters, a command with a CRC error, a command (other than a *Query*) with a session parameter not matching that of the inventory round currently in progress, or any other command either not recognized or not executable by the Tag.

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B.5 Present state: Open

Table B.5 – Open state-transition table

Command	Condition	Action	Next State
Query[1]	slot=0; matching **inventoried**[2] & **SL** flags	backscatter new RN16; transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**reply**
	slot<>0; matching **inventoried**[2] & **SL** flags	transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**arbitrate**
	otherwise	transition **inventoried** from *A*→*B* or *B*→*A* if and only if new session matches prior session	**ready**
QueryRep	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
QueryAdjust	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
ACK	valid handle	see Table 6.14	**open**
	invalid handle	–	**arbitrate**
NAK	all	–	**arbitrate**
Req_RN	valid handle	backscatter new RN16	**open**
	invalid handle	–	**open**
Select	all	assert or deassert **SL**, or set **inventoried** to *A* or *B*	**ready**
Read	valid handle & valid memory access	backscatter data and handle	**open**
	valid handle & invalid memory access	backscatter error code	**open**
	invalid handle	–	**open**
Write	valid handle & valid memory access	backscatter handle when done	**open**
	valid handle & invalid memory access	backscatter error code	**open**
	invalid handle	–	**open**
Kill[3] (see also Figure 6.23)	valid handle & valid nonzero kill password & Recom = 0	backscatter handle when done	**killed**
	valid handle & valid nonzero kill password & Recom <> 0	backscatter handle when done	**open**
	valid handle & invalid nonzero kill password	–	**arbitrate**
	valid handle & kill password=0	backscatter error code	**open**
	invalid handle	–	**open**
Lock	all	–	**open**
Access (see also Figure 6.25)	valid handle & valid access password	backscatter handle	**secured**
	valid handle & invalid access password	–	**arbitrate**
	invalid handle	–	**open**
BlockWrite	valid handle & valid memory access	backscatter handle when done	**open**
	valid handle & invalid memory access	backscatter error code	**open**
	invalid handle	–	**open**
BlockErase	valid handle & valid memory access	backscatter handle when done	**open**
	valid handle & invalid memory access	backscatter error code	**open**
	invalid handle	–	**open**
Block-Permalock	all	–	**open**
Invalid[4]	all, excluding valid commands interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25)	–	**open**
	otherwise valid commands, except *Req_RN* or *Query*, interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25).	–	**arbitrate**

1: *Query* starts a new round and may change the session. *Query* also instructs a Tag to load a new random value into its slot counter.

2: As described in 6.3.2.8, a Tag transitions its **inventoried** flag prior to evaluating the condition.

3. As described in 6.3.2.11.3.4, if a Tag does not implement recommissioning then the Tag treats nonzero Recom bits as though Recom = 0.

4: "Invalid" shall mean an erroneous command; an unsupported command; a command with invalid parameters; a command with a CRC error; a command (other than a *Query*) with a session parameter not matching that of the inventory round currently in progress; or any other command either not recognized or not executable by the Tag.

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B.6 Present state: Secured

Table B.6 – Secured state-transition table

Command	Condition	Action	Next State
Query[1]	slot=0; matching **inventoried**[2] & **SL** flags	backscatter new RN16; transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**reply**
	slot<>0; matching **inventoried**[2] & **SL** flags	transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**arbitrate**
	otherwise	transition **inventoried** from *A*→*B* or *B*→*A* if and only if new session matches prior session	**ready**
QueryRep	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
QueryAdjust	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
ACK	valid handle	see Table 6.14	**secured**
	invalid handle	–	**arbitrate**
NAK	all	–	**arbitrate**
Req_RN	valid handle	backscatter new RN16	**secured**
	invalid handle	–	**secured**
Select	all	assert or deassert **SL**, or set **inventoried** to *A* or *B*	**ready**
Read	valid handle & valid memory access	backscatter data and handle	**secured**
	valid handle & invalid memory access	backscatter error code	**secured**
	invalid handle	–	**secured**
Write	valid handle & valid memory access	backscatter handle when done	**secured**
	valid handle & invalid memory access	backscatter error code	**secured**
	invalid handle	–	**secured**
Kill[3] (see also Figure 6.23)	valid handle & valid nonzero kill password & Recom = 0	backscatter handle when done	**killed**
	valid handle & valid nonzero kill password & Recom <> 0	backscatter handle when done	**secured**
	valid handle & invalid nonzero kill password	–	**arbitrate**
	valid handle & kill password=0	backscatter error code	**secured**
	invalid handle	–	**secured**
Lock	valid handle & valid lock payload	backscatter handle when done	**secured**
	valid handle & invalid lock payload	backscatter error code	**secured**
	invalid handle	–	**secured**
Access (see also Figure 6.25)	valid handle & valid access password	backscatter handle	**secured**
	valid handle & invalid access password	–	**arbitrate**
	invalid handle	–	**secured**
BlockWrite	valid handle & valid memory access	backscatter handle when done	**secured**
	valid handle & invalid memory access	backscatter error code	**secured**
	invalid handle	–	**secured**
BlockErase	valid handle & valid memory access	backscatter handle when done	**secured**
	valid handle & invalid memory access	backscatter error code	**secured**
	invalid handle	–	**secured**
Block-Permalock	valid handle, valid payload, & Read/Lock = 0	backscatter permalock bits and handle	**secured**
	valid handle, invalid payload, & Read/Lock = 0	backscatter error code	**secured**
	valid handle, valid payload, & Read/Lock = 1	backscatter handle when done	**secured**
	valid handle, invalid payload, & Read/Lock = 1	backscatter error code	**secured**
	invalid handle	–	**secured**
Invalid[4]	all, excluding valid commands interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25).	–	**secured**
	otherwise valid commands, except *Req_RN* or *Query*, interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25).	–	**arbitrate**

1: *Query* starts a new round and may change the session. *Query* also instructs a Tag to load a new random value into its slot counter.

2: As described in 6.3.2.8, a Tag transitions its **inventoried** flag prior to evaluating the condition.

3. As described in 6.3.2.11.3.4, if a Tag does not implement recommissioning then the Tag treats nonzero Recom bits as though Recom = 0.

4: "Invalid" shall mean an erroneous command; an unsupported command; a command with invalid parameters; a command with a CRC error; a command (other than a *Query*) with a session parameter not matching that of the inventory round currently in progress; or any other command either not recognized or not executable by the Tag.

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B.7 Present state: Killed

Table B.7 – Killed state-transition table

Command	Condition	Action	Next State
Query	all	–	**killed**
QueryRep	all	–	**killed**
QueryAdjust	all	–	**killed**
ACK	all	–	**killed**
NAK	all	–	**killed**
Req_RN	all	–	**killed**
Select	all	–	**killed**
Read	all	–	**killed**
Write	all	–	**killed**
Kill	all	–	**killed**
Lock	all	–	**killed**
Access	all	–	**killed**
BlockWrite	all	–	**killed**
BlockErase	all	–	**killed**
BlockPermalock	all	–	**killed**
Invalid [1]	all	–	**killed**

1: "Invalid" shall mean an erroneous command, an unsupported command, a command with invalid parameters, a command with a CRC error, or any other command either not recognized or not executable by the Tag.

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Annex C
(normative)
Command-Response Tables

Command-response tables C.1 to C.18 shall define a Tag's response to Interrogator commands. The term "handle" used in the state-transition tables is defined in 6.3.2.4.5; error codes are defined in Table I.2; "slot" is the slot-counter output shown in Figure 6.19 and detailed in Annex J; "–" in the "Response" column means that a Tag neither modifies its **SL** or **inventoried** flags nor backscatters a reply.

C.1 Command response: Power-up

Table C.1 – Power-up command-response table

Starting State	Condition	Response	Next State
ready, arbitrate, reply, acknowledged, open, secured	power-up	–	**ready**
killed	all	–	**killed**

C.2 Command response: *Query*

Table C.2 – *Query*[1] command-response table

Starting State	Condition	Response	Next State
ready, arbitrate, reply	slot=0; matching **inventoried** & **SL** flags	backscatter new RN16	**reply**
	slot<>0; matching **inventoried** & **SL** flags	–	**arbitrate**
	otherwise	–	**ready**
acknowledged, open, secured	slot=0; matching **inventoried**[2] & **SL** flags	backscatter new RN16; transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**reply**
	slot<>0; matching **inventoried**[2] & **SL** flags	transition **inventoried**[2] from *A*→*B* or *B*→*A* if and only if new session matches prior session	**arbitrate**
	otherwise	transition **inventoried** from *A*→*B* or *B*→*A* if and only if new session matches prior session	**ready**
killed	all	–	**killed**

1: *Query* (in any state other than **killed**) starts a new round and may change the session; *Query* also instructs a Tag to load a new random value into its slot counter.

2: As described in 6.3.2.8, a Tag transitions its **inventoried** flag prior to evaluating the condition.

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C.3 Command response: *QueryRep*

Table C.3 – ***QueryRep*** command-response table[1]

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate	slot<>0 after decrementing slot counter	–	**arbitrate**
	slot=0 after decrementing slot counter	backscatter new RN16	**reply**
reply	all	–	**arbitrate**
acknowledged, open, secured	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
killed	all	–	**killed**

1: See Table C.18 for the Tag response to a *QueryRep* whose session parameter does not match that of the current inventory round.

C.4 Command response: *QueryAdjust*

Table C.4 – ***QueryAdjust***[1] command-response table[2]

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply	slot<>0	–	**arbitrate**
	slot=0	backscatter new RN16	**reply**
acknowledged, open, secured	all	transition **inventoried** from *A*→*B* or *B*→*A*	**ready**
killed	all	–	**killed**

1: *QueryAdjust*, in the **arbitrate** or **reply** states, instructs a Tag to load a new random value into its slot counter.

2: See Table C.18 for the Tag response to a *QueryAdjust* whose session parameter does not match that of the current inventory round.

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C.5 Command response: *ACK*

Table C.5 – *ACK* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate	all	–	**arbitrate**
reply	valid RN16	see Table 6.14	**acknowledged**
	invalid RN16	–	**arbitrate**
acknowledged	valid RN16	see Table 6.14	**acknowledged**
	invalid RN16	–	**arbitrate**
open	valid handle	see Table 6.14	**open**
	invalid handle	–	**arbitrate**
secured	valid handle	see Table 6.14	**secured**
	invalid handle	–	**arbitrate**
killed	all	–	**killed**

C.6 Command response: *NAK*

Table C.6 – *NAK* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged, open, secured	all	–	**arbitrate**
killed	all	–	**killed**

C.7 Command response: *Req_RN*

Table C.7 – *Req_RN* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply	all	–	**arbitrate**
acknowledged	valid RN16 & access password<>0	backscatter handle	**open**
	valid RN16 & access password=0	backscatter handle	**secured**
	invalid RN16	–	**acknowledged**
open	valid handle	backscatter new RN16	**open**
	invalid handle	–	**open**
secured	valid handle	backscatter new RN16	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

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C.8 Command response: *Select*

Table C.9 – *Select* command-response table

Starting State	Condition	Response	Next State
ready, arbitrate, reply, acknowledged, open, secured	all	assert or deassert **SL**, or set **inventoried** to *A* or *B*	**ready**
killed	all	–	**killed**

C.9 Command response: *Read*

Table C.8 – *Read* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open	valid handle & invalid memory access	backscatter error code	**open**
	valid handle & valid memory access	backscatter data and handle	**open**
	invalid handle	–	**open**
secured	valid handle & invalid memory access	backscatter error code	**secured**
	valid handle & valid memory access	backscatter data and handle	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

C.10 Command response: *Write*

Table C.10 – *Write* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open	valid handle & invalid memory access	backscatter error code	**open**
	valid handle & valid memory access	backscatter handle when done	**open**
	invalid handle	–	**open**
secured	valid handle & invalid memory access	backscatter error code	**secured**
	valid handle & valid memory access	backscatter handle when done	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

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C.11 Command response: *Kill*

Table C.11 – *Kill*[1] command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open[2]	valid handle & kill password=0	backscatter error code	**open**
	valid handle & invalid nonzero kill password	–	**arbitrate**
	valid handle & valid nonzero kill password & Recom=0	backscatter handle when done	**killed**
	valid handle & valid nonzero kill password & Recom<>0	backscatter handle when done	**open**
	invalid handle	–	**open**
secured[2]	valid handle & kill password=0	backscatter error code	**secured**
	valid handle & invalid nonzero kill password	–	**arbitrate**
	valid handle & valid nonzero kill password & Recom=0	backscatter handle when done	**killed**
	valid handle & valid nonzero kill password & Recom<>0	backscatter handle when done	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

1: See also Figure 6.23.

2: As described in 6.3.2.11.3.4, if a Tag does not implement recommissioning then the Tag treats nonzero Recom bits as though Recom=0.

C.12 Command response: *Lock*

Table C.12 – *Lock* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open	all	–	**open**
secured	valid handle & invalid lock payload	backscatter error code	**secured**
	valid handle & valid lock payload	backscatter handle when done	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

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C.13 Command response: *Access*

Table C.13 – *Access*[1] command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open	valid handle & invalid access password	–	**arbitrate**
	valid handle & valid access password	backscatter handle	**secured**
	invalid handle	–	**open**
secured	valid handle & invalid access password	–	**arbitrate**
	valid handle & valid access password	backscatter handle	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

1: See also Figure 6.25.

C.14 Command response: *BlockWrite*

Table C.14 – *BlockWrite* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open	valid handle & invalid memory access	backscatter error code	**open**
	valid handle & valid memory access	backscatter handle when done	**open**
	invalid handle	–	**open**
secured	valid handle & invalid memory access	backscatter error code	**secured**
	valid handle & valid memory access	backscatter handle when done	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

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C.15 Command response: *BlockErase*

Table C.15 – *BlockErase* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open	valid handle & invalid memory access	backscatter error code	**open**
	valid handle & valid memory access	backscatter handle when done	**open**
	invalid handle	–	**open**
secured	valid handle & invalid memory access	backscatter error code	**secured**
	valid handle & valid memory access	backscatter handle when done	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

C.16 Command response: *BlockPermalock*

Table C.16 – *BlockPermalock* command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate, reply, acknowledged	all	–	**arbitrate**
open	all	–	**open**
secured	valid handle, valid payload, & Read/Lock = 0	backscatter permalock bits and handle	**secured**
	valid handle, invalid payload, & Read/Lock = 0	backscatter error code	**secured**
	valid handle, valid payload, & Read/Lock = 1	backscatter handle when done	**secured**
	valid handle, invalid payload, & Read/Lock = 1	backscatter error code	**secured**
	invalid handle	–	**secured**
killed	all	–	**killed**

C.17 Command response: T_2 timeout

Table C.17 – T_2 timeout command-response table

Starting State	Condition	Response	Next State
ready	all	–	**ready**
arbitrate	all	–	**arbitrate**
reply, acknowledged	See Figure 6.16 and Table 6.13	–	**arbitrate**
open	all	–	**open**
secured	all	–	**secured**
killed	all	–	**killed**

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C.18 Command response: Invalid command

Table C.18 – Invalid command-response table

Starting State	Condition	Response	Next State
ready[1]	all	–	**ready**
arbitrate[2]	all	–	**arbitrate**
reply[2]	all	–	**reply**
acknowledged[2]	all	–	**acknowledged**
open[2]	all, excluding valid commands interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25).	–	**open**
	otherwise valid commands, except *Req_RN* or *Query*, interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25).	–	**arbitrate**
secured[2]	all, excluding valid commands interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25).	–	**secured**
	otherwise valid commands, except *Req_RN* or *Query*, interspersed between successive *Kill* or *Access* commands in a kill or access sequence, respectively (see Figure 6.23 and Figure 6.25).	–	**arbitrate**
killed[1]	all	–	**killed**

1: "Invalid" shall mean an erroneous command, an unsupported command, a command with invalid parameters, a command with a CRC error, or any other command either not recognized or not executable by the Tag.

2: "Invalid" shall mean an erroneous command; an unsupported command; a command with invalid parameters; a command with a CRC error; a command (other than a *Query*) with a session parameter not matching that of the inventory round currently in progress; or any other command either not recognized or not executable by the Tag.

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Annex D
(informative)
Example slot-count (*Q*) selection algorithm

D.1 Example algorithm an Interrogator might use to choose *Q*

Figure D.1 shows an algorithm an Interrogator might use for setting the slot-count parameter *Q* in a *Query* command. Q_{fp} is a floating-point representation of *Q*; an Interrogator rounds Q_{fp} to an integer value and substitutes this integer value for *Q* in the *Query*. Typical values for *C* are $0.1 < C < 0.5$. An Interrogator typically uses small values of *C* when *Q* is large, and larger values of *C* when *Q* is small.

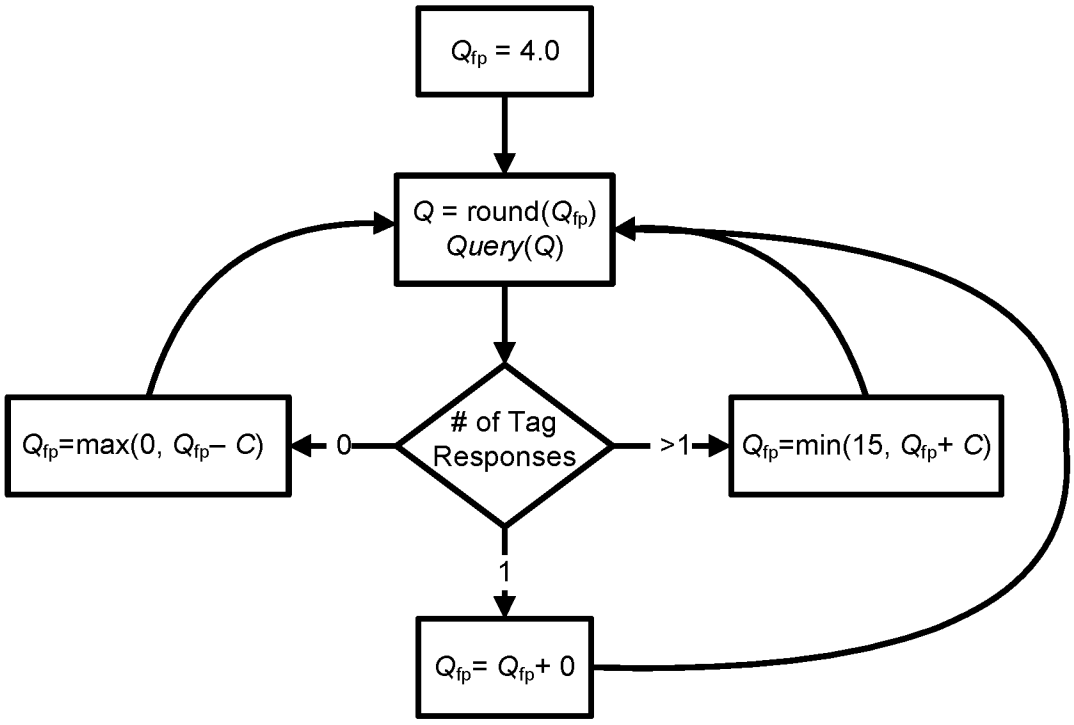


Figure D.1 – Example algorithm for choosing the slot-count parameter *Q*

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Annex E
(informative)
Example of Tag inventory and access

E.1 Example inventory and access of a single Tag

Figure E.1 shows the steps by which an Interrogator inventories and accesses a single Tag.

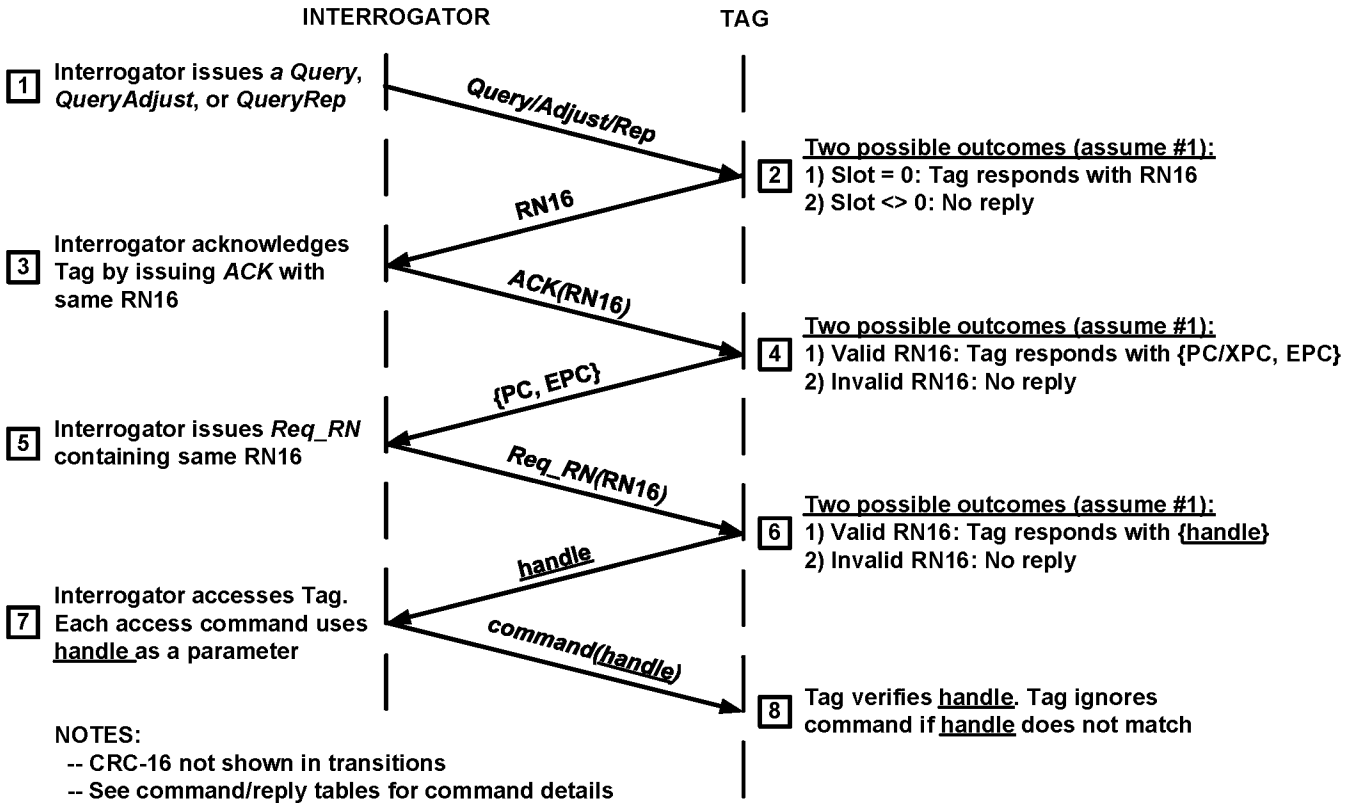


Figure E.1 – Example of Tag inventory and access

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Annex F
(informative)
Calculation of 5-bit and 16-bit cyclic redundancy checks

F.1 Example CRC-5 encoder/decoder

An exemplary schematic diagram for a CRC-5 encoder/decoder is shown in Figure F.1, using the polynomial and preset defined in Table 6.12.

To calculate a CRC-5, first preload the entire CRC register (i.e. Q[4:0], Q4 being the MSB and Q0 the LSB) with the value 01001_2 (see Table F.1), then clock the data bits to be encoded into the input labeled DATA, MSB first. After clocking in all the data bits, Q[4:0] holds the CRC-5 value.

To check a CRC-5, first preload the entire CRC register (Q[4:0]) with the value 01001_2, then clock the received data and CRC-5 {data, CRC-5} bits into the input labeled DATA, MSB first. The CRC-5 check passes if the value in Q[4:0] = 00000_2.

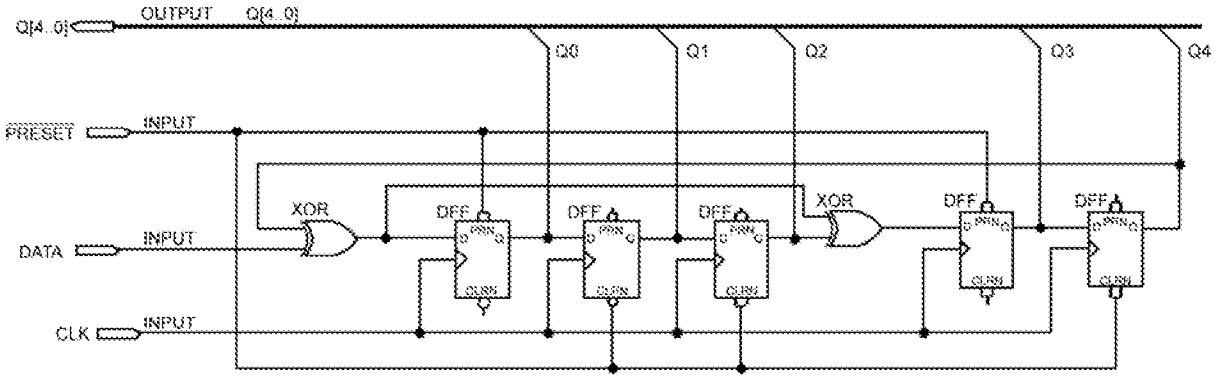


Figure F.1 – Example CRC-5 circuit

Table F.1 – CRC-5 register preload values

Register	Preload value
Q0	1
Q1	0
Q2	0
Q3	1
Q4	0

F.2 Example CRC-16 encoder/decoder

An exemplary schematic diagram for a CRC-16 encoder/decoder is shown in Figure F.2, using the polynomial and preset defined in Table 6.11 (the polynomial used to calculate the CRC-16, $x^{16} + x^{12} + x^5 + 1$, is the CRC-CCITT International Standard, ITU Recommendation X.25).

To calculate a CRC-16, first preload the entire CRC register (i.e. Q[15:0], Q15 being the MSB and Q0 the LSB) with the value $FFFF_h$. Second, clock the data bits to be encoded into the input labeled DATA, MSB first. After clocking in all the data bits, Q[15:0] holds the ones-complement of the CRC-16. Third, invert all the bits of Q[15:0] to produce the CRC-16.

There are two methods to check a CRC-16:

Method 1: First preload the entire CRC register (Q[15:0]) with the value $FFFF_h$, then clock the received data and CRC-16 {data, CRC-16} bits into the input labeled DATA, MSB first. The CRC-16 check passes if the value in Q[15:0]=$1D0F_h$.

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Method 2: First preload the entire CRC register (Q[15:0]) with the value $FFFF_h$. Second, clock the received data bits into the input labeled DATA, MSB first. Third, invert all bits of the received CRC-16, and clock the inverted CRC-16 bits into the input labeled DATA, MSB first. The CRC-16 check passes if the value in Q[15:0]=0000_h.

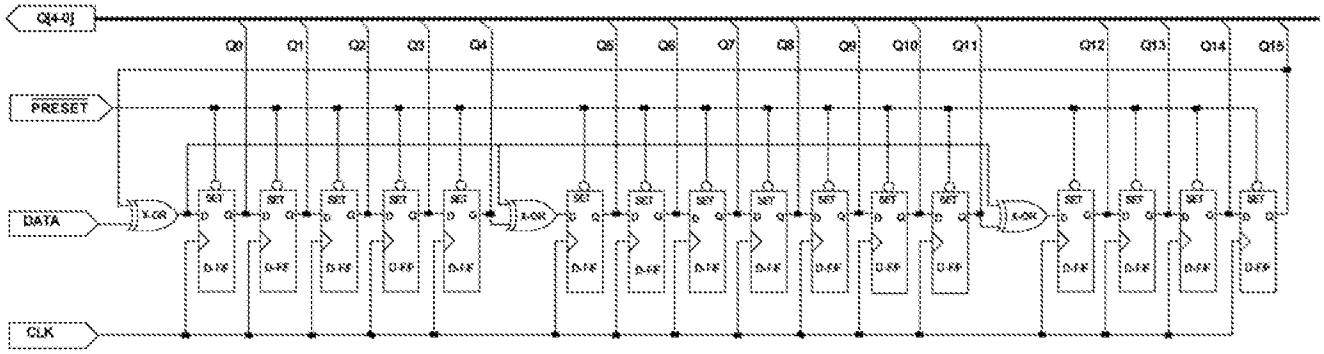


Figure F.2 – Example CRC-16 circuit

F.3 Example CRC-16 calculations

This example shows the StoredCRC (a CRC-16) that a Tag would calculate at power-up.

As shown in Figure 6.17, EPC memory contains a StoredCRC starting at address 00_h, a StoredPC starting at address 10_h, zero or more EPC words starting at address 20_h, an optional XPC_W1 starting at address 210_h, and an optional XPC_W2 starting at address 220_h. As described in 6.3.2.1.2.1, a Tag calculates its StoredCRC over its StoredPC and EPC, but omits the XPC_W1 and XPC_W2 from the calculation. Table F.2 shows the StoredCRC that a Tag would calculate and logically map into EPC memory at power-up, for the indicated example StoredPC and EPC word values. In each successive column, one more word of EPC memory is written, with the entire EPC memory written in the rightmost column. The indicated StoredPC values correspond to the number of EPC words written, with StoredPC bits 15_h–$1F_h$ set to zero. Entries marked N/A mean that that word of EPC memory is not included as part of the CRC calculation.

Table F.2 – EPC memory contents for an example Tag

EPC word starting address	EPC word contents	EPC word values						
00_h	StoredCRC	$E2F0_h$	$CCAE_h$	$968F_h$	$78F6_h$	$C241_h$	$2A91_h$	1835_h
10_h	StoredPC	0000_h	0800_h	1000_h	1800_h	2000_h	2800_h	3000_h
20_h	EPC word 1	N/A	1111_h	1111	1111_h	1111_h	1111_h	1111_h
30_h	EPC word 2	N/A	N/A	2222_h	2222_h	2222_h	2222_h	2222_h
20_h	EPC word 3	N/A	N/A	N/A	3333_h	3333_h	3333_h	3333_h
40_h	EPC word 4	N/A	N/A	N/A	N/A	4444_h	4444_h	4444_h
50_h	EPC word 5	N/A	N/A	N/A	N/A	N/A	5555_h	5555_h
60_h	EPC word 6	N/A	N/A	N/A	N/A	N/A	N/A	6666_h

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Annex G
(Normative)
Multiple- and dense-Interrogator channelized signaling

This Annex describes channelized signaling in the optional multiple- and dense-Interrogator operating modes. It provides methods that Interrogators may use, as permitted by local authorities, to maximize the spectral efficiency and performance of RFID systems while minimizing the interference to non-RFID systems.

Because regulatory requirements vary worldwide, and even within a given regulatory region are prone to ongoing reinterpretation and revision, this Annex does not specify multiple- or dense-Interrogator operating requirements for any given regulatory region. Instead, this Annex merely outlines the goals of channelized signaling, and defers specification of the Interrogator operating requirements for each individual regulatory region to the channel plans located at www.epcglobalinc.org/regulatorychannelplans.

When an Interrogator in a multiple- or dense-Interrogator environment instructs Tags to use subcarrier backscatter, the Interrogator shall adopt the channel plan found at the above-referenced link for the regulatory region in which it is operating. When an Interrogator in a multiple- and dense-Interrogator environment instructs Tags to use FM0 backscatter, the Interrogator shall adopt a channel plan in accordance with local regulations.

Regardless of the regulatory region and the choice of Tag backscatter data encoding,

- Interrogator signaling (both modulated and CW) shall be centered in a channel with the frequency accuracy specified in 6.3.1.2.1, unless local regulations specify tighter frequency accuracy, in which case the Interrogator shall meet the local regulations, and
- Interrogator transmissions shall satisfy the multiple- or dense-Interrogator transmit mask in 6.3.1.2.11 (as appropriate), unless local regulations specify a tighter mask, in which case the Interrogator shall meet the local regulations.

If an Interrogator uses SSB-ASK modulation, the transmit spectrum shall be centered in the channel during R=>T signaling, and the CW shall be centered in the channel during Tag backscatter.

G.1 Overview of dense-interrogator channelized signaling (informative)

In environments containing two or more Interrogators, the range and rate at which Interrogators singulate Tags can be improved by preventing Interrogator transmissions from colliding spectrally with Tag responses. This section describes three frequency-division multiplexing (FDM) methods that minimize such Interrogator-on-Tag collisions. In each of these methods, Interrogator transmissions and Tag responses are separated spectrally.

1. *Channel-boundary backscatter*: Interrogator transmissions are constrained to occupy only a small portion of the center of each channel, and Tag backscatter is situated at the channel boundaries.
2. *Alternative-channel backscatter*: Interrogator transmissions are located in a subset of the channels, and Tag backscatter is located in a different subset of the channels.
3. *In-channel backscatter*: Interrogator transmissions are constrained to occupy only a small portion of the center of each channel, and Tag backscatter is situated near but within the channel boundaries.

Figure G.1, shows examples of these FDM dense-Interrogator methods. For optimum performance, the operating requirements located at www.epcglobalinc.org/regulatorychannelplans suggest (but do not require) choosing values for BLF and M that allow a guardband between Interrogator signaling and Tag responses.

Example 1: Channel-boundary backscatter

FCC 15.247, dated October 2000, authorizes frequency-hopping operation in the ISM band from 902–928 MHz with 500 kHz maximum channel width, and does not prohibit channel-boundary backscatter. In such an environment Interrogators will use 500 kHz channels with channel-boundary backscatter. Example 1 of Figure G.1 shows Interrogator transmissions using PR-ASK modulation with Tari = 25 µs, and 62.5 kbps Tag data backscatter on a 250 kHz subcarrier (BLF = 250 kHz; M = 4). Interrogators center their R=>T signaling in the channels, with transmissions unsynchronized in time, hopping among channels.

Example 2: Alternative-channel backscatter

ETSI Technical Group 34 has proposed an amendment to ERC REC 70-03E Annex 11 allocating four high-power 200 kHz channels, each spaced 600 kHz apart, in the 865–868 MHz frequency range. This amendment allows adjacent-channel Tag backscatter. In such an environment Interrogators will use alternative-channel

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backscatter. Example 2 of Figure G.1 shows Interrogator transmissions using SSB-ASK modulation with Tari = 25 µs, and 75 kbps Tag data backscatter on a 300 kHz subcarrier (BLF = 300 kHz, M = 4).

Example 3: FDM in-channel backscatter

A hypothetical regulatory region allocates four 500 kHz channels and disallows adjacent-channel and channel-boundary backscatter. In such an environment Interrogators will use in-channel backscatter. Example 3 of Figure G.1 shows Interrogator transmissions using PR-ASK modulation with Tari = 25 µs, and 25 kbps Tag data backscatter on a 200 kHz subcarrier (BLF = 200 kHz, M = 8).

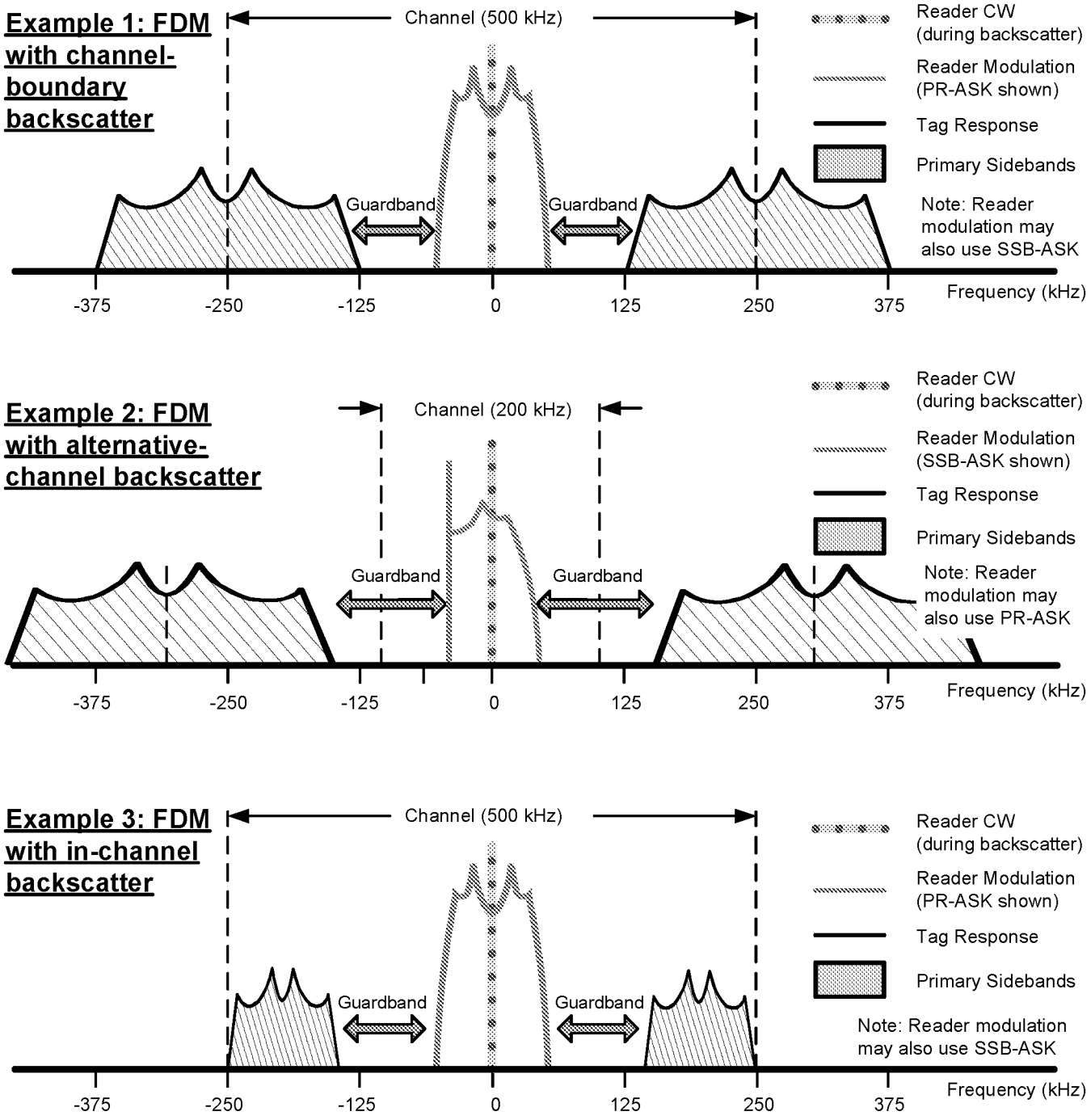


Figure G.1 – Examples of dense-Interrogator-mode operation

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Annex H
(informative)
Interrogator-to-Tag link modulation

H.1 Baseband waveforms, modulated RF, and detected waveforms

Figure H.1 shows R=>T baseband and modulated waveforms as generated by an Interrogator, and the corresponding waveforms envelope-detected by a Tag, for DSB- or SSB-ASK modulation, and for PR-ASK modulation.

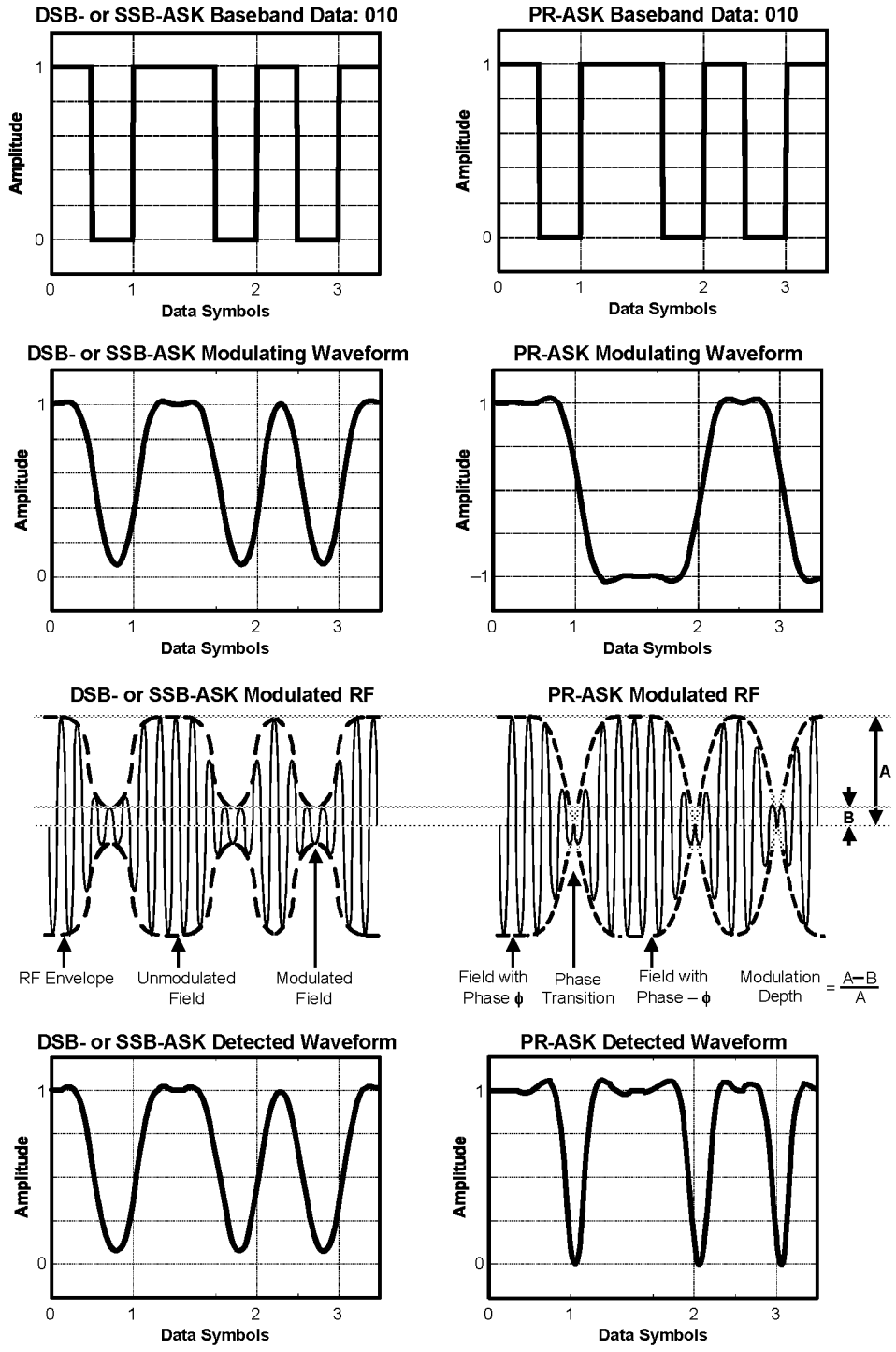


Figure H.1 – Interrogator-to-Tag modulation

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Annex I
(Normative)
Error codes

I.1 Tag error codes and their usage

If a Tag encounters an error when executing an access command that reads from or writes to memory, and if the command is a handle-based command (i.e. *Read*, *Write*, *Kill*, *Lock*, *BlockWrite*, *BlockErase*, or *BlockPermalock*), then the Tag shall backscatter an error code as shown in Table I.1 instead of its normal reply.

- If the Tag supports error-specific codes, it shall use the error-specific codes shown in Table I.2.
- If the Tag does not support error-specific codes, it shall backscatter error code 00001111_2 (indicating a non-specific error) as shown in Table I.2.
- Tags shall backscatter error codes only from the **open** or **secured** states.
- A Tag shall not backscatter an error code if it receives an invalid access command; instead, it shall ignore the command.
- If an error is described by more than one error code, the more specific error code shall take precedence and shall be the code that the Tag backscatters.
- The header for an error code is a 1-bit, unlike the header for a normal Tag response, which is a 0-bit.

Table I.1 – Tag-error reply format

	Header	Error Code	RN	CRC-16
# of bits	1	8	16	16
description	1	Error code	handle	

Table I.2 – Tag error codes

Error-Code Support	Error Code	Error-Code Name	Error Description
Error-specific	00000000_2	Other error	Catch-all for errors not covered by other codes
	00000011_2	Memory overrun	The specified memory location does not exist or the EPC length field is not supported by the Tag
	00000100_2	Memory locked	The specified memory location is locked and/or permalocked and is either not writeable or not readable
	00001011_2	Insufficient power	The Tag has insufficient power to perform the memory-write operation
Non-specific	00001111_2	Non-specific error	The Tag does not support error-specific codes

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Annex J
(normative)
Slot counter

J.1 Slot-counter operation

As described in 6.3.2.4.8, Tags implement a 15-bit slot counter. As described in 6.3.2.8, Interrogators use the slot counter to regulate the probability of a Tag responding to a *Query*, *QueryAdjust*, or *QueryRep* command. Upon receiving a *Query* or *QueryAdjust* a Tag preloads a *Q*-bit value, drawn from the Tag's RNG (see 6.3.2.5), into its slot counter. *Q* is an integer in the range (0, 15). A *Query* specifies *Q*; a *QueryAdjust* may modify *Q* from the prior *Query*.

A Tag in the **arbitrate** state shall decrement its slot counter every time it receives a *QueryRep* command, transitioning to the **reply** state and backscattering an RN16 when its slot-counter value reaches 0000_h. A Tag whose slot-counter value reached 0000_h, who replied, and who was not acknowledged (including a Tag that responded to the original *Query* and was not acknowledged) returns to **arbitrate** with a slot-counter value of 0000_h.

A Tag that returns to **arbitrate** with a slot-counter value of 0000_h shall decrement its slot-counter from 0000_h to $7FFF_h$ (i.e. the slot counter rolls over) at the next *QueryRep* with matching session. Because the slot-counter value is now nonzero, the Tag remains in **arbitrate**. Slot counters implements continuous counting, meaning that, after a slot counter rolls over it begins counting down again from $7FFF_h$, effectively preventing subsequent Tag replies until the Tag receives either a *Query* or a *QueryAdjust* and loads a new random value into its slot counter.

Annex B and Annex C contain tables describing a Tag's response to Interrogator commands; "slot" is a parameter in these tables.

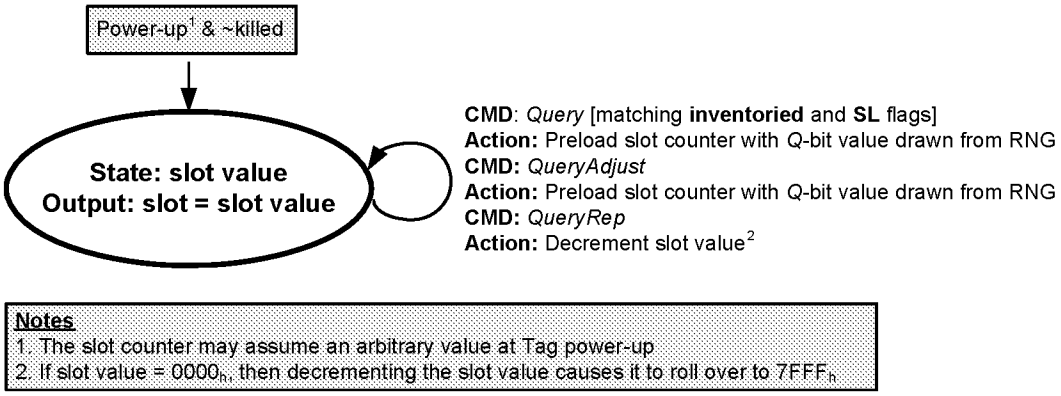


Figure J.1 – Slot-counter state diagram

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Annex K
(informative)
Example data-flow exchange

K.1 Overview of the data-flow exchange

The following example describes a data exchange, between an Interrogator and a single Tag, during which the Interrogator reads the kill password stored in the Tag's Reserved memory. This example assumes that:

- The Tag has been singulated and is in the **acknowledged** state.
- The Tag's Reserved memory is locked but not permalocked, meaning that the Interrogator must issue the access password and transition the Tag to the **secured** state before performing the read operation.
- The random numbers the Tag generates (listed in sequence, and not random for reasons of clarity) are:
  - RN16_0 1600_h (the RN16 the Tag backscattered prior to entering **acknowledged**)
  - RN16_1 1601_h (will become the handle for the entire access sequence)
  - RN16_2 1602_h
  - RN16_3 1603_h
- The Tag's EPC is 64 bits in length.
- The Tag's access password is $ACCEC0DE_h$.
- The Tag's kill password is $DEADC0DE_h$.
- The 1^{st} half of the access password EXORed with RN16_2 = $ACCE_h \otimes 1602_h = BACC_h$.
- The 2^{nd} half of the access password EXORed with RN16_3 = $C0DE_h \otimes 1603_h = D6DD_h$.

K.2 Tag memory contents and lock-field values

Table K.1 and Table K.2 show the example Tag memory contents and lock-field values, respectively.

Table K.1 – Tag memory contents

Memory Bank	Memory Contents	Memory Addresses	Memory Values
TID	TID[15:0]	10_h–$1F_h$	$54E2_h$
	TID[31:16]	00_h–$0F_h$	$A986_h$
EPC	EPC[15:0]	50_h–$5F_h$	3210_h
	EPC[31:16]	40_h–$4F_h$	7654_h
	EPC[47:32]	30_h–$3F_h$	$BA98_h$
	EPC[63:48]	20_h–$2F_h$	$FEDC_h$
	StoredPC[15:0]	10_h–$1F_h$	2000_h
	StoredCRC[15:0]	00_h–$0F_h$	as calculated (see Annex F)
Reserved	access password[15:0]	30_h–$3F_h$	$C0DE_h$
	access password[31:16]	20_h–$2F_h$	$ACCE_h$
	kill password[15:0]	10_h–$1F_h$	$C0DE_h$
	kill password[31:16]	00_h–$0F_h$	$DEAD_h$

Table K.2 – Lock-field values

Kill Password		Access Password		EPC Memory		TID Memory		User Memory	
1	0	1	0	0	0	0	0	N/A	N/A

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K.3 Data-flow exchange and command sequence

The data-flow exchange follows the *Access* procedure outlined in Figure 6.25 with a *Read* command added at the end. The sequence of Interrogator commands and Tag replies is:

Step 1: *Req_RN*[RN16_0, CRC-16]
Tag backscatters RN16_1, which becomes the handle for the entire access sequence

Step 2: *Req_RN*[handle, CRC-16]
Tag backscatters RN16_2

Step 3: *Access*[access password[31:16] EXORed with RN16_2, handle, CRC-16]
Tag backscatters handle

Step 4: *Req_RN*[handle, CRC-16]
Tag backscatters RN16_3

Step 5: *Access*[access password[15:0] EXORed with RN16_3, handle, CRC-16]
Tag backscatters handle

Step 6: *Read*[MemBank=Reserved, WordPtr=00_h, WordCount=2, handle, CRC-16]
Tag backscatters kill password

Table K.3 shows the detailed Interrogator commands and Tag replies. For reasons of clarity, the CRC-16 has been omitted from all commands and replies.

Table K.3 – Interrogator commands and Tag replies

Step	Data Flow	Command	Parameter and/or Data	Tag State
1a: *Req_RN* command	R => T	11000001	0001 0110 0000 0000 (RN16_0=1600_h)	**acknowledged → open**
1b: Tag response	T => R		0001 0110 0000 0001 (handle=1601_h)	
2a: *Req_RN* command	R => T	11000001	0001 0110 0000 0001 (handle=1601_h)	**open → open**
2b: Tag response	T => R		0001 0110 0000 0010 (RN16_2=1602_h)	
3a: *Access* command	R => T	11000110	1011 1010 1100 1100 ($BACC_h$) 0001 0110 0000 0001 (handle=1601_h)	**open → open**
3b: Tag response	T => R		0001 0110 0000 0001 (handle=1601_h)	
4a: *Req_RN* command	R => T	11000001	0001 0110 0000 0001 (handle=1601_h)	**open → open**
4b: Tag response	T => R		0001 0110 0000 0011 (RN16_2=1603_h)	
5a: *Access* command	R => T	11000110	1101 0110 1101 1101 ($D6DD_h$) 0001 0110 0000 0001 (handle=1601_h)	**open → secured**
5b: Tag response	T => R		0001 0110 0000 0001 (handle=1601_h)	
6a: *Read* command	R => T	11000010	00 (MemBank=Reserved) 00000000 (WordPtr=kill password) 00000010 (WordCount=2) 0001 0110 0000 0001 (handle=1601_h)	**secured → secured**
6b: Tag response	T => R		0 (header) 1101 1110 1010 1101 ($DEAD_h$) 1100 0000 1101 1110 ($C0DE_h$)	

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Annex L
(informative)
Optional Tag Features

The following options are available to Tags certified to this protocol.

L.1 Optional Tag passwords

Kill password: A Tag may optionally implement a kill password. A Tag that does not implement a kill password operates as if it has a zero-valued kill password that is permanently read/write locked. See 6.3.2.1.1.1.

Access password: A Tag may optionally implement an access password. A Tag that does not implement an access password operates as if it has a zero-valued access password that is permanently read/write locked. See 6.3.2.1.1.2.

L.2 Optional Tag memory banks and memory-bank sizes

Reserved memory: Reserved memory is optional. If a Tag does not implement either a kill password or an access password then the Tag need not physically implement Reserved memory. Because a Tag with non-implemented passwords operates as if it has zero-valued password(s) that are permanently read/write locked, these passwords must still be logically addressable in Reserved memory at the memory locations specified in 6.3.2.1.1.1 and 6.3.2.1.1.2.

EPC memory: EPC memory is required, but its size is vendor-defined. The minimum size is 32 bits, to contain a 16-bit StoredCRC and a 16-bit StoredPC. EPC memory may be larger than 32 bits, to contain an EPC whose vendor-specified length may be 16 to 496 bits (if a Tag does not support XPC functionality) or to 464 bits (if a Tag supports XPC functionality) in 16-bit increments, as well as an optional XPC word or words. See 6.3.2.1.2.

TID memory: TID memory is required, but its size is vendor-defined. The minimum-size TID memory contains an 8-bit ISO/IEC 15963 allocation class identifier, as well as sufficient identifying information for an Interrogator to uniquely identify the custom commands and/or optional features that a Tag supports. TID memory may optionally contain vendor-specific data. See 6.3.2.1.3.

User memory: User memory is optional. See 6.3.2.1.4, 6.3.2.1.4.1, and 6.3.2.1.4.2.

L.3 Optional Tag commands

***Proprietary*:** A Tag may support proprietary commands. See 2.3.3.

***Custom*:** A Tag may support custom commands. See 2.3.4.

***Access*:** A Tag may support the *Access* command. See 6.3.2.11.3.6.

***BlockWrite*:** A Tag may support the *BlockWrite* command. See 6.3.2.11.3.7.

***BlockErase*:** A Tag may support the *BlockErase* command. See 6.3.2.11.3.8.

***BlockPermalock*:** A Tag may support the *BlockPermalock* command. See 6.3.2.11.3.9.

L.4 Optional Tag error-code reporting format

A Tag may support error-specific or non-error-specific error-code reporting. See Annex I.

L.5 Optional Tag backscatter modulation format

A Tag may support ASK and/or PSK backscatter modulation. See 6.3.1.3.1.

L.6 Optional Tag functionality

A Tag may implement the UMI by one of two methods. See 6.3.2.1.2.2.

A Tag may implement an XPC_W1, XPC_W2, XI, and XEB. See 6.3.2.1.2.2 and 6.3.2.1.2.5.

A Tag may implement recommissioning. See 6.3.2.1.2.5, 6.3.2.10, and 6.3.2.11.3.4.

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Annex M
(informative)
Revision History

Table M.1 – Revision history

Date & Version Number	Section(s)	Change	Approved by
Sept 8, 2004 Version 1.0.4	All	Modified Chicago protocol V1.0.3 as per August 17, 2004 "combo" CRC change template.	
Sept 14, 2004 Version 1.0.5	All	Modified Gen2 protocol V1.0.4 as per September 10, 2004 CRC review.	
Sept 17, 2004 Version 1.0.6	All	Modified Gen2 protocol V1.0.5 as per September 17, 2004 HAG review.	
Sept 24, 2004 Version 1.0.7	All	Modified Gen2 protocol V1.0.6 as per September 21, 2004 CRC review to fix errata. Changed OID to EPC.	
Dec 11, 2004 Version 1.0.8	Multiple	Modified Gen2 protocol V1.0.7 as per the V1.0.7 errata.	
Jan 26, 2005 Version 1.0.9	Multiple	Modified Gen2 protocol V1.0.8 as per the V1.0.8 errata and AFI enhancement requests	
Dec 1, 2005 Version 1.1.0	Multiple	Harmonized Gen2 protocol V1.0.9 with the ISO 18000-6 Type C amendment.	
May 11, 2008 Version 1.2.0	Multiple	Modified Gen2 protocol V1.1.0 to satisfy the ILT JRG requirements V1.2.3.	

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Petitioner Exhibit 1002-0335
CSC ServiceWorks - Ex.1012
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/197,070	**12/19/2023 09:26:50 PM Z ET**	**104402-5074-US**

Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5568	FILED BY	Jackeline De Ranieri
PATENT CENTER #	63679679	FILING DATE	05/14/2023
CUSTOMER #	24341	FIRST NAMED INVENTOR	Paresh K. Patel
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Douglas Crisman

Documents

TOTAL DOCUMENTS: 57

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
104402-5074-US Information Disclosure Statement 19DEC2023.pdf	4	Transmittal Letter	192 KB
104402-5074-US List of References Form 1449 19DEC2023.pdf	16	Information Disclosure Statement (IDS) Form (SB08)	324 KB
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WO2006020692A2.pdf	129	Foreign Reference	6153 KB
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New International Application Filed with the USPTO as a Receiving Office

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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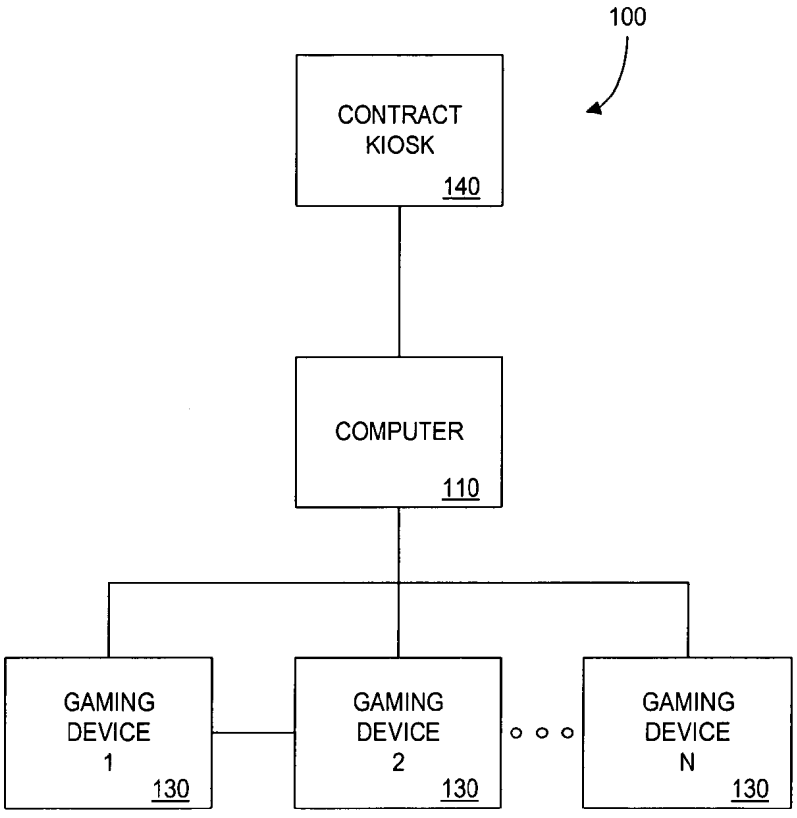
(71) Applicants and
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[Continued on next page]

(54) Title: SYSTEMS, METHODS AND APPARATUS FOR FACILITATING PLAY OF A GAMING DEVICE IN ACCORDANCE WITH A CONTRACT



(57) Abstract: In accordance with one or more embodiments, a contract is established with a player. The contract may define, for example, a period of time, a contract fee, and a benefit that a player may earn or otherwise qualify for by participating in, for example, game play of a gaming device or a table game. The play or other activity of the player may be monitored (e.g., by a casino server) to determine whether the player is complying with the terms defined by the contract and / or whether the player has earned or otherwise qualified for the benefit.

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SYSTEMS, METHODS AND APPARATUS FOR FACILITATING PLAY OF A GAMING DEVICE IN ACCORDANCE WITH A CONTRACT

Claim of Priority

The present application claims the benefit of (i) Provisional Application Serial No. 60/600,211, filed August 10, 2004 in the name of Walker et al. and entitled SYSTEMS, METHODS AND APPARATUS FOR ADMINISTERING GAMING CONTRACTS, and (ii) Provisional Application Serial No. 60/600,646, filed August 11, 2004 in the name of Walker et al. and entitled SYSTEMS, METHODS AND APPARATUS FOR MONITORING GAMING CONTRACTS. The entirety of each of these applications is incorporated by reference herein for all purposes.

Related Applications

The present application is related to the following commonly-owned patents and patent applications:

(i) U.S. Application Serial No. 08/804,060, entitled SYSTEM AND METHOD FOR GENERATING AND EXECUTING INSURANCE POLICIES FOR GAMBLING LOSSES, which was filed on February 21, 1997 in the name of Walker et al. and which issued as US Patent No. 6,113,493 on September 05, 2000;

(ii) U.S. Application Serial No. 08/880,838, entitled GAMING DEVICE FOR A FLAT RATE PLAY SESSION AND A METHOD OF OPERATING SAME, which was filed on June 23, 1997 in the name of Walker et al. and which issued as US Patent No. 6,077,163 on June 20, 2000;

(iii) U.S. Application Serial No. 10/001,089, entitled GAMING DEVICE FOR A FLAT RATE PLAY SESSION AND A METHOD OF OPERATING SAME, which was filed on November 02, 2001 in the name of Walker et al. and which is currently pending;

(iv) U.S. Application Serial No. 10/636,520, entitled SYSTEM AND METHOD FOR COMMUNICATING GAME SESSION INFORMATION, which was filed on August 07, 2003 in the name Walker et al. and which is currently pending;

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(v) U.S. Application Serial No. 10/420,066, entitled METHOD AND APPARATUS FOR EMPLOYING FLAT RATE PLAY, which was filed on April 21, 2003 in the name Walker et al. and which is currently pending; and

(vi) U.S. Application Serial No. 10/365,154, entitled METHOD AND APPARATUS FOR PROVIDING INSURANCE POLICIES FOR GAMBLING LOSSES, which was filed on February 11, 2003 in the name of Walker et al. and which issued as US patent no. 6,869,362 on March 22, 2005.

BRIEF DESCRIPTION OF THE FIGURES

Various embodiments of the present invention are described herein with reference to the accompanying drawings. In the drawings, like reference numerals indicate identical or functionally similar elements. The leftmost digit(s) of a reference numeral typically identifies the figure in which the reference numeral first appears. As will be understood by those skilled in the art, the drawings and accompanying descriptions presented herein indicate some exemplary arrangements for stored representations of information. A number of other arrangements may be employed besides the tables shown. Similarly, the illustrated entries represent exemplary information, but those skilled in the art will understand that the number and content of the entries can be different from those illustrated herein. A brief description of the drawings follows:

FIG. 1 is a block diagram of an example system, according to one or more embodiments of the present invention.

FIG. 2 is a block diagram of a server operable to communicate with one or more gaming devices, according to one or more embodiments of the present invention.

FIG. 3 is a block diagram of an example gaming device, according to one or more embodiments of the present invention.

FIGS. 4A and 4B are a table illustrating an example player database, in accordance with one or more embodiments of the present invention.

FIG. 5 is a table illustrating an example player eligibility rules database, in accordance with one or more embodiments of the present invention.

FIGS. 6A and 6B are a table illustrating an example gaming device database, in accordance with one or more embodiments of the present invention.

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FIG. 7 is a table illustrating an example gaming device eligibility rules database, in accordance with one or more embodiments of the present invention.

FIG. 8 is a table illustrating an example gaming device status database, in accordance with one or more embodiments of the present invention.

FIG. 9 is a table illustrating an example contract customization rules database, in accordance with one or more embodiments of the present invention.

FIG. 10 is a table illustrating an example available contracts database, in accordance with one or more embodiments of the present invention.

FIG. 11 is a table illustrating an example purchased contracts database, in accordance with one or more embodiments of the present invention.

FIG. 12 is a table illustrating example contract cards, in accordance with one or more embodiments of the present invention.

FIG. 13 is an example contract receipt, in accordance with one or more embodiments of the present invention.

FIG. 14 is a flowchart illustrating an example process, in accordance with one or more embodiments of the present invention.

FIG. 15 is a flowchart illustrating an example process, in accordance with one or more embodiments of the present invention.

FIG. 16 is a flowchart illustrating an example process, in accordance with one or more embodiments of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

Numerous embodiments are described in this patent application, and are presented for illustrative purposes only. The described embodiments are not intended to be limiting in any sense. The invention is widely applicable to numerous embodiments, as is readily apparent from the disclosure herein. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural, logical, software, electrical and other changes may be made without departing from the scope of the present invention. Accordingly, those skilled in the art will recognize that the

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present invention may be practiced with various modifications and alterations. Although particular features of the present invention may be described with reference to one or more particular embodiments or figures that form a part of the present disclosure, and in which are shown, by way of illustration, specific embodiments of the invention, it should be understood that such features are not limited to usage in the one or more particular embodiments or figures with reference to which they are described. The present disclosure is thus neither a literal description of all embodiments of the invention nor a listing of features of the invention that must be present in all embodiments.

The terms "an embodiment", "embodiment", "embodiments", "the embodiment", "the embodiments", "an embodiment", "some embodiments", "an example embodiment", "at least one embodiment", "one or more embodiments" and "one embodiment" mean "one or more (but not necessarily all) embodiments of the present invention(s)" unless expressly specified otherwise.

The terms "including", "comprising" and variations thereof mean "including but not limited to", unless expressly specified otherwise.

The term "consisting of" and variations thereof mean "including and limited to", unless expressly specified otherwise.

The enumerated listing of items does not imply that any or all of the items are mutually exclusive. The enumerated listing of items does not imply that any or all of the items are collectively exhaustive of anything, unless expressly specified otherwise. The enumerated listing of items does not imply that the items are ordered in any manner according to the order in which they are enumerated.

The terms "a", "an" and "the" mean "one or more", unless expressly specified otherwise.

The term "based on" means "based at least on", unless expressly specified otherwise.

The methods described herein (regardless of whether they are referred to as methods, processes, algorithms, calculations, and the like) inherently include one or more steps. Therefore, all references to a "step" or "steps" of such a method have antecedent basis in the mere recitation of the term 'method' or a like term. Accordingly, any reference in a claim to a 'step' or 'steps' of a method is deemed to have sufficient antecedent basis.

Headings of sections provided in this patent application and the title of this patent application are for convenience only, and are not to be taken as limiting the disclosure in any way.

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Devices that are in communication with each other need not be in continuous communication with each other, unless expressly specified otherwise. In addition, devices that are in communication with each other may communicate directly or indirectly through one or more intermediaries.

A description of an embodiment with several components in communication with each other does not imply that all such components are required. On the contrary a variety of optional components are described to illustrate the wide variety of possible embodiments of the present invention.

Further, although process steps, method steps, algorithms or the like may be described in a sequential order, such processes, methods and algorithms may be configured to work in alternate orders. In other words, any sequence or order of steps that may be described in this patent application does not, in and of itself, indicate a requirement that the steps be performed in that order. The steps of processes described herein may be performed in any order practical. Further, some steps may be performed simultaneously despite being described or implied as occurring non-simultaneously (e.g., because one step is described after the other step). Moreover, the illustration of a process by its depiction in a drawing does not imply that the illustrated process is exclusive of other variations and modifications thereto, does not imply that the illustrated process or any of its steps are necessary to the invention, and does not imply that the illustrated process is preferred.

It will be readily apparent that the various methods and algorithms described herein may be implemented by, e.g., appropriately programmed general purpose computers and computing devices. Typically a processor (e.g., a microprocessor) will receive instructions from a memory or like device, and execute those instructions, thereby performing a process defined by those instructions. Further, programs that implement such methods and algorithms may be stored and transmitted using a variety of known media.

When a single device or article is described herein, it will be readily apparent that more than one device / article (whether or not they cooperate) may be used in place of a single device / article. Similarly, where more than one device or article is described herein (whether or not they cooperate), it will be readily apparent that a single device / article may be used in place of the more than one device or article.

The functionality and / or the features of a device may be alternatively embodied by one or more other devices which are not explicitly described as having such functionality / features. Thus, other embodiments of the present invention need not include the device itself.

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The term "computer-readable medium" as used herein refers to any medium that participates in providing data (e.g., instructions) that may be read by a computer, a processor or a like device. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media include, for example, optical or magnetic disks and other persistent memory. Volatile media include dynamic random access memory (DRAM), which typically constitutes the main memory. Transmission media include coaxial cables, copper wire and fiber optics, including the wires that comprise a system bus coupled to the processor. Transmission media may include or convey acoustic waves, light waves and electromagnetic emissions, such as those generated during radio frequency (RF) and infrared (IR) data communications. Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a CD-ROM, DVD, any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, a RAM, a PROM, an EPROM, a FLASH-EEPROM, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read.

Various forms of computer readable media may be involved in carrying sequences of instructions to a processor. For example, sequences of instruction (i) may be delivered from RAM to a processor, (ii) may be carried over a wireless transmission medium, and / or (iii) may be formatted according to numerous formats, standards or protocols, such as Bluetooth, TDMA, CDMA, and 3G.

Where databases are described, it will be understood by one of ordinary skill in the art that (i) alternative database structures to those described may be readily employed, (ii) other memory structures besides databases may be readily employed. Any schematic illustrations and accompanying descriptions of any sample databases presented herein are illustrative arrangements for stored representations of information. Any number of other arrangements may be employed besides those suggested by the tables shown. Similarly, any illustrated entries of the databases represent exemplary information only; those skilled in the art will understand that the number and content of the entries can be different from those illustrated herein. Further, despite any depiction of the databases as tables, other formats (including relational databases, object-based models and / or distributed databases) could be used to store and manipulate the data types described herein. Likewise, object methods or behaviors of a database can be used to implement the processes of the present invention. In addition, the databases may, in a known manner, be stored locally or remotely from a device that accesses data in such a database.

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In accordance with one embodiment, a method provides for determining that play of a gaming device qualifies for coverage under a contract previously purchased, monitoring the play, and reconciling the contract based on the monitored play.

In one or more embodiments, the determination that play of a gaming device qualifies for coverage under a contract previously purchased may be based on receiving, from a gaming device, an indication that an identifier that is associated with the contract has been inserted into or otherwise received by the gaming device. The determination may further comprise determining terms of the contract, and determining that play of the gaming device satisfies the terms.

In one or more embodiments, reconciling the contract may comprise determining whether the contract has been complied with and providing a benefit to a player who purchased the contract only if the contract has been complied with. The benefit may comprise, for example, a refund of at least a portion of losses incurred by the player during a period of time defined by the contract, a refund of at least a portion of wagers posted by the player during a period of time defined by the contract, and / or allowing a player to continue playing a gaming device once a credit meter balance of the gaming device has been depleted.

In one or more embodiments, determining that a contract has been complied with may comprise determining that an amount of play defined by the contract has been completed in a satisfactory manner. This may comprise, for example, one or more of: (i) determining that the amount of play is not less than a minimum amount of play; (ii) determining that the amount of play is not more than a maximum amount of play; (iii) determining that the amount of play equals a specified amount of play; (iv) determining that the play was conducted on a gaming device approved for play under the contract; (v) determining that the play was conducted within a period of time defined by the contract; (vi) determining that the play required a minimum sum of wagers; (vii) determining that the play was conducted at a minimum required rate; and (viii) determining that a minimum wager amount was posted for at least one game play encompassed by the play.

In accordance with one or more embodiments, a method provides for receiving a contract initiation signal from a gaming device; storing data associated with game play of the gaming device until one of a contract play termination signal is received and / or an end of a contract period is determined; and providing a benefit defined by the contract based on whether the data indicates a compliance with terms of the contract.

In one embodiment, the benefit may comprise a refund of at least a portion of losses incurred by a player associated with the contract during a period of time defined by the contract.

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In another embodiment, the benefit may comprise a refund of at least a portion of wagers posted by a player associated with the contract during a period of time defined by the contract.

In yet another embodiment, the benefit may comprise authorizing the gaming device to allow play of the gaming device once a credit meter balance of the gaming device has been depleted below a predefined level. The level may be zero, a number of credits insufficient to post a wager for a game play at the gaming device, a number of credits insufficient to post a maximum allowable wager for a game play at the gaming device, and / or a number of credits defined by a casino, a player, a gaming device manufacturer or another entity. In one embodiment, authorizing the gaming device to allow play of the gaming device comprises authorizing the gaming device to allow the credit meter balance to be a negative number. In another embodiment, authorizing the gaming device to allow play of the gaming device comprises authorizing the gaming device to add credits to the credit meter balance without requiring payment therefore from a player playing the gaming device.

In one or more embodiments, a system is provided. The system comprises a computing device operable to communicate with a plurality of gaming devices (e.g., a server of a casino), each of the gaming devices operable to facilitate a wagering game. The computing device is further operable to: (i) determine an initiation of a game play at one of the gaming devices; (ii) determine an identifier of a contract associated with the game play, wherein the contract has been entered into by a player prior to the initiation of the game play, and wherein the contract defines a contract period and a benefit to which the player is entitled if the terms of the contract have been satisfied; (iii) determine data associated with the game play; and (iv) determine whether the player is entitled to the benefit based on the data and the terms.

In one embodiment, the system further comprises the plurality of gaming devices.

In one embodiment, the contract comprises a contract in exchange for which the player provided payment.

In one embodiment, the computing device is further operable to store the data in association with data from at least one other game play, thereby storing data indicative of a plurality of game plays; and determine whether the player is entitled to the benefit based on the data indicative of the plurality of game plays.

In one embodiment, the computing device is further operable to determine whether the game play qualifies as a game play that is covered under the terms of a contract.

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In one embodiment, the computing device is further operable to store the data associated with the game play in association with the identifier only if the game play qualifies as a game play that is covered under the terms of a contract.

In one embodiment, the computing device is further operable to identify the contract based on an identifier provided by the player to the gaming device. The identifier may comprise, for example, an identifier that uniquely identifies the player and / or an identifier that uniquely identifies the contract.

In one embodiment, the computing device may further be operable to provide the benefit to the player. Providing the benefit may comprise, for example, causing a gaming device of the plurality of gaming devices to output the benefit to the player and / or authorizing a casino employee to provide the benefit to the player. The benefit may comprise a monetary payment (e.g., a refund of at least a portion of losses incurred by the player during the contract period).

In one embodiment, the computing device may further be operable to receive a request from the player for the benefit and determine, in response to the request, whether the player is entitled to the benefit based on the data and the terms.

In one embodiment, the computing device is further operable to determine the benefit based on the data and the terms of the contract. For example, the computing device may be operable to determine a value of the benefit based on the data and the terms of the contract.

In one embodiment, the computing device may further be operable to authorize a sale of the contract to the player. For example, in some embodiments only certain players (e.g., players associated with a specified status or other characteristic such as being a hotel guest, players associated with one or more specified gambling history characteristics, players associated with a specified history of previous contract purchases and / or contract compliance, etc) may be eligible to purchase any contract and / or to purchase a particular contract. In another embodiment, a certain contract may only be available if specified conditions are satisfied (e.g., a level of gaming device business on the casino floor is satisfactory, a general level of business of the casino is satisfactory, if the contract is flagged as available in a database of available contracts, etc.).

In one embodiment, the benefit is provided to a player at an end of a period defined by the contract, provided the player has complied with the terms of the contract. For example, a refund of at least a portion of player losses incurred during the period of time may be provided at the end of the period of time. In another embodiment, the benefit is provided to a player during a period of time

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defined by the contract, provided the player is currently complying with the terms of the contract. For example, a player may be allowed to continue playing a gaming device even if the credit meter balance has been depleted below a predefined level if the player is complying with the terms of the contract (e.g., the player is playing at a specified minimum rate of play, the player is playing an eligible gaming device, the player is playing during an eligible time of day, etc.).

In accordance with one aspect of the invention(s) described herein, disclosed herein are apparatus, systems and methods for administering a gaming contract (e.g., an agreement between a player and a casino establishment relating to game play within the casino). In one or more embodiments, a computer of the present invention (e.g., a "player tracking" and / or "slot accounting" controller in communication with one or more gaming devices) may be configured to (i) provide a gaming contract associated with a contract identifier (e.g., activate a gaming contract and provide a player a "contract card," which may be similar in appearance to such an object as a player tracking card), (ii) receive a contract initiation signal (e.g., detect the insertion of the contract card into an eligible gaming device), (iii) track game play data associated with the contract identifier (e.g., track an amount wagered and / or an amount lost by the gaming device player), and (iv) reconcile the contract based at least on the game play data (e.g., reimburse the player for an amount wagered and / or an amount lost). Such a system may be advantageous in that gaming contracts may be administered without requiring substantial gaming device reconfigurations (e.g., a slot machine and / or various components thereof need not be programmed or otherwise configured to administer contracts, track game play, etc.).

Systems, apparatus and computer program products are provided for carrying out the above-described embodiments and numerous other embodiments of the present invention. Each computer program product described herein may be carried by a medium readable by a computer (e.g., a carrier wave signal, a floppy disk, a hard drive, a random access memory, etc.).

Thus, in accordance with one aspect of the present invention, play of a gaming device may be made more beneficial and / or convenient to a player with the aid of a contract that a player may purchase. Many different types of contracts are described herein and in the related applications listed herein. Any and all of these contracts may be implemented via the systems and apparatus described herein. Further, in accordance with another aspect of the present invention, play of one or more gaming devices may be monitored by a computing device (e.g., a server of a casino) to determine whether a player who purchased a contract has or is complying with the terms of the contract and is thus entitled to a benefit defined by the contract. In this manner, the benefits of a

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contract may be realized by players without necessarily requiring any or substantial reconfiguration of existing gaming device, as explained herein.

With these and other advantages and features of the invention that will become hereinafter apparent, the nature of the invention may be more clearly understood by reference to the following detailed description of the invention, to the appended claims and to the several drawings attached herein.

Many other advantageous features may be provided in accordance with a contract executable via a gaming device, as described below. At least some of the novel methods and apparatus for facilitating execution of a contract via a gaming device provided herein overcome one or more drawbacks of the prior art.

RELEVANT TERMINOLOGY

The terms "controller" "computing device" and "central controller" are used interchangeably herein and refer, unless specified otherwise, to an electronic device (e.g., a computer) that communicates with one or more peripheral devices (e.g., a card reader affixed to a gaming device), kiosks (e.g., a "contract kiosk" as described further herein), gaming devices, and / or any other devices described herein (e.g., computer devices operated by casino personnel). For example a controller may comprise a casino server operable to communicate with a plurality of gaming devices and / or its peripheral devices. In some embodiments, a controller may perform a variety of "player tracking" and / or "slot accounting" functions. Thus, a controller in communication with a gaming device may be configured to, among other things, (i) identify players (e.g., by detecting the insertion of a player tracking card), (ii) detect gaming contract initiation signals (e.g., by detecting the insertion of a "contract card"), and / or (iii) monitor and / or record game play data associated with players or gaming contracts (e.g., by measuring statistics such as wager amounts, payout amounts, win/loss amounts, and so on). Thus, the controller may contain or otherwise be configured to read data from and / or write data to one or more databases or other memory mechanisms regarding data associated with a particular player, gaming contract and / or gaming session. In some embodiments, a controller may function to, for example, (i) control the activities of a gaming device and / or its peripheral device, (ii) authorize an activity and / or event at a gaming device, (iii) direct a gaming device and / or its peripheral device to perform a function, (iv) monitor activity at a gaming device and / or its peripheral device, and / or (v) interrogate a gaming device and / or its peripheral device for information.

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The term "game" means, unless specified otherwise, a wagering activity whereby a player posts consideration, usually monetary in form, in exchange for a chance at winning a payout. The definition is intended to include basic games and bonus games.

The terms "gaming device", "gaming device", "gambling device" and / or "gaming machine" are used interchangeably herein and refer, unless specified otherwise, to any electrical, mechanical or electro-mechanical device that, in a manner well known in the art, accepts a wager, determines an outcome and determines winnings based on the outcome. The outcome may be randomly generated, may be generated through a combination of randomness and player skill, or may be generated entirely through player skill. Gaming devices may include slot machines (both video and mechanical reels), video poker machines, video blackjack machines, video roulette machines, video keno machines, video bingo machines, pachinko machines, video lottery terminals, handheld gaming devices, and the like. In one or more embodiments, a gaming device may comprise and may also include a computer, personal digital assistant, or cell phone that is communication with an on-line casino (e.g., a gaming website). In one embodiment, a gaming device comprises a handheld gaming device, which may communicate with one or more other devices in a wireless manner.

The terms "game play", "play", "handle pull" and "spin", when used as a noun, are used interchangeably herein and refer, unless specified otherwise, to a single play of a game at a gaming device that generates a singular, corresponding outcome (e.g., a player pulls the handle of a slot machine and the reels resolve to "bar-lemon-plum"). In some embodiments, a game play may comprise a bonus round. It should be noted that, in some instances, the term "game play" may refer to any number of game plays. In one embodiment, a game play includes a sequence of events in which (i) a wager is initiated or made (either by a player or automatically by a gaming device), (ii) an outcome is provided (e.g., a random number and / or a set of reel indicia or other indicia is provided) and (iii) the wager is disposed of and / or a payout is provided in accordance with the outcome (the payout may be made, for example, by applying a credit to a credit balance).

As used herein, a "winning game play" is a game play in which a winning outcome is produced (e.g., a payout or other prize is provided to a player as a result of the outcome).

As used herein, a "losing game play" is a game play in which a winning outcome is not produced (e.g., a payout or other prize is not provided to a player as a result of the outcome and a player loses the wager posted for the game play).

The term "game play data" means, unless specified otherwise, to data and / or information associated with one or more game plays. In some embodiments, a game play data may be

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associated with (i) a player (e.g., as uniquely identifier by a player identifier, such as P-000001), and / or (ii) a gaming contract (e.g., as uniquely identified by a gaming contract identifier, such as GC-000001). Game play data may comprise various statistics related to game play, including but not limited to (i) wager data (e.g., a monetary amount wagered by a player in association with one or more game plays), (ii) payout data (e.g., a monetary amount won by a player in association with one or more game plays), (iii) win/loss data (e.g., a monetary result of one or more game plays, which may be determined by subtracting a wager amount from a payout amount), (iv) payline data (e.g., a number of slot machine paylines activated by a player in association with one or more game plays), (v) time data (e.g., an amount of time elapsed between and / or during one or more game plays), and so on. Game play data may also comprise an indication of a number of game plays initiated in association with a particular player and / or gaming contract (e.g., player P-000001 has played 1,238 handle pulls).

The terms "game session", "gaming session", "session", and "play session" are used interchangeably herein and refer, unless specified otherwise, to a gambling event with a beginning and end that typically encompasses a plurality of game plays. The end of the session may be determined voluntarily (in which the player elects to stop play) or involuntarily (in which the gaming device and / or controller terminates play). In some embodiments, a session may begin when a player provides an identifier (e.g., a player identifier and / or a contract identifier), and end upon an occurrence of a session ending event. A session ending event may comprise, for example, (i) an occurrence of an end of a period of time defined by a contract, (ii) a signal or indication from a player (e.g., the player's removal of a player tracking card and / or a contract card from a gaming device), (iii) a completion of terms of a contract, and / or a reconciliation of a contract. In some embodiments, a player may pay (e.g., pre-pay prior to initiating the game session) a fixed price for a game session. The payment may be in exchange for, for example, (i) a predetermined number of game plays, or (ii) a period of time during which an indeterminate number of game plays may ensue. Apparatus and methods which, among other things, permit and enable various ways of providing gaming contracts and game sessions such as prepaid or flat-rate play sessions, and which are appropriate for use in accordance with the present invention are disclosed in U.S. Patent No. 6,077,163, filed June 23, 1997, entitled "GAMING DEVICE FOR A FLAT RATE PLAY SESSION AND METHOD OF OPERATING SAME," as well as pending U.S. Patent Application No. 10/001,089, filed November 2, 2001, entitled "GAME MACHINE FOR A FLAT RATE PLAY SESSION AND METHOD OF OPERATING SAME"; the entirety of each are incorporated herein by reference for all purposes.

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The terms "gaming contract" and "contract" are used interchangeably herein and refer, unless specified otherwise, to an agreement between a player and another entity (e.g., a casino or other gaming establishment) relating to game play that may be conducted at one or more gaming devices and / or table games. In one embodiment, a contract has an associated price for which the player may purchase the contract and defines a benefit to be provided to the player. The contract may further define one or more terms with which the player must comply in order to be provided with the defined benefit. As explained in more detail below, the benefit may be provided at the end of a period of time defined by the contract. For example, a benefit may comprise a monetary amount that is a refund of at least a portion of losses incurred by the player during the period of time. In another embodiment, the benefit may be provided during a period of time defined by the contract (e.g., once, a plurality of times, continuously, periodically, in response to a triggering condition, or on another basis). For example, a benefit may comprise access to a feature of a gaming device and / or an ability to continue playing the gaming device even though a credit meter balance of the gaming device has been depleted below a predetermined level. In some embodiments, a contract period may comprise (i) a predetermined number of game plays, or (ii) an indeterminate number of game plays to be initiated within a predetermined period of time (e.g., one hour). Further, in some embodiments, a gaming contract may be provided only if a player (i) pays or agrees to pay a premium, fee or surcharge, which may be associated with one or more game plays and / or wager amounts (e.g., an incremental 1¢ fee is assessed for every 25¢ wagered by the player; the player pays a flat $30 premium for two hours of insured play), and / or (ii) agrees to a predetermined contract period (e.g., 12 hours of slot play; 6,000 handle pulls, 25,000 lines played, etc.). One example of a contract is an insurance contract. An insurance contract is described in more detail below.

The terms "gaming contract data" and "contract data" are used interchangeably herein and refer, unless specified otherwise, to information or data associated with or pertaining to a gaming contract, including but not limited to (i) game play data associated with the contract, (ii) a refund rate associated with the contract, (iii) contract fees associated with the contract, (iv) a period of time associated with the contract, and so on.

The terms "gaming contract play" and "contract play" are used interchangeably herein and refer, unless specified otherwise, to one or more game plays which result from a contract, are covered under the terms of a contract, qualify for inclusion under a contract, or are otherwise associated with a contract (e.g., all game plays initiated by a player during a period of time defined by a contract).

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The term "player tracking card" refers, unless specified otherwise, to an instrument issued by a casino and useful in uniquely identifying a player and / or tracking gambling or other activity of the player. Most casinos issue plastic cards (resembling frequent shopper cards) to players as a way of identifying the player at a slot machine or table game. As is well known in the art, such cards typically have encoded thereon (in machine-readable and / or human readable form) a player identifier (e.g., a six digit number) which uniquely identifies the player (e.g., because the number is associated with a record in a player database that includes corresponding player information). The player inserts the card into a reader device affixed to a gaming device (e.g., which may be an example of a peripheral device), and the player identifier is read from the card, most often magnetically or optically. From the player identifier, the corresponding player information may in turn be read from a database, typically via a network connection between the reader device and a device hosting the database (e.g., a controller).

As described in more detail below, in some embodiments a player establishing a gaming contract may receive a "contract card". In some embodiments, a contract card may have a substantially similar function and appearance as to that of a player tracking card, though a contract card may alternately or additionally be associated with a unique contract identifier (e.g., such that data may be read from and / or written to a database regarding the contract and / or game play data associated therewith). In some embodiments a player tracking card may comprise a contract card once a player established a contract.

The term "rate of play" as used herein, unless specified otherwise, refers to the number of game plays performed per unit of time. For example, a rate of 20 game plays performed in five minutes is slower than a rate of 25 game plays performed in five minutes.

The term "depletion of a credit meter balance" as used herein, unless specified otherwise, refers to a reduction of a credit meter balance below a predetermined threshold. For example, depletion of a credit meter balance may refer to the credit meter balance reaching (i) zero credits, (ii) a negative amount of credits (i.e., an amount less than zero), (iii) an amount of credits that is less than a wager amount that is applicable per game play; (iv) an amount of credits that is less than a maximum allowable wager amount per game play; and / or (v) another amount. "Depletion of a credit meter balance" may also include reduction of the credit balance to or below a predetermined level that may have been set by the player, by the gaming device, by the casino, or by the controller.

As used herein, unless specified otherwise, the term "player" includes one person or a group of persons who place wagers on the operation of a gaming device. Such wagers may be made in connection with a contract.

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As used herein, unless specified otherwise, the term "payout" includes an amount greater than zero that is credited to a credit balance of a gaming device in response to a winning game play and / or a prize provided to a player as a result of a game play.

As used herein, unless specified otherwise, the term "inputting" includes any manner of providing an input, a signal, a stimulus, an indication, data or information to a device, and includes actuating an actuatable portion of the device and / or transmitting a signal to the device from another device.

A gaming machine should be understood to "receive" (as that term is used herein and in the appended claims) an input, a signal, data or information upon actuation of an actuatable portion of the gaming machine (e.g., a push button, a keypad, a keyboard, a region of a touch screen) and / or upon receipt of a signal generated by a device exterior to the gaming machine.

EXEMPLARY EMBODIMENTS OF THE INVENTIVE SYSTEM

Referring now to FIG. 1, an example embodiment 100 of a system in accordance with one or more embodiments is depicted in block diagram form. Embodiment 100 is referred to as system 100 herein. The present invention can be configured to work as a system 100 in a network environment including a computer 110 (*e.g.*, a slot server of a casino) that is in communication, via a communications network, with one or more gaming devices 130 (*e.g.*, slot machines, video poker machines, etc.) and with one or more contract kiosks 140. A kiosk 140 may comprise, for example, a stand-alone kiosk or computing device located at a casino-staffed personnel counter via which a player may view available contracts, purchase a contract, and / or receive a benefit for a contract previously entered into. The computer 110 may communicate with any and all of the gaming devices 130 and any and all of the contract kiosks 140 directly or indirectly, via a wired or wireless medium such as the Internet, LAN, WAN or Ethernet, Token Ring, or via any appropriate communications means or combination of communications means. Each of the gaming devices 130 may comprise computers, such as those based on the Intel® Pentium® processor, that are adapted to communicate with the computer 110. Any number and type of devices 130 may be in communication with the computer 110. Similarly, any number and type of contract kiosks 140 may be in communication with the computer 110.

In some embodiments, a contract kiosk 140 may be configured to execute or assist in the execution of various processes described herein, or portions thereof. In some embodiments, a kiosk may comprise a processor and a memory as described. A kiosk may also comprise various input devices (e.g., a keypad, a keyboard, a mouse, buttons, a port that receives player tracking cards, an optical scanner for reading barcodes or other indicia, a CCD camera, etc.), output devices (e.g., a display screen, audio

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speakers, etc.), benefit output devices (e.g., a coin tray or printer for printing cashless gaming tickets), combinations thereof (e.g., a "ticket-in/ticket-out" device, a touch-sensitive display screen, etc.), communications ports, and so on. Thus, a kiosk may comprise many of the features and components of a gaming device, though the kiosk itself may not necessarily be configured to enable gambling activity as a primary function. A kiosk may communicate with any or all of (i) a controller operable to communicate with one or more gaming devices, (ii) a gaming device, (iii) an inventory/reservation system of a casino-maintained property (e.g., a hotel), (iv) casino personnel devices, (v) merchant POS terminals, and so on. A number of contract kiosks 140 may be stationed within casino premises (e.g., at various locations on a slot floor, in a casino hotel lobby, near a swimming pool operated by a casino, etc.). In various embodiments, kiosks may execute or assist in the execution of (i) determining and outputting a player status or other types of data described herein (e.g., a kiosk receives a player tracking card, and outputs a number of accumulated reward which a player may be entitled to redeem), (ii) outputting payments to players (e.g., upon receipt of cashless gaming tickets, player tracking cards, contract cards, smart cards, etc.), (iii) outputting a menu of available contracts and detailed information of each available contract, (iv) determining a player's eligibility to purchase a contract, (v) facilitating a player's purchase of a contract (e.g., including receiving payment therefore), (vi) receiving data indicative of whether a player has complied with, or is complying with, terms of a contract previously purchased by the player (e.g., the data may be received from a gaming device, from computer 110, from a player device, from a contract card and / or player tracking card comprising a memory (e.g., a "smart card"), and / or from a contract server), and / or (vii) any other process described herein, or portion thereof. In some embodiments, a contract kiosk 140 may be configured to, among other things, (i) provide a gaming contract associated with a gaming contract identifier, (ii) reconcile contracts based on contract data (e.g., provide refunds), and / or (iii) output contract data (e.g., provide contract status information). A contract kiosk 140 may be operable to read from and / or write to one or more databases described herein. The memory of a contract kiosk 140 may store a program for executing such processes, or portions thereof.

It should be noted that, in accordance with one embodiment, one or more of the contract kiosks 140 may be in communication with a server or controller different from computer 110. For example, a contract server may be operable to store information about available and / or purchased contracts, authorize a contract kiosk 140 to sell a contract to a player, authorize a contract kiosk 140 to provide a benefit to a player, receive data from a casino employee regarding a contract, etc. In such an embodiment, computer 110 may communicate with contract kiosks 140 via the contract server. Of course, in other embodiments that include a contract kiosk, computer 110 may still communicate with contract kiosks 140 directly (e.g., in addition to, or in lieu of, communicating with the contract server).

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Communication between the devices 130, 140 and the computer 110, among the devices 130, and among the devices 140 may be direct or indirect, such as over the Internet through a Web site maintained by computer on a remote server or over an on-line data network including commercial on-line service providers, bulletin board systems and the like. In yet other embodiments, the gaming devices 130 and / or the contract kiosks 140 may communicate with one another and / or the computer 110 over RF, cable TV, satellite links and the like.

Some, but not all, possible communication networks that may comprise the network or be otherwise part of the system 100 include: a local area network (LAN), a wide area network (WAN), the Internet, a telephone line, a cable line, a radio channel, an optical communications line, and a satellite communications link. Possible communications protocols that may be part of the system include: Ethernet (or IEEE 802.3), SAP, ATP, Bluetooth™, and TCP/IP. Communication may be encrypted to ensure privacy and prevent fraud in any of a variety of ways well known in the art.

A variety of communications protocols may be part of the system 100 or another system operable to facilitate the embodiments described herein, including but not limited to: Ethernet (or IEEE 802.3), SAP, SAS™, SuperSAS™, ATP, Bluetooth™, and TCP/IP. Further, in some embodiments, various communications protocols endorsed by the Gaming Standards Association of Fremont, CA, may be utilized, such as (i) the Gaming Device Standard (GDS), which may facilitate communication between a gaming device and various component devices and / or peripheral devices (e.g., printers, bill acceptors, etc.), (ii) the Best of Breed (BOB) standard, which may facilitate communication between a gaming device and various servers related to play of one or more gaming devices (e.g., servers that assist in providing accounting, player tracking, ticket-in/ticket-out and progressive jackpot functionality), and / or (iii) the System-to-System (S2S) standard, which may facilitate communication between game-related servers and / or casino property management servers (e.g., a hotel server comprising one or more databases that store information about booking and reservations). Communication may be encrypted to ensure privacy and prevent fraud in any of a variety of ways well known in the art.

In some embodiments, a computer 110 may not be necessary and / or preferred. For example, one or more embodiments may be practiced on a stand-alone gaming device 130, a gaming device 130 in communication only with one or more other gaming devices 130, and / or a gaming device 130 in communication with one or more contract kiosks 140 (*i.e.* without a computer 110A). In such embodiments, any functions described as performed by the computer 110 or data described as stored on the computer 110 may instead be performed by or stored on one or more gaming devices 130 and / or by one or more contract kiosks 140.

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In some embodiments, the contract kiosks 140 may not be necessary and / or preferred. For example, one or more embodiments may be practiced on a stand-alone gaming device 130, a gaming device 130 in communication only with one or more other gaming devices 130, and / or a gaming device 130 in communication with computer 110 (*i.e.* without any contract kiosk 140). In such embodiments, any functions described as performed by a kiosk 140 or data described as stored on a kiosk 140 may instead be performed by or stored on one or more gaming devices 130 and / or by computer 110.

In one or more embodiments, system 100 may include additional devices, such as one or more casino personnel devices, one or more additional servers (e.g., a contract server, as described above, a hotel reservation server, and / or an inventory management server). One or more point-of-sale terminals associated with one or more merchants may also be included in system 100.

In some embodiments, various casino employees may be equipped with or otherwise utilize one or more casino personnel devices, such as personal digital assistants (PDAs) or other computing devices (e.g., personal computer terminals). A casino personnel device may comprise various input devices (e.g., a keypad, a touch-sensitive display screen, a card reader, an infrared bar code scanner, etc.), various output devices (e.g., an LCD screen), a processor, a memory and / or a communications port, as described herein with respect to other devices. In some embodiments, a casino personnel device may communicate with a gaming device, server, kiosk, peripheral device, and / or an inventory/reservation system of a casino-maintained property (e.g., a hotel). Thus, a casino personnel device may be configurable to, among other things, (i) read from and / or write to one or more databases of the present invention, (ii) assist in payments made to players (e.g., a representative "scans" a cashless gaming receipt and determines a value associated with the receipt, and if the receipt is valid, provides payment equal to the value; a representative "swipes" a contract card to determine whether or not a player is due a benefit), and / or (iii) execute or assist in the execution of various other processes described herein. For example, a casino employee may utilize a casino personnel device to (i) obtain, display and / or view information about available contracts, (ii) sell a contract to a player, (iii) determine a player's eligibility for a contract, (iv) determine a player's compliance with a previously purchased contract, and / or (v) provide, or authorize the provision of, a benefit defined by a contract to a player associated with the contract. In one or more embodiments, a casino personnel device may be operable to read data from and / or write data to one or more of the databases described herein. A memory of a casino personnel device may store a program for executing processes described herein, or portions thereof.

In some embodiments, various merchants (e.g., shops, restaurants, etc.) may utilize point-of-sale (POS) computer terminals to facilitate various processes of the present invention. For example, in some

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embodiments, a player may receive a benefit defined by a contract in the form of a cashless gaming ticket or other ticket, voucher or instrument redeemable for an amount of currency. However, the ticket may alternately or additionally be redeemable for an amount of credit at a particular merchant location. Thus, in some embodiments, merchants may utilize POS terminals to redeem such vouchers. In some embodiments, such devices may be configured to read from and / or write to one or more databases of the present invention. Such POS terminals may thus comprise various hardware and software described herein with respect to other devices, and may communicate with (i) a casino server, (ii) a gaming device, (iii) an inventory/reservation system (e.g., a computer terminal at a theatre communicates with an inventory database to determine a number of unsold seats for a certain event), (iv) a contract kiosk, and so on.

In some embodiments of the present invention, various component devices (e.g., any or all of the benefit output devices, output devices, input devices and / or input output devices described herein) may be embodied as peripheral devices. For example, such devices may not necessarily be components of a gaming device, though they may be configured in such a manner so as to communicate with one or more gaming device processors or any other devices described herein. For example, a peripheral device such as a large display device may be associated with a plurality of gaming devices, and thus may not necessarily be considered a component of any one gaming device. Further, in some embodiments, certain peripheral devices such as card readers may be interchangeable between gaming devices, and thus may be considered a component of a first gaming device while connected thereto, removed from the first gaming device, connected to a second gaming device, and so on. In other embodiments, various peripheral devices may never be considered a component of a particular gaming device. For example, in some embodiments, a peripheral device such as a USB-based portable memory device may store (i) one or more databases described herein, and / or (ii) a program for executing one or more process steps described herein. Such a peripheral device may then be utilized by casino personnel for upgrading/retrofitting existing gaming devices as described herein.

EXEMPLARY EMBODIMENTS OF A CONTROLLER

Referring now to FIG. 2, illustrated therein is an embodiment 200 of a controller operable to communicate with at least one gaming device (e.g., computer 110). Embodiment 200 is referred to as computer 200 herein. The computer 200 may be implemented as a system controller, a dedicated hardware circuit, an appropriately programmed general-purpose computer, or any other equivalent electronic, mechanical or electro-mechanical device. The computer 200 may comprise, for example, a server computer operable to communicate with one or more client devices, such as one or more gaming devices, one or more kiosks, one or more peripheral devices, and / or one or

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more casino personnel devices. The computer 200 may be operative to manage the system 100 execute some or all of the methods described herein.

In operation, the computer 200 may function under the control of a casino, another merchant, or other entity that may also control use of the gaming devices 130 and / or contract kiosks 140. For example, the computer 200 may be a slot server in a casino. In some embodiments, the computer 200 and a slot server may be different devices. In some embodiments, the computer 200 may comprise a plurality of computers operating together. In some embodiments, the computer 200 and a contract server may be the same device.

The computer 200 comprises a processor 205, such as one or more Intel® Pentium® processors. The processor 205 is in communication with a memory 210 and a communications port 215 (*e.g.*, for communicating with one or more other devices). The memory 210 may comprise an appropriate combination of magnetic, optical and / or semiconductor memory, and may include, for example, Random Access Memory (RAM), Read-Only Memory (ROM), a compact disc and / or a hard disk. The processor 205 and the memory 210 may each be, for example: (i) located entirely within a single computer or other device; or (ii) connected to each other by a remote communication medium, such as a serial port cable, telephone line or radio frequency transceiver. In one embodiment, the computer 200 may comprise one or more devices that are connected to a remote server computer for maintaining databases.

The memory 210 stores a program 220 for controlling the processor 205. The processor 205 performs instructions of the program 220, and thereby operates in accordance with the present invention, and particularly in accordance with the methods described in detail herein. The program 220 may be stored in a compressed, uncompiled and / or encrypted format. The program 220 furthermore includes program elements that may be necessary, such as an operating system, a database management system and "device drivers" for allowing the processor 205 to interface with computer peripheral devices. Appropriate program elements are known to those skilled in the art, and need not be described in detail herein. The program 220 may include computer program code that allows the computer 200 to employ the communications port 215 to communicate with a gaming device (e.g., gaming device 300, described below) in order to, for example:

1. track gambling activity performed at the gaming device;

2. track gaming activities of individual players;

3. track gaming session activities at the gaming device;

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4. determine whether an identifier identifying a contract has been provided to the gaming device;

5. determine whether current play of the gaming device is covered under a contract;

6. determine whether the gaming device is eligible for contract play;

7. instruct the gaming device to perform one or more functions (e.g., output a message and / or provide a benefit to a player);

8. determine whether play of the gaming device complies with terms of a contract; and / or

9. manage a contract play mode of the gaming device.

According to an embodiment of the present invention, the instructions of the program 220 may be read into a main memory from another computer-readable medium, such from a ROM to RAM. Execution of sequences of the instructions in program 220 causes processor 205 to perform the process steps described herein. In alternate embodiments, hard-wired circuitry may be used in place of, or in combination with, software instructions for implementation of the processes of the present invention. Thus, embodiments of the present invention are not limited to any specific combination of hardware and software.

The memory 210 also stores (i) a player database 225; (ii) a player eligibility rules database 230; (iii) a gaming device database 235; (iv) a gaming device eligibility rules database 240; (v) a gaming device status database 245; (vi) a contract customization rules database 250; (vii) an available contracts database 255; and (viii) a purchased contracts database 260. Each of the databases 225 through 260 are described in more detail below.

Although the databases 225 through 260 are described as being stored in a memory of computer 200, in other embodiments some or all of these databases may be partially or wholly stored, in lieu of or in addition to being stored in a memory of computer 200, in a memory of one or more other devices. Such one or more other devices may comprise, for example, one or more peripheral devices, one or more contract kiosks 140, a contract server, one or more gaming devices, a slot server (if different from the computer 200), another device, or a combination thereof. Further, some or all of the data described as being stored in the memory 210 may be partially or wholly stored (in addition to or in lieu of being stored in the memory 210) in a memory of one or more other devices. Such one or more other devices may comprise, for example, one or more peripheral

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devices, one or more gaming devices, one or more contract kiosks 140, a contract server, a slot server (if different from computer 200), another device, or a combination thereof. In one or more embodiments, memory 210 may store databases in addition to those described herein.

EXEMPLARY EMBODIMENTS OF A GAMING DEVICE

Referring now to Fig. 3, illustrated therein is a block diagram of an example embodiment 300 of a gaming device (e.g., a gaming device 130) that may be used in accordance with one or more embodiments. Embodiment 300 is referred to herein as gaming device 300.

The gaming device 300 may be implemented as a system controller, a dedicated hardware circuit, an appropriately programmed general-purpose computer, or any other equivalent electronic, mechanical or electro-mechanical device. The gaming device 300 may comprise, for example, a slot machine, a video poker terminal, a video blackjack terminal, a video keno terminal, a video lottery terminal, a pachinko machine or a table-top game (e.g., a mechanical or electro-mechanical device may be associated with a table game and be operable by a player and / or a dealer).

In some embodiments, a gaming device 300 may comprise, for example, a personal computer (*e.g.*, which may communicate with an online casino Web site), a telephone (*e.g.*, to communicate with an automated sports book that provides gaming services), and / or a portable handheld gaming device (*e.g.*, a personal digital assistant, Nintendo GameBoy or Sony PSP, a dedicated personal hand-held gaming device provided by a casino, or any combination thereof). In some embodiments, a user device such as a PDA or cell phone may be used in place of, or in addition to, some or all of the gaming device 300 components depicted in Fig. 3. Further, a gaming device 300 may comprise a personal computer or other device operable to communicate with an online casino and facilitate game play at the online casino. In one or more embodiments, the gaming device 300 may comprise a computing device operable to execute software that simulates play of, for example, a reeled (mechanical or video) slot machine game, video poker game, video blackjack game, video keno game, video roulette game, or lottery game. In another embodiment, a gaming device 300 may comprise a hand-held device operable to display the results of a table game, slot machine game, keno game or other game being executed on a casino floor.

It should be noted that not all of the components described herein as being components of gaming device 300 may be necessary and / or preferred for a gaming device operable to implement embodiments described herein. For example, in embodiments in which a gaming device comprises a personal computer operable to access an online casino, a random number generator may not be a component of the gaming device but may rather be a component of a server administering the

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online casino. In another example, a gaming device that comprises a personal computer may not necessarily include a benefit output device and / or a player-tracking device.

The gaming device 300 comprises a processor 305, such as one or more Intel® Pentium® processors. The processor 305 is in communication with a memory 310 and a communications port 315 (*e.g.*, for communicating with one or more other devices). The memory 310 may comprise an appropriate combination of magnetic, optical and / or semiconductor memory, and may include, for example, Random Access Memory (RAM), Read-Only Memory (ROM), a compact disc and / or a hard disk. The memory 310 may comprise or include any type of computer-readable medium. The processor 305 and the memory 310 may each be, for example: (i) located entirely within a single computer or other device; or (ii) connected to each other by a remote communication medium, such as a serial port cable, telephone line or radio frequency transceiver. In one embodiment, the gaming device 300 may comprise one or more devices that are connected to a remote server computer for maintaining databases.

The memory 310 stores a program 320 for controlling the processor 305. The processor 305 performs instructions of the program 320, and thereby operates in accordance with embodiments of the present invention, and particularly in accordance with the methods described in detail herein. The program 320 may be stored in a compressed, uncompiled and / or encrypted format. The program 320 may furthermore includes program elements that may be necessary, such as an operating system, a database management system and "device drivers" for allowing the processor 305 to interface with computer peripheral devices. Appropriate program elements are known to those skilled in the art, and need not be described in detail herein.

According to an embodiment described herein, the instructions of the program 320 may be read into a main memory from another computer-readable medium, such as from a ROM to RAM. Execution of sequences of the instructions in program 320 causes processor 305 to perform the process steps described herein. In some embodiments, hard-wired circuitry may be used in place of, or in combination with, software instructions for implementation of the processes of the present invention. Thus, embodiments described herein are not limited to any specific combination of hardware and software.

The memory 310 also stores a plurality of databases, including a probability database 325 and a payout database 330. A probability database may be stored in the memory 310 in tabular form, or any other appropriate database form, as is well known in the art. The data stored therein may include a number of exemplary records or entries, each defining a random number. Those skilled in the art will understand that the probability database may include any number of entries.

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The tabular representation may also define fields for each of the entries or records. The fields may specify: (i) a random number (or range of random numbers) that may be generated by the random number generator; and (ii) an outcome that indicates the one or more indicia comprising the outcome that corresponds to the random number of a particular record. A gaming device may utilize a probability database to determine, for example, what outcome corresponds to a random number generated by a random number generator and to display the determined outcome. The outcomes may comprise the three symbols to be displayed along the payline of a three-reel slot machine. Other arrangements of probability databases are possible. For example, the book "Winning At Slot Machines" by Jim Regan (Carol Publishing Group Edition, 1997) illustrates examples of payout and probability tables and how they may be derived. The entirety of this book is incorporated by reference herein for all purposes.

A payout database may be stored in the data storage device in tabular form, or any other appropriate database form, as is well known in the art. The data stored therein includes a number of example records or entries, each defining an outcome that may be obtained on a gaming device that corresponds to a payout. Those skilled in the art will understand that the payout database may include any number of entries. The tabular representation also defines fields for each of the entries or records. The fields specify: (i) an outcome, which indicates the one or more indicia comprising a given outcome; and (ii) a payout that corresponds to each respective outcome. The outcomes may be those obtained on a three-reel slot machine.

A gaming device may utilize the payout database to determine whether a payout should be output to a player as a result of an outcome obtained for a game. For example, after determining the outcome to output on the gaming device, the gaming device may access the payout database to determine whether the outcome for output is one of the outcomes stored as corresponding to a payout. If it is, the gaming device may provide the corresponding payout to the player via a benefit output device described herein. Other arrangements of payout databases are possible. For example, the book "Winning At Slot Machines" by Jim Regan (Carol Publishing Group Edition, 1997) illustrates many examples of payout and probability tables and how they may be derived.

Additionally, the memory 310 may store (e.g., while a game play covered under a contract is being executed or while a session covered under a contract is being executed), information associated with the contract (e.g., an indication that a current game play is covered under a contract, an indication of compliance with the terms of a contract, an indication of a status of a contract, etc.), via, for example, a memory caching or disk caching mechanism.

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Although databases 325 and 330 are described as being stored in a gaming device 300, in other embodiments of the present invention some or all of these databases may be partially or wholly stored (in addition to or in lieu of being stored in gaming device 300) in one or more other devices. Such one or more other devices may comprise, for example, (i) one or more peripheral devices, (ii) a peripheral device server, (iii) computer 110, (iv) a kiosk 140 (v) another device, or (vi) a combination thereof. Further, some or all of the data described as being stored in the databases 325 and / or 330 may be partially or wholly stored (in addition to or in lieu of being stored in the gaming device 300) in a memory of one or more other devices. Such one or more other devices may comprise, for example, (i) one or more peripheral devices, (ii) a peripheral device server, (iii) computer 110, (iv) a kiosk 140, (v) another device, or (vi) a combination thereof.

In one or more embodiments, as described below, data may be stored in a memory of another device (e.g., a database of computer 110 or a database of a kiosk 140). In one or more embodiments, gaming device 300 may be operable to access the data thereof or have information associated with the data stored therein downloaded to the gaming device as necessary and / or appropriate. For example, gaming device 300 may access a memory of another device to determine terms of a contract to determine whether a current game play is covered under the terms of the contract.

The processor 305 is also operable to communicate with a random number generator 345, which may be a component of gaming device 300. The random number generator 345, in accordance with at least one embodiment of the present invention, may generate data representing random or pseudo-random values (referred to as "random numbers" herein). The random number generator may generate a random number every predetermined unit of time (*e.g.*, every second) and / or in response to an event such as an initiation of a game play on the gaming device or receipt of a signal from another device. In the former embodiment, the generated random numbers may be used as they are generated (*e.g.*, the random number generated at substantially the time of game play initiation is used for that game play) and / or stored for future use. A random number generated by the random number generator may be used by the processor 305 to determine, for example, an outcome for a game play, a payout associated with an outcome, and / or which of a plurality of payouts to provide as the result of an outcome.

A random number generator, as used herein, may be embodied as a processor separate from but working in cooperation with processor 305. Alternatively, a random number generator may be embodied as an algorithm, program component, or software stored in the memory of gaming device 300 and used to generate a random number.

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Note that, although the generation or obtainment of a random number is described herein as involving a random number generator of a gaming device, other methods of determining a random number may be employed. For example, a gaming device owner or operator may obtain sets of random numbers that have been generated by another entity. HotBits™, for example, is a service that provides random numbers that have been generated by timing successive pairs of radioactive decays detected by a Geiger-Muller tube interfaced to a computer. In another example, a blower mechanism that uses physical balls with numbers thereon may be used to determine a random number by randomly selecting one of the balls and determining the number thereof.

In yet another example, another device remote from and / or distinct from the gaming device 300 (e.g., a computer 110) may include a random number generator that generates random numbers to be provided to the gaming device 300. For example, in some embodiments, a gaming device may receive random numbers and / or any other data related to the random or pseudo-random determination of an outcome from a separate device, such as a server. It should be noted that such embodiments may be advantageous in environments or jurisdictions wherein the "central determination" of outcomes is required by regulation or otherwise preferred. Thus, for example, outcomes may be determined centrally by a server, and then propagated (e.g., electronically) such that indications of the outcomes may be viewed using one or more gaming devices (e.g., "Class II" gaming devices, Video Lottery Terminals, and so on).

The processor 305 is also operable to communicate with a benefit output device 350, which may be a component of gaming device 300. The benefit output device 350 may comprise one or more devices for outputting a benefit (e.g., a payout) to a player of the gaming device 300. It should be noted that a benefit output by a gaming device may, in some circumstances or embodiments, comprise a benefit defined by a contract that a player has qualified to receive as a result of compliance with the contract.

For example, in one embodiment the gaming device 300 may provide coins and / or tokens as a benefit. In such an embodiment the benefit output device 350 may comprise a hopper and hopper controller, for dispensing coins and / or tokens into a coin tray of the gaming device 300.

In another example, the gaming device 300 may provide a receipt or other document on which there is printed an indication of a benefit. For example, the gaming device may be operable to output one or more cash-out tickets. In such an embodiment the benefit output device 350 may comprise a printing mechanism and a document dispensing mechanism.

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In yet another example, the gaming device 300 may provide electronic credits as a benefit (which, *e.g.*, may be subsequently converted to coins and / or tokens and dispensed from a hopper into a coin tray). In such an embodiment the benefit output device 350 may comprise a credit meter balance and / or a processor that manages the amount of electronic credits that is indicated on a display of a credit meter balance. The processor may be the processor 305 or another processor.

In yet another example, the gaming device 300 may credit a monetary amount to a financial account associated with a player as a benefit provided to a player. The financial account may be, for example, a credit card account, a debit account, a charge account, a checking account, or a casino account. In such an embodiment the benefit output device 350 may comprise a device for communicating with a server on which the financial account is maintained.

Note that, in one or more embodiments, the gaming device 300 may include more than one benefit output device 350 even though only one benefit output device is illustrated in Fig. 3. For example, the gaming device 300 may include each of (i) a hopper and hopper controller combination, (ii) a credit meter balance, and (iii) a document printing and dispensing combination. Such a gaming device may be operable to provide more than one type of benefit to a player of the gaming device.

A single benefit output device 350 may be operable to output more than one type of benefit. For example, a benefit output device 350 may be operable to increase the balance of credits in a credit meter and communicate with a remote device in order to increase the balance of a financial account associated with a player.

The processor 305 is also operable to communicate with a display device 355, which may be a component of gaming device 300. The display device 355 may comprise, for example, one or more display screens or areas for outputting information related to game play on the gaming device, such as a cathode ray tube (CRT) monitor, liquid crystal display (LCD) screen, or light emitting diode (LED) screen.

In one or more embodiments, gaming device 300 may comprise more than one display device. For example, gaming device 300 may comprise an LCD display for displaying electronic reels, a display area that displays rotating mechanical reels, and an LED display of a player tracking device (e.g., such as player tracking device 360, described below) that outputs information to a player.

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The processor 305 may also be in communication with one or more other output devices besides the display device 355, for outputting information (*e.g.*, to a player or another device). Such other one or more output devices may also be components of gaming device 300. Such other one or more output devices may comprise, for example, an audio speaker (*e.g.*, for outputting audio information corresponding to audio / video content), an infra-red transmitter, a radio transmitter, an electric motor, a printer (e.g., such as for printing cashless gaming vouchers), a ticket or product dispenser, an infra-red port (e.g., for communicating with a second gaming device or a portable device of a player), a Braille computer monitor, and a coin or bill dispenser. For gaming devices, common output devices include a cathode ray tube (CRT) monitor on a video poker machine, a bell on a gaming device (e.g., rings when a player wins), an LED display of a player's credit balance on a gaming device, an LCD display of a personal digital assistant (PDA) for displaying keno numbers.

The display device 355 may comprise, for example, one or more display areas. For example, one of the display areas may display outcomes of games played on the gaming device (*e.g.*, electronic reels of a gaming device). Another of the display areas may display rules for playing a game of the gaming device. Yet another of the display areas may display the benefits obtainable by playing a game of the gaming device (*e.g.*, in the form of one or more payout tables). In one or more embodiments, the gaming device 300 may include more than one display device, one or more other output devices, or a combination thereof (*e.g.*, two display devices and two audio speakers). In one embodiment, a first display area and a second display area may comprise two distinct areas of the same display device (e.g., a slit screen or a window within a screen, etc.).

The processor 305 is also in communication with an input device 365, which is a device that is capable of receiving an input (*e.g.*, from a player or another device, such as a selection of an option or feature available on the gaming device, such as a selection of an episode of a television show) and which may be a component of gaming device 300. An input device may communicate with or be part of another device (*e.g.* a computer 110A or computer 110B, another gaming device, etc.). For example, a player may use a touch screen to indicate his desire to view contracts available for purchase and / or to view a status of a contract previously purchased or entered into by the player.

Some examples of input devices include: a bar-code scanner, an optical scanner configured to read other indicia of a voucher or cashless gaming ticket, a CCD camera, a magnetic stripe reader (e.g., for reading data encoded upon a player tracking card), a smart card reader (e.g., for reading data stored upon a smart card), a computer keyboard or keypad, a button, a handle, a lever, a keypad, a touch-screen, a microphone, an infrared sensor, a voice recognition module, a

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coin or bill acceptor, a sonic ranger, a computer port, a video camera, a motion detector, a digital camera, a network card, a universal serial bus (USB) port, a GPS receiver, a radio frequency identification (RFID) receiver, an RF receiver, a thermometer, a pressure sensor, an infrared port (e.g., for receiving communications from a second gaming device or from a another device such as a smart card or PDA of a player), and a weight scale. For gaming devices, common input devices include a button or touch screen on a video poker machine, a lever or handle connected to the gaming device, a magnetic stripe reader to read a player tracking card and / or contract card inserted into a gaming device, a touch screen for input of player selections during game play, a paper ticket acceptor for accepting paper tickets such as cash-out tickets and a coin and bill acceptor.

In some embodiments, a gaming device may comprise components capable of facilitating both input and output functions (i.e., input/output devices). In one example, a touch-sensitive display screen comprises an input/output device (e.g., the device outputs graphics and receives selections from players). In another example, a processor may communicate with a "ticket-in/ticket-out" device configured to dispense and receive cash-out tickets. Such a device may also assist in (e.g., provide data so as to facilitate) various accounting functions (e.g., ticket validation and redemption). For example, any or all of a gaming device, kiosk and casino personnel device maintained at a cashier cage may (i) comprise such a benefit input/output device, and / or (ii) communicate with a central server that manages the accounting associated with such ticket-in/ticket-out transactions (e.g., so as to track the issuance, redemption and expiration of such tickets). One example of ticket-in/ticket-out technology that may be adapted or utilized to implement embodiments described herein is the EZ Pay™ system, is manufactured by International Gaming Technology, headquartered in Reno, Nevada.

Of course, as would be understood by one of ordinary skill in the art, a gaming device may comprise various combinations of such component devices. For example, in one or more embodiments, the gaming device may include more than one display device, one or more other output devices, several input devices, and so on (e.g., two display screens, two audio speakers, a ticket-in/ticket-out device and several buttons).

The processor 305 is also in communication with a payment system 270, which may be a component of gaming device 300. The payment system 270 is a device capable of accepting payment from a player (*e.g.*, a bet or initiation of a balance, a payment in exchange for entering into a contract).

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Exemplary methods of accepting payment by the payment system 270 include (i) receiving hard currency (i.e., coins or bills), and accordingly the payment system 270 may comprise a coin or bill acceptor; (ii) receiving an alternate currency (e.g., a cash-out ticket, a coupon, a non-negotiable token), and accordingly the payment system 270 may comprise a bar code reader or other sensing means; (iii) receiving a payment identifier (*e.g.*, a credit card number, a debit card number, a player tracking card number, a code via a keypad or touch-screen); (iv) receiving a smart card having an indication of an amount of currency stored thereon; and (v) determining that a player has performed a value-added activity (e.g., participating in surveys, monitoring remote images for security purposes, referring friends to the casino).

The processor 305 is further operable to communicate with a player tracking device 360, which may be a component of gaming device 300. Player tracking device 360 may, in one or more embodiments, comprise a reader device operable to read information from and / or write information to a card such as a smart card and / or a player tracking card, such that (i) players may be identified, and (ii) various data associated with players may then be determined. For example, a contract previously entered into by the player may be identified, a status of the contract may be determined, a number of cashable credits available to the player may be determined, a number of promotional credits that may not be redeemed for cash but that are associated with the player may be determined, a code or other indication of a benefit to be provided to the player may be determined, a number of accumulated loyalty points associated with the player may be determined, a number of accumulated game elements such as symbols, cards or hands associated with the player may be determined, etc. In one example, a card reader device may determine an identifier associated with a player (e.g., by reading a player tracking card comprising an encoded version of the identifier), such that the gaming device may then access data (e.g., of a player database, a session database) associated with the player. In another example, a smart card reader device may determine data associated with a player directly by accessing a memory of an inserted smart card.

As described in more detail below, player database may be used, for example, to store player wager data (e.g., such that players wagering over a given threshold in a given amount of time may be rewarded for their patronage, qualify for a particular gaming contract, and so on). The player database may also contain other information that may be useful in, for example, promoting and managing player behaviors (e.g., information about the player's gaming preferences, lodging arrangements, and the like). Further, the player database may store data regarding a given player's standing in a game session, gaming contract or bonus game, so that the player can continue the game session, gaming contract or bonus game at a plurality of game machines that have common access to the player database. Such player data may be stored in a relational database and

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retrieved or otherwise accessed by the processor after receiving a "key" data point from the player, such as a unique identifier read from the player's player tracking card, contract card or cashout ticket.

In one embodiment, a player tracking device 360 may be operable to read an identifier that uniquely identifies a contract. For example, a card inserted into the player tracking device may have a contract identifier stored thereon, which contract identifier may be readable by the player tracking device 360. The player tracking device 360 may further be operable to retrieve data (e.g., from computer 110, a contract kiosk 140 and / or a contract server) associated with the contract and / or output an indication of the data.

In one embodiment, the player tracking device may comprise (i) a card reader (e.g., a port into which player tracking cards may be inserted), (ii) various input devices (e.g., a keypad, a touch-screen), (iii) various output devices (e.g., a small, full-color display screen), and / or (iv) combinations thereof (e.g., a touch-sensitive display screen that accommodates both input and output functions). Various commercially available devices may be suitable for such an application, such as the NextGen™ interactive player tracking panel manufactured by IGT or the iVIEW display screen manufactured by Bally® Gaming and Systems.

As known in the art, "smart cards" may incorporate (i) a memory, and (ii) means for accessing such a memory. For example, in one embodiment, the memory may store data related to aspects of the present invention. In one embodiment, data may be written to the smart card as a player plays one or more gaming devices (e.g., such that various data may be updated on a continuous, periodic or event-triggered bases). Accordingly, in one or more embodiments one or more devices operable to carry out various processes of the present invention (e.g., a gaming device or kiosk) may have associated therewith a smart card reader device, such that data may be read from the smart card pursuant to the execution of such processes. An example of a smart card system that may be used to implement one or more embodiments of the present invention is the s-Choice™ Smart Card Casino Management System from Smart Card Integrators, Inc.™.

Of course, other non-card-based methods of identifying players and / or contracts are contemplated. For example, a unique identification code may be associated with the player and / or contract. The player and / or contract may then be identified upon entering the code. For example, the code may be stored (e.g., within a database maintained within the gaming device, a contract kiosk 140, a contract server and / or a computer 110) such that the player may enter the code using an input device of a gaming device, and accordingly allow the player and / or contract to be uniquely identified. In other embodiments, player biometrics may serve as identification means (e.g., a player

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and / or contract is identified via a thumbprint or retinal scan of the player). In further embodiments, a barcode of a cashless gaming ticket may encode a player identifier and / or a contract identifier.

Thus, as described, various data associated with a player may be tracked and stored (e.g., in an appropriate record of a centrally-maintained database), such that it may be accessed as desired (e.g., when entering into a contract with a player, when determining a player's compliance with a contract, when determining promotional offers, contract and / or rewards to be provided or offered to a player, when determining the status of player with respect to a particular game, contract or period of gambling activity, and so on). Further, various statistics may be measured in association with a player (e.g., coin-in statistics, win/loss statistics, buy-in amount for a session) and similarly accessed.

Various systems for facilitating such monitoring of player behavior and activity are contemplated. For example, a two-wire system such as one offered by International Gaming Systems (IGT) may be used. Similarly, a protocol such as the IGT SAS™ protocol or the IGT SuperSAS™ protocol may be used. The SAS ™ protocol and the SuperSAS™ protocol each allows for communication between gaming machines and slot accounting systems and provides a secure method of communicating all necessary data supplied by the gaming device to the online monitoring system. One aspect of the SAS™ protocol and the SuperSAS™ protocol that may be beneficial in implementing aspects of the present invention is the authentication function which allows operators and regulators to remotely interrogate gaming devices for important memory verification information, for both game programs, and peripheral devices. In another example, a one-wire system such as the OASIS™ System offered by Aristocrat Technologies™ or the SDS slot-floor monitoring system offered by Bally Gaming and Systems™ may be used. Each of the systems described above is an integrated information system that continually monitors slot machines and customer gaming activity. Thus, for example, any one of these systems may be used to monitor a player's gaming activity in order to determine player outcomes, buy-in amounts, coin-in statistics, win/loss statistics and / or any other data deemed relevant.

In one embodiment, a player may operate a plurality of gaming devices. For example, a player may simultaneously play two side-by-side gaming devices, a player may play one gaming device (e.g. a gaming device) and then continue his gaming session at another gaming device (e.g. a video poker machine), and a player may remotely operate a gaming device, possibly by using a telephone, PDA or other device (i) to transmit commands (directly or indirectly) to the gaming device, such as wager amounts and commands to select certain cards; and / or (ii) to receive output (directly or indirectly) from the gaming device.

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In one embodiment, a gaming device may allow a player to play a game of skill rather than a game of chance. Such an embodiment may be more appealing to certain players or may be permitted in areas where it is illegal to gamble on games of chance.

In one or more embodiments, aspects of the present invention, such as facilitating play of a gaming device under the terms of a contract (e.g., providing a benefit during a period of time defined by the contract and / or monitoring the play to determine compliance with the contract), may be practiced by replacing and / or augmenting one or more components (e.g., hardware and / or software components) of an existing gaming device. Thus, in one or more embodiments, the invention may be applied as a retrofit or upgrade to existing gaming devices currently available for play within various casinos.

For example, a memory (e.g., computer chip) of the gaming device may be replaced or added, the replacement or additional memory storing a program for instructing the processor of the gaming device to operate in accordance with one or more embodiments. In another example, data output via the gaming device (e.g., graphical and / or textual data displayed on the gaming device) may be replaced or added, the replacement or additional data indicating to a player information relevant to one or more aspects of the present invention.

In a specific example, a gaming device may comprise various electronic components mounted to one or more printed circuit boards (PCBs). Such components may include various hardware described herein, such as a communications port and various controllers of peripheral devices (e.g., a display controller), as well as a memory for storing programming instructions (software) and a processor for carrying out such instructions. Forms of memory that may be found in a gaming device include electronically erasable programmable read-only memory (EEPROM), erasable programmable read-only memory (EPROM) and flash memory. Thus, in one or more embodiments of the present invention, an EPROM storing software with instructions for carrying out aspects of the present invention (as well as instructions for carrying out other functions traditionally performed by the gaming device) may replace an EPROM previously installed in a gaming device or may be reprogrammed in accordance with one or more embodiments described herein, such that the gaming device may be configured to operate in accordance with various processes described herein.

For example, a "contract play" module may be made available for purchase to various casino operators. The module, which may comprise various hardware and software (e.g., an EEPROM storing software instructions), may be installed in an existing gaming device (e.g., a video-reel slot machine, a video poker machine, etc.), such that when the module is installed, players of

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the device may elect (i) to play the gaming device in a manner that does not incorporate embodiments described herein, or (ii) to play the gaming device in a manner that incorporates embodiments described herein (e.g., be eligible for a benefit defined by a contract). Thus, players who are familiar with operating a gaming device may elect to pay for them in a different or similar manner as they are accustomed to.

Accordingly, a gaming device may be configured to allow a player to select one of two "modes" of the gaming device, and to enable the selected mode. If a player selects a "standard" mode, the gaming device may be configured to operate in a manner similar to how it operated before the installation of the module (e.g., the gaming device operates in a conventional manner, such that embodiments described herein may not be utilized). If a player selects "contract play" mode, the gaming device may then be operable to execute game play in accordance with one or more embodiments described herein.

In one example of allowing a player to select one or more modes, a touch-sensitive display screen may be configured to output a prompt asking a player to select a mode of operation. Such a prompt may be output in occurrence to various trigger conditions (e.g., coins, bills or tickets are inserted; a credit balance increases from zero to some other number; a player presses a "play" button; a motion, weight, infrared or other sensor detects the presence of a player; etc.). Accordingly, a player may select a mode of operation (e.g., by pressing an appropriately labeled icon of a touch-sensitive display screen), and upon receiving the player's selection, the gaming device may be configured to operate in the selected mode.

In another embodiment, a gaming device may be operable to automatically determine whether it should switch modes from a standard mode to a "contract play" mode. A gaming device may perform such a determination, for example, by evaluating data received from a player and / or another device and / or by querying another device. For example, a gaming device may be programmed to determine (e.g., upon receiving a player identifier and based upon the player identifier) whether the player currently playing the gaming device has entered into a contract. In another embodiment, a gaming device may be programmed to recognize that a player has entered a contract identifier into the gaming device. Upon determining that a player has previously entered into or purchased a contract, a gaming device may further be programmed to determine a status of the contract and / or whether a current game play of the gaming device is covered under the terms of the contract. For example, the gaming device may be programmed to access data (e.g., the terms of the contract) stored on another device (e.g., a contract kiosk 140, a contract server, computer 110, etc.) or query such other device for an answer to the determination. If the gaming

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device determines that current play of the gaming device qualifies for coverage under the terms of the contract, the gaming device may switch from a standard mode to a "contract play" mode. In "contract play" mode, for example, a gaming device may be operable to transmit information associated with the game plays being conducted to another device to enable the other device to determine compliance with the contract and / or to locally determine compliance with the contract. In one embodiment, a gaming device may be operable to output an indication that it is currently in "contract play" mode (e.g., to inform a player that the current play of the gaming device is covered under the terms of a contract). For example, the gaming device may turn on a light, change graphics, output a sound, etc.

In other embodiments, as described, a peripheral device may be useful for implementing one or more embodiments of the present invention into the operation of a conventional gaming device. For example, in order to avoid or minimize the necessity of modifying or replacing a program already stored in a memory of a conventional gaming device, an external or internal module that comprises a peripheral device may be inserted in, connected to or otherwise associated with the gaming device. Such a peripheral device may be operable to, for example, monitor and / or transmit information about a player's gambling activity at the gaming device to another device (e.g., computer 110, a kiosk 140 and / or a contract server). The peripheral device may monitor and / or transmit such information to enable a determination of compliance with the terms of a contract.

In still further embodiments, rather than configure existing gaming devices to execute embodiments described herein by installing or connecting new hardware and / or software, software may be downloaded into an existing memory of one or more gaming devices. U.S. Patent No. 6,805,634 to Wells et al. teaches methods for downloading data to gaming devices in such a manner. The entirety of U.S. Patent No. 6,805,634 is incorporated by reference herein for all purposes. Thus, in some embodiments, an existing gaming device may be reprogrammed to accommodate new functionality of the present invention without the need, or by minimizing the need, to remove and replace hardware within the gaming device.

In one embodiment, a gaming device 300 or another device operable to carry out one or more embodiments described herein (e.g., a contract kiosk 140) may be operable to output a menu of available contracts to a player via a player interface. A player interface may comprise, for example, a video screen that is a touch screen operable to display such one or more such menus. A menu so displayed to a player may provide the player with, for example, a choice of whether to play the gaming device in a conventional manner or in a manner consistent with one or more embodiments described herein. In another example, a menu so displayed to a player may provide

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the player with available contracts, contracts which the player has previously entered into and / or contracts for which the player is currently eligible. A player may be presented with a menu of options via a touch screen, for example, upon indicating a desire to consider options available via such a menu and / or upon initiating play at the gaming device 300. A player may select an option from such a menu by touching the area of the screen on which the option appears.

It should be appreciated that one or more embodiments may include storing graphic and / or sound elements that are used to construct the menu of available options. These elements may be store, for example, in EEPROM, flash memory, hard disk, CD ROM, or in any other suitable storage device. The menu may be displayed via any suitable display device, such as a CRT, LCD, VFC, LED display. In one embodiment, the menu may be implemented using only dedicated electromechanical switches. In one embodiment, a player operates an input device of the device operable to display the menu, in order to cause the menu to be displayed. In one embodiment, the device includes a touch screen and a touch screen controller (not shown) associated with a video monitor display device. The touch screen and touch screen controller may be operable to communicate with a video controller of the video monitor display device and a processor (e.g., a processor of gaming device 300). Thus, a player may be enabled to indicate decisions (e.g., which contract the player desires to view more detailed information about, which contract the player desires to purchase, which contract the player desires to reconcile, etc.) by touching the touch screen in the appropriate places.

In one embodiment, display of the menu preempts display of other information. For example, in one embodiment the same display device or screen used to display indicia indicative of an outcome by displaying the indicia as disposed along a payline during active game play may be used to display a menu of available contracts to a player upon an indication of a player to view the menu. In another embodiment, a dedicated display device or screen may be used to display a menu of available contracts on a continuous, periodic, or other basis.

EXEMPLARY EMBODIMENTS OF THE DATABASES

Example structures and sample contents of the (i) a player database 225; (ii) a player eligibility rules database 230; (iii) a gaming device database 235; (iv) a gaming device eligibility rules database 240; (v) a gaming device status database 245; (vi) a contract eligibility rules database 250; and (vii) a purchased contracts database 255 are shown in FIGS. 4 – 10, respectively. The specific data and fields illustrated in these drawings represent only some embodiments of the records stored in the databases described herein. The data and fields of these databases can be readily modified, for example, to include more or fewer data fields. A single database also may be employed. Note

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that in the databases, a different reference numeral is employed to identify each field of each database. However, in at least one embodiment, fields that are similarly named (e.g., session identifier fields) store similar or the same data in a similar or in the same data format.

The databases 225, 230, 235, 240, 245, 250 and 255 are described in detail below and example structures are depicted with sample entries in the accompanying figures. As will be understood by those skilled in the art, the schematic illustrations and accompanying descriptions of the sample databases presented herein are exemplary arrangements for stored representations of information. Any number of other arrangements may be employed besides those suggested by the tables shown. For example, even though seven separate databases are illustrated, the invention could be practiced effectively using one, two, three, four, five, six, eight or more functionally equivalent databases. Similarly, the illustrated entries of the databases represent exemplary information only; those skilled in the art will understand that the number and content of the entries can be different from those illustrated herein. Further, despite the depiction of the databases as tables, an object-based model could be used to store and manipulate the data types of the present invention and likewise, object methods or behaviors can be used to implement the processes of the present invention.

It should also be noted that some or all of the data or types of data illustrated in FIGS. 4 – 10 may be stored and managed in individual ones of the gaming devices 130, the contract kiosks 140, and / or a contract server, and may be used therein to manage, control and / or monitor contract play modes of the gaming devices 130.

Referring now to FIGS. 4A and 4B, illustrated therein is a tabular representation 400 of an example embodiment of a player database 225. Tabular representation 400 is referred to herein as player database 400. The player database 400 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to store and / or access information about players who are members of a loyalty club administered by a casino. As is well known, most casinos offers rewards (e.g., comp points) to players in exchange for the players providing personal information about themselves, being assigned a unique player tracking number, and allowing their gambling and / or other activities in the casino to be tracked. The data in the player database 400 may be input by, for example, a casino employee and / or a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server). The data may be updated by one or more of these entities as well.

For example, upon a player signing up for a casino's loyalty club, a record may be opened for the player in the player database, the record being uniquely identifiable based on the player

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identifier assigned to the player. A device and / or person may access the player database 400 to determine, for example, whether a player is eligible for a contract; and / or whether an active contract is associated with the player. In another example, the player database 400 may be accessed by a device and / or person in order to update information associated with a player (e.g., to store an indication of a contract entered into by the player, to update the total amount wagered by the player, etc.).

The player database 400 includes a number of example records or entries, including records R400-1 through R400-4, each defining a player who has associated therewith a unique player identifier. Those skilled in the art will understand that the player database 400 may include any number of entries. The player database 400 also defines fields for each of the entries or records. The fields specify: (i) a player identifier 402; (ii) a player name 404; (iii) a player address 406 that stores a postal address and / or other contact information associated with a player; (iv) a member since 408 that indicates a date at which the player joined the casino loyalty club; (v) a total wagered 410 that indicates a sum of wagers posted by the player within a specified period of time (e.g., since the player joined the loyalty club); (vi) a theoretical win 412 of the player; (vii) an active contract(s) 414 that indicates a contract identifier for any currently active contract (e.g., any contract previously entered by the player that is not yet expired, not yet completed, not yet reconciled, etc); (viii) an expired contracts 416 that stores an indication of contracts previously entered into by the player that are currently expired or otherwise inactive (e.g., the duration of the contract has elapsed or the contract has otherwise been completed, fulfilled or terminated); and (ix) a hotel guest? 418 indication that indicates whether the player is currently registered as a guest in a hotel associated with the casino administering the loyalty club.

In one embodiment, a player database may not store an indication of contracts associated with a player. This information may instead be stored in a separate database, such as a purchased contracts database as described below.

To illustrate a usage of player database 400, assume a player has requested to purchase a contract which only players of a certain status are eligible to purchase (e.g., only players who are currently registered as hotel guests). In this example, a player database may be accessed to determine, based on the information stored in field 418, whether the player is eligible to purchase the requested contract. To illustrate another usage of the player database 400, assume a player has inserted a player tracking card into a gaming device. A computer 400 or another device may determine, based on the player identifier of the player tracking card, whether the player's play of the gaming device is covered under a contract by, for example, (i) determining whether the player is

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associated with a currently active contract, based on the information stored in field 414; and (ii) determining the terms of the contract (e.g., by accessing another database, such as a purchased contracts database 255, which is described below with respect to FIG. 10).

A player database may be used, for example, to store player wager data (e.g., such that players wagering over a given threshold in a given amount of time may be rewarded for their patronage, qualify for a particular gaming contract, and so on). The player database may also contain other information that may be useful in, for example, promoting and managing player behaviors (e.g., information about the player's gaming preferences, lodging arrangements, and the like). Further, the player database may store data regarding a given player's standing in a game session, gaming contract or bonus game, so that the player can continue the game session, gaming contract or bonus game at a plurality of game machines that have common access to the player database. Such player data may be stored in a relational database and retrieved or otherwise accessed by the processor after receiving a "key" data point from the player, such as a unique identifier read from the player's player tracking card, contract card or cashout ticket. The player database 400 may also store additional or different information from that described. For example, the player database may store information about an average wager amount posted by a player; games, features or other play options preferred by the player; gambling habits of the player; etc.

Referring now to FIG. 5, illustrated therein is a tabular representation 500 of a player eligibility rules 230. Tabular representation 500 is referred to herein as player eligibility rules database 500. The player eligibility rules database 500 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to store and / or access information about rules based on which it is determined whether a player is eligible to enter into contract. In accordance with one embodiment, only certain players are eligible to enter into contracts at all or into particular contracts. In other embodiments, player eligibility rules database 500 may not be used because all players may be eligible to enter into any available contract. The data in the player eligibility rules database 500 may be input by, for example, a casino employee and / or a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server). The data may be updated by one or more of these entities as well.

The player eligibility database 500 includes a number of example records or entries, including records R500-1 through R500-4, each defining a rule in accordance with which it may be determined whether a player is eligible to enter into a contract. Those skilled in the art will understand that the player eligibility rules database 500 may include any number of entries. The player eligibility rules database 500 also defines fields for each of the entries or records. The fields

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specify: (i) a player eligibility rule identifier 502 that identifies (e.g., uniquely) a rule based on which it may be determined whether a player is eligible to enter into a contract; (ii) condition(s) 504 that specify a condition of a corresponding rule; (iii) an eligibility 506 that indicates a player's eligibility to enter into a contract if the corresponding condition(s) is satisfied; and (iv) a rule status 508 that indicates whether a rule is currently enabled (i.e., to be applied in a determination of whether a player is eligible to enter into a contract) or is disabled (i.e., is not to be applied in a determination of whether a player is eligible to enter into a contract). In one embodiment, casino personnel may enable a particular rule at certain desired time and may disable the rule at another time. In one embodiment, a rule may be enabled and / or disabled based on a schedule or other basis programmed into a device. For example, a computer 110 may be programmed to enable a rule if certain condition(s) are satisfied.

Thus, for example, record R500-1 indicates that, based on rule "R-001", a player who is not a hotel guest or does not have a guest pass is not eligible to enter into any available contract.

It should be noted that, in one embodiment, a player eligibility rule may be associated with one or more particular contracts, such that it may only be applied in a determination of whether a player is eligible to enter into the one or more particular contracts. This may be contrasted with another embodiment in which a rule may be of general applicability, such that it may be applied in a determination of whether a player is eligible to enter into any contract at all. In one embodiment, a player eligibility rules database may store some rules that are associated with one or more particular contracts and some rules that are of general applicability. In another embodiment, a rule that applies to a particular contract may be stored in a record of another database, such as database storing information on available contracts. For example, a record defining a particular contract available for purchase may store one or more player eligibility rules based on which it may be determined whether a player is eligible to purchase the particular contract.

To illustrate a usage of player eligibility rules database 500, assume a player has indicated a desire to enter into a contract. Based on rule R-001 of player eligibility rules database 500 it may be determined that the player is not eligible to enter into any contract if the player is not a hotel guest or does not have a guest pass. Thus, the player's player identifier may be requested and used to determine whether the player is a hotel guest (e.g., is currently registered as a guest in a hotel associated with the casino at which the player is attempting to enter into a contract) or has a guest pass. For example, the player database 400 and / or a hotel reservation system may be accessed to determine this information. If it is determined that the player is not a hotel guest or does not have a guest pass, it may be determined that, under Rule R-001, the player is not eligible

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to enter into any contract. Of course, the player may be eligible to enter into a contract under another rule that is currently enabled. Accordingly, each of the enabled rules in the player eligibility rules database 500 may be evaluated in turn to determine whether the player is eligible to enter into a contract. It should be noted that player eligibility rules database 500 may be accessed, for purposes of the determination described immediately above or for other purposes, by casino personnel and / or a device (e.g., a contract kiosk 140, a gaming device 130, computer 110, a contract server, another device, or a combination thereof).

Referring now to FIGS. 6A and 6B, illustrated therein is a tabular representation 600 of a gaming device database 235. Tabular representation 600 is referred to herein as gaming device database 600. The gaming device database 600 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to store and / or access information about gaming devices (e.g., gaming devices that may be available for contract play). The data in the gaming device database 600 may be input by, for example, a casino employee and / or a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server). The data may be updated by one or more of these entities as well. For example, a casino employee may enter a record for a new gaming device once a new gaming device becomes available. In another example, a gaming device may update data in a record associated with the gaming device based on upgrades and / or other changes to the gaming device.

The gaming device database 600 includes a number of example records or entries, including records R600-1 through R600-4, each defining a gaming device that may be part of system 100. Those skilled in the art will understand that the gaming device database 600 may include any number of entries. The gaming device database 600 also defines fields for each of the entries or records. The fields specify: (i) a gaming device identifier 602 that (e.g., uniquely) identifies a gaming device or gaming device type; (ii) a game name 604 that specifies a name of a game playable on the corresponding gaming device (in one or more embodiments more than one game may be playable on a gaming device); (iii) a manufacturer 606 of the gaming device; (iv) a location 608 of a gaming device (e.g., a geographic location within a casino property); (v) a game type 610 that indicates a type of game(s) playable on the gaming device; (vi) a standard deviation 612 associated with the gaming device (as will be described further herein); (vii) a payout percentage 614 of the gaming device; (viii) a top jackpot 616 (in terms of number of credits) available for winning on the gaming device; and (ix) a denomination 618 accepted by the gaming device.

To illustrate a usage of gaming device database 600, assume a player has indicated a desire to play a gaming device under the terms of a contract (e.g., the player has provided a

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contract identifier to the gaming device). The gaming device database 600 may be accessed to determine whether play of the gaming device qualifies for coverage under the contract. For example, a term of the contract (which may be determined based on the contract identifier provided by the player) may specify that the contract only covers play on video poker machines. If it is determined that the gaming device which the player is attempting to play is not a video poker gaming device (e.g., based on the gaming device identifier, which may be received along with the contract identifier by a device performing this determination, if such a device is not the gaming device itself), it may be concluded that play of the gaming device will not be covered under the contract. The player may be notified of this conclusion (e.g., a warning message may be output to the player).

Referring now to FIG. 7, illustrated therein is a tabular representation 700 of a gaming device eligibility rules database 240. Tabular representation 700 is referred to herein as gaming device eligibility rules database 700. The gaming device eligibility rules database 700 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to determine whether a gaming device is eligible for contract play. A gaming device being eligible for contract play may mean, for example, that play of the gaming device will (i) qualify for coverage under the terms of a contract, (ii) aid a player in complying with one or more terms of a contract and / or (iii) aid a player in earning or otherwise qualifying for a benefit defined by a contract. The data in the gaming device eligibility rules database 700 may be input by, for example, a casino employee and / or a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server). The data may be updated by one or more of these entities as well.

The gaming device eligibility rules database 700 includes a number of example records or entries, including records R700-1 through R700-4, each defining a rule based on which it may be determined whether a gaming device is eligible for contract play. Those skilled in the art will understand that the gaming device eligibility rules database 700 may include any number of entries. The gaming device eligibility rules database 700 also defines fields for each of the entries or records. The fields specify: (i) a gaming device eligibility rule identifier 702 that (e.g., uniquely) identifies a rule in accordance with which a determination may be made as to whether a gaming device is eligible for contract play; (ii) a condition(s) 704 that specifies one or more conditions to be satisfied and / or one or more characteristic(s) of a gaming device; (iii) an eligibility 706 that indicate whether (if the corresponding condition is satisfied or a gaming device is determine to possess the corresponding characteristic) a gaming device is eligible for contract play; and (iv) a rule status 708 that indicates whether a rule is currently enabled (i.e., to be applied in a determination of whether a gaming device is eligible for contract play) or disabled (i.e., not to be applied in a determination of

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whether a gaming device is eligible for contract play). In one embodiment, casino personnel may enable a particular rule at certain desired time and may disable the rule at another time. In one embodiment, a rule may be enabled and / or disabled based on a schedule or other basis programmed into a device. For example, a computer 110 may be programmed to enable a rule if certain condition(s) are satisfied.

Thus, for example, record R700-1 indicates that, based on rule "R-001", a gaming device that contributes to a progressive jackpot is not eligible for contract play.

It should be noted that, in one embodiment, a gaming device eligibility rule may be associated with one or more particular contracts, such that it may only be applied in a determination of whether a gaming device is eligible for contract play under the one or more particular contracts (e.g., whether play of the gaming device will be covered under the terms of the one or more particular contracts). This may be contrasted with another embodiment in which a rule may be of general applicability, such that it may be applied in a determination of whether a gaming device is eligible for contract play under any contract at all. In one embodiment, a gaming device eligibility rules database may store some rules that are associated with one or more particular contracts and some rules that are of general applicability. In another embodiment, a rule that applies to a particular contract may be stored in a record of another database, such as database storing information on available contracts. For example, a record defining a particular contract available for purchase may store one or more gaming device eligibility rules based on which it may be determined whether a particular gaming device is eligible for contract play under the particular contract.

To illustrate a usage of gaming device eligibility rules database 700, assume a player has indicated a desire to play a gaming device under the terms of a contract (e.g., the player has provided a contract identifier to the gaming device). The gaming device eligibility rules database 700 may be accessed to determine whether play of the gaming device qualifies for coverage under the contract. For example, rule "R-002" may be applied to determine whether the gaming device the player is attempting to play has a payback percentage of greater than 95%. This may be determined based on the gaming device identifier of the gaming device the player is attempting to play, which may have been received from the gaming device and by the device that is performing the gaming device eligibility determination (if the device is different from the gaming device). For example, the gaming device database 600 may be accessed and field 614 of the record corresponding to the gaming device identifier may be analyzed to determine the payback percentage of the gaming device. If it is determined that the gaming device which the player is

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attempting to play has a payback percentage that is greater than 95%, it may be concluded that play of the gaming device will not be covered under the contract and that the gaming device is not eligible for contract play. The player may be notified of this conclusion (e.g., a warning message may be output to the player).

Referring now to FIG. 8, illustrated therein is a tabular representation 800 of a gaming device status database 245. Tabular representation 800 is referred to herein as gaming device status database 800. The gaming device status database 800 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to store and / or access information about a current status of the gaming device (e.g., whether the gaming device is currently in use). The data in the gaming device status database 800 may be input by, for example, a casino employee and / or a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server). The data may be updated by one or more of these entities as well. For example, a gaming device may update data in a record associated with the gaming device based on a change in its current status (e.g., when a player initiates play on the gaming device, the gaming device may transmit a signal that indicates it is currently in use, which signal may be received by controller 200 and used to update the status in the appropriate record of the gaming device status database 800).

The gaming device status database 800 includes a number of example records or entries, including records R800-1 through R800-4, each defining a status of a gaming device that may be part of system 100. Those skilled in the art will understand that the gaming device status database 800 may include any number of entries. The gaming device status database 800 also defines fields for each of the entries or records. The fields specify: (i) a gaming device identifier 802 that (e.g., uniquely) identifies a particular gaming device that may be located on a casino property or otherwise controlled by an entity practicing aspects of the present invention; (ii) a gaming device type identifier 804 that identifies (e.g., uniquely) the type of gaming device; and (iii) a gaming device status 806 that indicates a status of the gaming device (e.g., whether the gaming device is currently in use or is currently not in use). Other example statuses of a gaming device that may be stored in the gaming device status database 800 include an indication of whether a gaming device is currently off-line, is currently being serviced, and / or is currently engaged in contract play.

To illustrate a usage of gaming device status database 800, assume a player has indicated a desire to purchase a contract to cover game play on a particular gaming device. The gaming device status database 800 may be accessed to determine whether to authorize the sale of the contract to the player, based on whether the gaming device is currently in use.

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Referring now to FIG. 9, illustrated therein is a tabular representation 900 of a contract customization rules database 250. Tabular representation 900 is referred to herein as contract customization rules database 900. The contract customization rules database 900 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to store and / or access information about manners in which a player may build or customize a contract. The data in the contract customization rules database 900 may be input by, for example, a casino employee and / or a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server).

The contract customization rules database 900 includes a number of example records or entries, including records R900-1 through R900-4, each defining respective boundaries for each of a plurality of contract terms. Those skilled in the art will understand that the contract customization rules database 900 may include any number of entries. The contract customization rules database 900 also defines fields for each of the entries or records. The fields specify: (i) a contract rule identifier that (e.g., uniquely) identifies a rule for customizing or building a contract; (ii) contract term boundaries 904 that specifies at least one boundary for a value of at least one contract term; (iii) a result 906 that indicates whether a contract should be approved or provided if the contract term(s) is as specified in the contract term boundaries. In one embodiment, casino personnel may enable a particular rule at certain desired time and may disable the rule at another time. In one embodiment, a rule may be enabled and / or disabled based on a schedule or other basis programmed into a device. For example, a computer 110 may be programmed to enable a rule if certain condition(s) are satisfied.

To illustrate a usage of contract customization rules database 900, assume a player has indicated a desire to build or customize a contract and has provided a desired value for a term of the desired contract. More specifically, assume the player has requested a contract that defines a period of 48 hours (e.g., the contract will cover play of a gaming device for a period of 48 hours). It may be determined, based on rule R-003 (record R900-3) of contract customization rules database 900 that the contract should not be approved or provided, since the defined contract period is greater than 24 hours.

Referring now to FIG. 10, illustrated therein is a tabular representation 1000 of an available contracts database 255. Tabular representation 1000 is referred to herein as available contracts database 1000. The available contracts database 1000 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to store and / or access information about contracts that are available for purchase. For example, a kiosk 140 or a gaming

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device 130 may access the available contracts database 1000 to determine what information to output to a player via a menu of available contracts. As described herein, in one or more embodiments, one or more contracts may be pre-defined (e.g., by a casino, game designer, gaming device manufacturer, or another entity) and offered for sale to players. A pre-defined contract may comprise a contract that has respective values specified for each of a plurality of terms that define the contract. Examples of terms of a contract include (i) a period of time defined by the contract, (ii) a price for the contract, (iii) a refund rate or other benefit provided under the contract, (iv) one or more conditions a player must comply with (e.g., a rate of play, a minimum wager amount per game play, etc.) in order to earn or qualify for the benefit defined by the contract, and (v) gaming devices and / or games eligible for play under the contract. In such an embodiment, information about the pre-defined contracts may be stored in a database such as available contracts database 1000, for output to a player who has indicated a desire to purchase an available contract. The data in the available contracts database 1000 may be input by, for example, a casino employee, employee of a game designer and / or gaming device manufacturer and / or by a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server). For example, casino personnel may set initial values for respective terms of a contract and a device (e.g., computer 110) may update the values based on the success of the contract and / or feedback from the players.

The available contracts database 1000 includes a number of example records or entries, including records R1000-1 through R1000-4, each defining a respective contract that is available for purchase or that may otherwise be entered into by a player. Those skilled in the art will understand that the available contracts database 1000 may include any number of entries. The available contracts database 1000 also defines fields for each of the entries or records. The fields specify: (i) a contract type identifier 1002 that identifies a particular type of contract characterized by certain terms, though does not necessarily identify a unique contract provided to a particular player (note: a unique contract identifier may be assigned once a player purchases a contract type); (ii) a contract price 1004 that specifies a monetary amount or other form of consideration to be provided by a player in exchange for entering into the contract; (iii) a contract period 1006 that defines a period of time (which may be defined in terms of a number of game plays, a number of units of time, as ending upon an occurrence of a specified event, etc.) during which game play that complies with the remainder of the terms of the contract will be covered under the contract; (iv) a contract benefit 1008 that defines a benefit a player may earn or qualify for by complying with the terms of the contract; and (v) compliance requirements 1010 that define restrictions on game play that a player must comply with in order to earn or qualify for the benefit of the contract.

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Thus, for example record R1000-1 indicates that if a player purchases a contract of contract type "CT-01234" for a price of $20.00, the player will not need to provide any payment for 500 game plays of a "Double Gems Jackpots" game (beyond the $20.00 price of the contract) and the credit meter balance of a gaming device on which the player is playing the game will be allowed to become a negative number if necessary for the player to complete the 500 game plays.

To illustrate a usage of available contracts database 1000, assume a player has indicated a desire to purchase a contract. The player may be presented (e.g., via a touch-screen of a contract kiosk 140) with a menu of available contracts. The menu may be populated based on information obtained from the available contracts database 1000.

Referring now to FIG. 11, illustrated therein is a tabular representation 1100 of a purchased contracts database 260. Tabular representation 1100 is referred to herein as purchased contracts database 1100. The purchased contracts database 1100 may be utilized by a device (e.g., a computer 110, a kiosk 140, a gaming device 130 and / or a contract server) to store and / or access information about contracts that have been purchased or otherwise entered into by players. For example, a kiosk 140 or a gaming device 130 may access the purchased contracts database 1100 to determine a period remaining in a contract previously purchased by a player. The data in the purchased contracts database 1100 may be input by, for example, a casino employee and / or by a device (e.g., a gaming device 130, a computer 110, a contract kiosk 140, and / or a contract server). For example, casino personnel or a contract kiosk 140 may create a record in the purchased contracts database 1100 upon a player purchasing a contract and update the record as the player participates in play covered under the terms of the contract.

The purchased contracts database 1100 includes a number of example records or entries, including records R1100-1 through R1100-4, each defining a respective contract that has been purchased or otherwise entered into by a player. Those skilled in the art will understand that the purchased contracts database 1100 may include any number of entries. The purchased contracts database 1100 also defines fields for each of the entries or records. The fields specify: (i) a contract identifier 1102 that uniquely identifies a contract; (ii) a player identifier 1103 that identifies the one or more players associated with the contract (note that in some embodiments the player identifier and the contract identifier may comprise the same identifier); (iii) a contract period 1106 that specifies a period of time defined by the contract (e.g., a period of time during which the contract is active, a period of time during which play is covered under the terms of a contract, and / or a period of time defining an amount of play covered under the terms of the contract); (iv) a refund rate 1108 that specifies a percentage of losses or wagers posted by a player that will be refunded to the player, as

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one example of a benefit that may be provided to a player under a contract; (v) a contract fee 1110 that specifies a consideration to be exacted from a player in exchange for the benefit defined by the contract (which may be a price the player pre-pays for the contract or another form of consideration); (vi) a play requirement(s) 1112 that specifies one or more restrictions on game play that a player must normally comply with in order to earn or qualify for the benefit of the contract; (vii) a period remaining 1114 that specifies the period of time remaining in the contract (i.e., the total period of time defined by the contract less the period of the contract utilized by the player to date); (viii) a total wager 1116 that indicates a sum of wagers posted by the player while participating in play covered under the terms of the contract; (ix) a total payout 1118 that specifies a sum of payouts won by the player as a result of participating in play covered under the terms of the contract; and (x) a total loss 1120 that specifies the sum of losses incurred by the player as a result of participating in play covered under the terms of the contract. It should be noted that the example contracts illustrated in purchased contracts database 1100 are directed to a type of contract in which a benefit is a refund of losses incurred by a player as a result of participating in play covered under the terms of the contract. As described herein, other contracts may define different benefits. Accordingly, in some embodiments different fields may be appropriate to track information relevant to such different benefits.

Thus, for example record R1100-1 indicates that a player identified as "P-000927" has purchased a contract identified as "C-000001", and that this contract has an associated period of time of six (6) hours, a refund rate of 100% and a contract fee in which $0.01 will be charged to the player for each $0.25 wagered by the player while participating in play covered under the terms of the contract. The contract further specifies that a player must participate in 400 game plays per hour in order to qualify for the $100 refund rate and that the player has a remaining two (2) hours and thirty-four (34) minutes remaining under the contract. The record of the contract further specifies that the player has wagered a sum of $395.50 under the contract and received a sum of payouts equal to $181.75, which results in a loss to date of $213.75.

To illustrate a usage of the purchased contracts database 1100, assume a player provided contract identifier "C-000001" to a gaming device and indicated a desire that play of the gaming device be covered under the terms of the contract (e.g., the player has indicated a desire to engage in contract play). It may be determined, based on the contract identifier, whether the contract has a period of time remaining prior to affirming to the player that the play of the gaming device will be covered under the terms of the contract. Further, the required rate of play that is a play requirement defined by the contract may be determined, and the player's play of the gaming device may be monitored to determine whether the player is complying with the required rate of play. It should be

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noted that the required rate of play may be a minimum rate of play, a maximum rate of play and / or a specific rate of play with which the player must comply.

Referring now to FIG. 12, illustrated therein are two example contract cards that may be provided to a player who enters into a contract in accordance with one or more embodiments described herein. As described herein, in some embodiments, a contract card may have a substantially similar physical appearance and functionality as to that of a player tracking card, although a contract card may be associated with a unique contract identifier instead of or in addition to a player identifier (e.g., such that data may be read from and / or written to a contract database regarding the contract and / or game play data associated therewith). As illustrated in FIG. 12, a contract card may comprise a magnetic stripe, which when read by a card reader device, may indicate a gaming contract identifier and / or a player identifier. A variety of methods of encoding contract cards with contract identifiers and other data are imagined. For example, in one embodiment, a contract card comprises a "smart card" or other device comprising a memory, such that gaming contract data may be stored on the smart card (e.g., a gaming device and / or controller transmits data to the smart card device via radio frequency transmission). In another embodiment, a contract card may comprise a cashless gaming ticket (e.g., the barcode thereof may be read so as to determine a contract identifier).

In other embodiments, a player may not be provided with a contract card, but a controller may determine that one or more game plays should be monitored pursuant to contract play in some other manner. For example, in one embodiment, a player may be provided with a code. The player may then enter the code using an input device of a gaming device (e.g., a player enters a gaming contract identifier using a touch-sensitive display screen). In another embodiment, a player may be instructed to actuate one or more input devices of a gaming device in a specific sequence and / or for a particular period of time (e.g., "To initiate Contract Play, press and hold both the "Spin" button and the "Paytable" button for five seconds). In one or more embodiments, a player identifier may be received so as to signal contract play. Various methods of receiving player identifiers are contemplated. In one embodiment, a player may use a player tracking card in lieu of a contract card (e.g., such game play data may be monitored and then stored in a player database, as opposed to a contract database). In another embodiment, a player may be identified by biometric means (e.g., via a retina recognition device).

Turning now to the first example contract card 1200A, a front view 1205A and a back view 1210A of the contract card are illustrated. The front of the contract card 1200A includes a description of the benefit defined by the contract card (1215A), the name of the player associated

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with the contract card (1220A), the contract identifier uniquely identifying the contract of the contract card (1225A), the player identifier of the player associated with the contract card (1230A) and an indication of the period of time defined by the contract (1235A). The back of the contract card 1200A includes a magnetic stripe 1245A, as well as an area for the signature of the player associated with the contract card (1235A), and a description of the terms and conditions associated with the contract (1240A). The terms and conditions may describe, for example, any restrictions by which the player must abide in order to earn or otherwise qualify for the benefit defined by the contract. In another embodiment, the terms and conditions may pertain to the proper use of the contract card, irrespective of the terms of the contract associated with the card (e.g., the contract card may only properly be used by the player who rightfully purchased or otherwise entered into the contract associated with the card, etc.).

It should be noted that a player associated with a contract card may comprise a player who purchased or otherwise entered into the contract corresponding to the contract card.

Turning now to the second example card 1200B, the front view 1205B includes features substantially similar to those of example contract card 1200A: (i) a description of the benefit defined by the contract associated with the contract card (1215B), (ii) a name of the player associated with the contract card (1225B), (iii) a player identifier identifying the player associated with the contract card (1230B), and (iv) a contract identifier that uniquely identifies the contract associated with the contract card (1235B). In addition, the front 1205B of the contract card 1200B includes a photograph of the player associated with the contract card (1220B), which may be useful for security purposes (e.g., to ensure that the bearer of the contract card is the player who purchased or otherwise entered into the contract associated with the contract card).

The back 1210B of the example contract card 1200B includes features substantially similar to those of the back 1210A of example contract card 1200A: (i) a magnetic stripe 1250B, (ii) an area for a signature of a player associated with the contract card (1240B), and (iii) a description of the terms and conditions associated with the contract card (1245B).

Referring now to FIG. 13, illustrated therein is an example of a contract receipt that may be provided to a player upon an end of a contract, which receipt the player may use to obtain the benefit defined by the contract. A contract may be considered to end, for example,

(i) upon the occurrence of a period of time defined by the contract (e.g., a player plays the 100th game play of the 100 game plays defined by a contract, a

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player completes the 2nd hour of play of the two (2) hours defined by a contract);

(ii) upon a player completing all play requirements defined by a contract in a satisfactory manner (e.g., a player completes 500 game plays at a designated gaming device while maintaining a minimum required rate of play of 300 game plays per hour);

(iii) upon a player earning or otherwise qualifying for a benefit defined by a contract (e.g., a player has incurred at least $100 in losses within one hour); and / or

(iv) upon an occurrence of another designated event (e.g., the current time is 8:00pm on July 01, 2005, which is the expiration time of a contract; the player collects 100 "lemon" symbols through play of a slot machine game, and thus the contract ends; and so on).

It should be noted that a contract that has ended may not necessarily have been satisfactorily completed such that a player is necessarily entitled to a benefit defined by the contract. For example, upon determining that a contract has ended, casino personnel and / or a device (e.g., computer 110, contract kiosk 140, etc.) may perform a distinct determination of whether the player has complied with the terms of the contract and is thus entitled to a benefit defined by the contract.

Of course, as described herein, in some embodiments a benefit may be provided to a player under the terms of the contract during the duration of the contract and before an end of the contract. For example, the player may be provided with access to a feature of a gaming device and / or allowed to continue playing the gaming device (and receiving payouts for winning outcomes) even if the credit meter balance of the gaming device is depleted, while executing game plays covered under the contract and before an end of the contract.

Returning again to FIG. 13, in one embodiment a gaming device 130, contract kiosk 140, casino personnel device and / or another device may be operable to print a contract receipt for a player once a contract is complete. The receipt may entitle the player to a benefit defined by the contract (e.g., a monetary amount based on a refund of at least a portion of losses incurred by the player as a result of participating in game plays under the contract). For example, the player may present the receipt to casino personnel at a casino cage or to a contract kiosk 130 in order to receive the benefit. In one embodiment, the receipt may include machine readable indicia (e.g., a

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bar code) that instructs a device (e.g., a contract kiosk 130) to provide the specified benefit to the player.

In one example, a player may have purchased a contract with an associated refund rate of 100% and contract fee of 1¢ per 25¢ wagered. After a contract period concludes, the player may have accumulated $135.87 in losses and $13.17 in contract fees. This information may be, for example, monitored and tracked by computer 110 as the player plays one or more gaming devices 130. Accordingly, as the player is owed a refund, the player may approach a casino representative stationed at a location within the casino. The player may provide his contract card to the representative, such that she may access contract data (e.g., the representative enters a contract identifier using a keypad of a computer device in communication with one or more databases of the present invention). It may then be determined (e.g., based on the information monitored, tracked and stored by computer 110) that the player is owed $122.70 (e.g., the refund amount of $135.87, minus the $13.17 in contract fees). The representative may then pay the player with cash in the appropriate amount. In one embodiment, the player may be provided with a physical "contract receipt" (e.g., in addition to or in lieu of being provided with the cash). If the receipt is provided in lieu of cash, the receipt may be exchangeable for the appropriate amount of cash at an appropriate casino counter, at a contract kiosk 140 or via another means. The contract receipt may comprise, for example, a sheet of printed paper, an exemplary illustration of which is depicted by Fig. 13.

A contract receipt, as illustrated in the example of FIG. 13, may include, for example,

(i) an indication of the casino or other entity that entered into the contract with the player (1305);

(ii) a contract identifier and / or player identifier (1310);

(iii) a win and / or loss amount associated with the contract (1315) that may be calculated, for example, by subtracting the amount of coins wagered by the player (1320) from the amount of coins paid to the player (1325);

(iv) an indication of a refund rate (1330) or other benefit defined by the contract;

(v) an indication of a gross value of the benefit earned by the player as a result of the contract, such as the gross amount to be refunded to the player (1335);

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(vi) an indication of contract fees or other fees (e.g., taxes) to be subtracted from the gross value of the benefit earned by the player as a result of the contract (1340);

(vii) an indication of the net value of the benefit earned by the player as a result of the contract, such as the net amount to be refunded to the player (1345), which net value may be calculated by deducting any applicable fees from the gross value of the benefit;

(viii) a summary of the play that was covered under the contract (1350), which may be a summary of all game plays that contributed to the determination of the gross value of the benefit earned by the player as a result of the contract; and

(ix) an area for the signature of the player associated with the contract (1355).

It should be noted that in some embodiments a player may be provided a monetary amount that is a benefit earned by the player as a result of a contract by having the amount credited to an account associated with the player (e.g., a credit card account, a debit card account, a casino-maintained account, etc.). In such embodiments, a contract receipt may include an indication of the account to which the monetary amount was added.

In some embodiments, a contract receipt may not comprise a physical contract receipt. For example, in one embodiment, text and / or graphics representative of a contract receipt may alternately or additionally be output by a display screen of a kiosk.

In one embodiment, a contract receipt may be provided to a player before completion of a contract. For example, if a player terminates play of a gaming device before completion of a contract, the gaming device or another device may print a receipt for the player that is readable by another device and that allows the other device to read or derive information about the player's contract (e.g., how many game plays and / or time the player is entitled to under the contract, etc.).

EXEMPLARY PROCESSES

FIGS. 14 - 16 are flow charts of respective exemplary processes 1400, 1500 and 1600 that may be practiced via, for example, system 100 (FIG. 1). Any and all of the processes of FIGS. 14, 15 and 16 (or any portion of any such process) may be embodied within computer program code of one or more programs described herein and may comprise a computer program product.

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The processes described herein, and variations thereof that will be apparent from the disclosure herein, may be performed, for example, as a result of operation of the processor 205 of the computer 200, processor 305 of gaming device 300, a processor of a contract kiosk 140, a processor of a contract server, a processor of another device and / or a combination of any of the aforementioned processes (e.g. working in series, parallel, cooperatively, or otherwise in combination).

Except where impractical, it is contemplated that in one embodiment the processes and / or methods described herein and / or illustrated in FIGS. 14, 15 and 16 may be performed by a computer 110 interactive with one or more gaming devices 130 and / or one or more kiosks 140. It is also contemplated that the method or methods of the present invention may be performed on a stand-alone gaming device.

Referring now to FIG. 14, process 1400 begins with step 1405, in which a contract is established with a player. Establishing a contract may comprise, for example, entering into a commitment with a player, in which commitment it is promised that a benefit defined by the contract will be provided to the player if the player complies with the terms of the contract. It should be understood that establishing a contract with a player includes determining that a player has purchased or otherwise entered into a contract (e.g., via a contract kiosk 140, via a gaming device 130, via a casino employee, etc.).

It should further be noted that process 1400, as any process described herein, need not necessarily be performed all at one time (i.e., a step of the process need not begin immediately after a preceding step has been completed). In some embodiments, a significant amount of time (e.g., minutes, hours, days , week, etc.) may pass between steps. For example, in one embodiment step 1405 (determining that a contract has been established) may be performed at a first time and step 1410 (determining contract initiation signal from gaming device) may be performed several hours or days later).

A contract may be established in a variety of manners and via a variety of entities. As described, various process steps of embodiments described herein (including embodiments in which a contract is established with a player) may be performed by one or more of a variety of entities, including a computer 110, a gaming device 130, a contract kiosk 140, casino personnel, etc.

In some embodiments, a player may indicate a desire to enter into or establish a contract. For example, a player may approach a casino representative in the interest of establishing a contract. In a more specific example, in one embodiment a booth or other location within casino

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premises may be dedicated to selling, establishing, and / or administering contracts, and may be staffed with personnel and casino personnel devices accordingly (e.g., a desk behind which staff operate computer terminals, such that requests to purchase contracts may be received). In another embodiment, a player may approach a "mobile" casino representative to establish a contract (e.g., a casino "floor representative" may be given a PDA or other handheld computing device, which may communicate with any of the devices/computers described herein such that a request to provide a contract may be received). In other embodiments, a player may approach a "contract kiosk" and indicate an interest in establishing a contract (e.g., by actuating an input device of the kiosk, such as a graphic of a touch-sensitive display screen that reads "Press here to get your losses covered!"). In another embodiment, a player may establish a contract upon checking in to a hotel associated with a casino. In further embodiments, a player may request to establish a contract by dialing a particular phone number and accessing an IVRU (e.g., a tent-card advertisement placed on top of a slot machine reads, "Dial 1-888-CONTRACT" and get 50% of your gambling losses covered – FREE!", such that the player dials the phone number, listens to a menu of options, and selects an option to purchase a contract by pressing an appropriate button of a cellular phone keypad). In one embodiment, a player may indicate a desire to establish a contract by actuating an actuatable input device of a gaming device. In this manner, a request to establish a contract may be received by a system of the present invention in a variety of manners.

As described, in one embodiment all or some available contracts may only be available to some players. For example, only certain players may be eligible to establish a particular contract or any contract at all (e.g., based on a characteristic associated with the player). Accordingly, in some embodiments the step of establishing a contract may comprise reviewing player data to determine player eligibility for establishing a contract. For example, in one embodiment, only players characterized by certain data may establish a contract (e.g., only registered hotel guests). Further, in some embodiments, players associated with certain player data may receive only certain contract terms (e.g., "high rollers" may be eligible to receive a higher percentage refund of gambling losses, longer contract periods, and so on) and / or may only be eligible for certain contracts but not others. It should be noted that, in an embodiment in which it is being determined whether a player is eligible to enter into a particular contract, the identifier of the contract and / or the terms of the contract may first be determined, prior to determining the player's eligibility to enter into the contract.

In some embodiments, a player database (e.g., a player database as illustrated in FIGS. 4A and 4B) may be accessed in accordance with a particular player identifier or player name (e.g., a casino representative keys-in a player name, swipes a player tracking card through a card-reader device in communication with a casino personnel device, etc.) so as to determine player eligibility.

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Data stored within a player database may then be used to determine whether or not a particular player (i) is a registered hotel guest, (ii) has wagered a certain amount of money over the course of one or more trips to a casino, (iii) has generated a certain amount of "theoretical win" for the casino (e.g., which may be determined by multiplying a total amount wagered by a "house edge" metric of, e.g., 9%), (iv) has generated a certain amount of actual winnings or losses over the course of one or more trips to the casino, (v) is associated with any active contracts, (vi) has completed (e.g., successfully) a contracts in the past, (vii) has registered for a casino "player account" membership (e.g., signed up for a player tracking card) perhaps on or before a certain date, and / or (vii) otherwise is eligible to establish a contract.

As described with reference to FIGS. 4A and 4B (player database 400), player data may be collected and / or stored in a variety of manners. For example, a player may have previously registered for a player tracking card. Thus, various game play data (e.g., payout data, win/loss data, wager data, etc.) may have been tracked and stored in association with a player identifier as is known in the art. It should be noted that, in some embodiments, a player may not have previously registered for a player tracking card or registered as a casino hotel guest. Accordingly, a player database may contain no data stored with reference to the player (e.g., a casino representative uses a computer of the present invention to search for the player's name, but no record is revealed). In some embodiments, a player having no record or account may not be eligible to establish a contract or may only be eligible to establish a particular contract(s) and / or contract(s) with particular terms. In one such embodiment, a player may be offered an opportunity to establish a player record or account. For example, the player may be presented with an opportunity sign up for a player tracking card (e.g., open a player account). In another example, a player may receive a "guest pass" in exchange for performing a particular task (e.g., filling out a survey, eating at a casino-maintained restaurant, etc.); such a guest pass may then permit the player to establish a contract, a particular contract and / or a contract defining particular terms. In other embodiments, a player having no record may receive a contract characterized by only certain contract terms.

As described, player eligibility to establish a contract may be determined based on the player data associated with the player. For example, a player eligibility rules database (such as the exemplary player eligibility rules database 500 depicted in FIG. 5) may be accessed and one or more rules stored therein may be applied to determine the player's eligibility to enter into a contract, based on the player data associated with the player in conjunction with the one or more rules. For example, a rule may indicate that if a player is associated with an active contract, the player may not establish a second contract (e.g., as specified by rule R-002 of the player eligibility database 500 (record R500-2)). In another example, a rule may indicate that if a player has generated more than

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$10,000 in theoretical win, the player may establish any contract (e.g., a contract with any terms that the player desires; as specified by rule R-003 of player eligibility rules database 500 (record R500-3)). In yet another example, a rule may indicate that if a player had not registered for a player tracking card before a particular date, the player may only be eligible to establish a contract with an associated refund rate of less than 51% (e.g., as specified by rule R-004 of the player eligibility rules database 500 (record R500-4)).

As also described, in one embodiment establishing a contract may include determining an eligibility of one or more gaming devices for facilitating game plays that are covered under the contract. A gaming device being eligible for contract play may comprise, for example, the gaming device being authorized, approved, operable and / or available to facilitate game plays that, when participated in by a player who has established a contract, aid the player in earning or otherwise qualifying for a benefit defined by the contract (e.g., "count" as game plays covered under the contract).

A determination of whether a gaming device or type of gaming device is eligible for contract play (or a determination of which gaming devices or gaming device types are eligible for contract play) may be performed at one or more times, as deemed appropriate and desirable. In one embodiment, before a contract is established with a player, it may be determined whether or not a particular gaming device or type of device is permitted for contract play (e.g., this may be particularly useful in a scenario in which a player requests a contract to be executed on a particular gaming device or type of gaming device). For example, the determination may be performed after a player requests to establish a contract but prior to establishing the contract with the player. In another embodiment, the determination may be performed before a player ever requests to enter into a contract. The determination of gaming device eligibility may be helpful in order to inform a player, prior to the player establishing a contract, as to which gaming devices and / or types of gaming devices the player may play in order to earn or otherwise qualify for a benefit under the contract.

It should be noted that in some embodiments available contracts may be pre-packaged and displayed on a menu of available contracts to a player, as described herein. In such embodiments, the determination of whether a particular gaming device and / or particular type of gaming device is eligible for facilitating game play under a contract (e.g., whether play of the gaming device will aid a player in earning or otherwise qualifying for a benefit defined by the contract) may be performed at a time the contract is being defined and prior to a time at which a player is requesting to establish a contract. For example, a casino or other entity defining a contract to be included on a menu of available contracts may define, as one of the terms of the contract, the gaming devices and / or

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types of gaming devices the play of which will comply with the terms of the contract. This determination may be made, for example, based on some of the considerations described below. Accordingly, in such pre-packaged contract embodiments, upon a time of a player attempting to establish a contract, there may be no need to determine gaming device eligibility or the determination of gaming device eligibility may simply comprise retrieving the previously made decision as to which gaming device and / or types of gaming devices are eligible for play under the contract.

In some embodiments, it may be beneficial to restrict certain gaming devices or gaming device types characterized by certain attributes from a contract. Restricting a gaming device or type of gaming device from contract play may comprise rendering the gaming device unauthorized, unapproved, inoperable and / or unavailable to facilitate game plays that, when participated in by a player who has established a contract, aid the player in earning or otherwise qualifying for a benefit defined by the contract (e.g., the game plays do not "count" as game plays covered under the contract). A gaming device or gaming device type may be restricted from all contract play in general and / or from contract play under one or more particular contracts. A gaming device or gaming device type that is restricted from contract play may be flagged as such in a database, associated with a restricted status in a memory of a device (e.g., a memory of a kiosk 140 or computer 110) and / or may display or otherwise output an indication of its restricted status (e.g., to all players or to players who attempt to initiate contract play on the gaming device). In one embodiment, an indication of which gaming device(s) and / or gaming device type(s) are restricted from contract play may be output to a player considering a purchase of a contract. For example, such an indication may be output via a display screen of a device via which the player is purchasing the contract, printed on a receipt provided as a proof of a purchase of a contract, printed on a contract card, or otherwise provided to a player who has purchased or otherwise entered into a contract. In some embodiments, a gaming device itself may output an indication of whether the gaming device is restricted from contract play (e.g., an LED is lit, a sound is emitted, and so on). An indication of which gaming device(s) and / or gaming device type(s) are eligible for contract play may be output in similar manners.

It should be noted that whether a particular gaming device or gaming device type is restricted or eligible for contract play may change during a period defined by a contract. For example, a particular gaming device may be restricted from contract play at a time a player enters into a contract but may become eligible for contract play while the contract is active and before the contract ends.

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Various characteristics or attributes may be considered when determining whether a gaming device and / or gaming device type is eligible for contract play. In one or more embodiments, a gaming device may be restricted from contract play (i.e., a player would not earn or qualify for a benefit defined by the corresponding contract by playing the gaming device) if a standard deviation metric associated with the gaming device is too high. In some embodiments, a standard deviation metric associated with a gaming device may be determined by the following calculation:

Let x be a random variable that can take on experimental values of x_1, x_2, ... x_n, with corresponding probabilities p_1, p_2, ... p_n. For example, x may represent a model of a game play of a gaming device. The experimental values would be payouts, such as -1, 1, 5, 100, and so on. The probabilities would be the probabilities of the corresponding payouts occurring. For example, the payout "-1" might occur with probability 0.9. The expectation of x is denoted E[x]. The expectation of x, which may also be known as the mean, or average, is defined as

$$E[x] = p_1*x_1 + p_2*x_2 + \ldots + p_n*x_n$$

$$= \sum_{k=1..n} p_k x_k$$

The variance of x is denoted σ_x^2. The variance is defined as

$$\sigma_x^2 = p_1*(x_1-E[x])^2 + p_2*(x_2-E[x])^2 + \ldots p_n*(x_n - E[x])^2$$

$$= \sum_{k=1..n} p_k*(x_k-E[x])^2$$

Thus, the standard deviation metric associated with the gaming device, σ_x, is the square root of the variance.

In other embodiments, a gaming device may be restricted from contract play if it is characterized by a relatively high payback percentage. In some embodiments, a gaming device payback percentage may be determined based on a house edge metric. For example, a gaming device that statistically retains 9¢ of every dollar wagered for the house (i.e., a house edge metric of .09) may be thought of as a "91% payback" device.

In further embodiments, a variety of other characteristics or attributes may be considered when determining gaming device eligibility for contract play. Such attributes include, but are not limited to: (i) the gaming device's manufacturer (e.g., the name of the company that manufactured

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and distributed the device), (ii) the gaming device's location on the casino floor (e.g., a device is in a particular room or part of a particular bank of devices), (iii) the gaming device's wager denomination (e.g., a 5¢-per-line slot machine may be allowed, but a 25¢-per-line slot machine may not), (iv) the number of paylines which may be activated during one game play, (v) the number of hands of poker which may be played during one game play, (vi) a "game type" associated with the gaming device (e.g., a "slot machine" may be allowed but a "video poker" machine may not, a "Double Gems Jackpots" game may not be eligible), (vii) the conditions under which the casino purchased or leased the gaming device (e.g., a "participation" gaming device for which casinos must pay another entity a percentage of the gaming device's win may not be eligible), (viii) the jackpot amount associated with the gaming device (e.g., the top payout amount associated with the gaming device; it should be noted that a "progressive" jackpot may have a variable value, which may be accumulated by setting aside a small fraction of each wager amount into a jackpot pool, as is known in the art), (ix) the time of day (e.g., certain gaming devices may only be eligible for contract play during certain "off-peak" times), (x) the average or maximum speed at which the gaming device is operable to conduct a game play, and so on.

In one embodiment, a gaming device database (such as that illustrated in FIG. 6) may store data which may be useful in determining an eligibility of a gaming device for contract play. For example, in one embodiment, a casino server (e.g., computer 110) may maintain a gaming device database which may store data associated with gaming devices and / or gaming device types currently positioned on casino premises. Thus, a gaming device eligibility rules database (such as that illustrated in FIG. 7) may be used in conjunction with a gaming device database to determine whether or not a gaming device type and / or gaming device is eligible for contract play.

For example, in one embodiment, any gaming device characterized by a "progressive" jackpot as indicated by a gaming device type database may not be eligible for contract play (i.e., rule R-001 of gaming device eligibility rules database 700). In another embodiment, if a gaming device database indicates that a standard deviation metric associated with a gaming device is greater than a predetermined threshold amount (e.g., "6") the gaming device may not be eligible for contract play. In yet another example, a gaming device manufactured by a certain company may not be eligible for contract play (e.g., rule R-00N of gaming device eligibility database 700). As described, in some embodiments rules may be enabled or disabled as a casino operator or other entity finds desirable and / or appropriate (e.g., a gaming device eligibility rules database is updated to reflect which rules the casino desires to enable).

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In one embodiment, a determination of whether to establish a contract with a player and / or a determination of eligibility of a gaming device and / or gaming device type for contract play may be based on a level of utilization of the gaming device and / or type of gaming device. Thus, in some embodiments, step 1405 may comprise determining a level utilization of a gaming device and / or type of gaming device. For example, in one embodiment, a gaming contract may only be provided if it is determined that there is sufficient capacity for contract play (e.g., enough slot machines located on the floor of a casino are not currently being utilized, such that adding another player to the floor for the duration of a particular contract period will not result in a shortfall of gaming device capacity that is deemed unacceptable by a casino). In one embodiment, gaming device utilization data may be stored in a database, such as the example gaming device status database 800 depicted in FIG. 8. For example, a gaming device database may indicate a status associated with a gaming device (e.g., identified by a unique gaming device identifier, such as "GD-000001"), which may describe whether the particular device is currently "in use" or "not in use." A variety of methods of monitoring gaming devices to detect such utilization are contemplated (e.g., detecting game play activity, detecting the insertion of a player tracking card or contract card, detecting the presence of a player using a sensor device, monitoring gaming devices with video cameras, etc.). In some embodiments, a device (e.g., computer 110) may track gaming device utilization in a substantially automatic manner (e.g., computer 110 determines use of a gaming device and updates a status of the gaming device in the gaming device status database, as necessary or appropriate). In one embodiment, a percentage utilization metric may then be calculated with respect to all gaming devices within a casino (e.g., 37% of all gaming devices are in use) or a percentage of gaming devices being associated with a particular characteristic (e.g., 59% of all video poker machines are in use, etc.).

Accordingly, in some embodiments, a gaming contract may or may not be established depending on a determined percentage utilization metric (e.g., if a percentage utilization metric is above a certain threshold, no gaming contracts are to be provided). In another embodiment, a gaming contract may be established but a beginning time of the contract (e.g., a time at which a player may begin playing one or more gaming devices in order to earn or otherwise qualify for a benefit under the contract) may be deferred until a level of utilization is deemed to be acceptable.

In one embodiment, historic gaming device utilization data may be considered when determining whether or not a gaming contract is to be established and / or whether a beginning time of a contract is to be deferred. For example, it may be determined that, on average, gaming device utilization from 12 p.m. until 6 p.m. on Wednesdays has been 23% at Casino A.

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In one embodiment, step 1405 may comprise determining one or more terms of a contract. Determining a term of a contract may comprise, for example, determining the nature of the term and determining a value for the term. For example, a nature of a term may be determining a period defined by a contract while determining the value for the term may comprise determining the actual value of the period (e.g., three hours, 100 game plays, until a payout of at least 1000 credits is won, until a loss of at least $100 is incurred etc.). In one embodiment (e.g., an embodiment in which a player selects a contract to enter into from a menu of available pre-packaged contract), the terms (and values thereof) of the contract may already be defined and step 1405 may simply comprise determining the previously defined terms. In one embodiment, a player may be allowed to customize a contract by changing a value of one or more terms or selecting all terms and values for the contract.

In one embodiment, once (i) a request to establish a gaming contract has been received from a player, (ii) the player's eligibility has been determined, (iii) eligible/ineligible gaming device types have been identified, and / or (iv) gaming device utilization has been determined, one or more terms of the contract may be determined before the contract is established with a player. A variety of example contract terms will now be described in further detail.

One example term of a contract is the benefit to be provided to the player if the player complies with other terms of the contract. The term defining the benefit may further define how a value of the benefit is to be determined (e.g., a formula based on which the value of the benefit is to be determined).

A benefit may comprise, for example, a refund amount. As described, in one or more embodiments a benefit defined by a contract may comprise a refund of at least a portion of the losses incurred by a player, or wagers posted by a player, for game plays covered under the contract. In some embodiments, a refund amount may be based on amount of losses incurred by a player or a sum of wagers posted by the player. In such embodiments, a refund rate may be defined by the contract, the refund rate comprising a percentage (e.g., 100%, 75%, 50%, etc.) of the losses incurred by the player or sum of wagers posted by the player that is to be paid to the player. Accordingly, a refund rate associated with a gaming contract may comprise a formula based on which a refund amount may be determined.

In one embodiment, a refund rate may be greater than 100% (e.g., "We'll refund all your losses plus pay you 5%!"). In yet another embodiment, a contract may entitle a player to receive a payment based on a win amount (e.g., "Get double your winnings!").

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In another embodiment, a refund amount may be a predetermined amount that is not based on losses incurred by the player or wagers posted by the player (e.g., if a player agrees to play 12 hours of slots, the player receives a $50 bonus payment at the conclusion of the contract). In one embodiment, a refund amount may be provided to a player at the end of a gaming contract.

In one embodiment, as described herein, a contract may define a benefit other than a refund amount. For example, a benefit may comprise access to a feature of the gaming device, a reduced maximum wager amount, a more favorable payout table and / or probability table, an ability to continue playing a gaming device once a credit meter balance is depleted, goods, services, and / or an increased rate of earning comp points, etc. As described, in one embodiment a benefit may be provided to a player during a period of time defined by a contract (e.g., so long as the player is complying with other terms, such as play requirements (described below) of the contract.

In one embodiment, a benefit may be provided only once under the terms of the contract (e.g., at the end of the contract). In another embodiment, a benefit may be provided to a player (i) a plurality of times (e.g., periodically, in response to a predetermined event, etc.) and / or (ii) continuously or substantially continuously (e.g., so long as the player is complying with the play requirements defined by the contract, the player enjoys an increased rate of earning comp points).

Another example of a term of a contract may be a contract fee. A contract fee may comprise, for example, a purchase price of a contract and / or consideration to be provided by the player in exchange for being entitled to earn or otherwise qualify for the benefit defined by the contract. A contract fee may be required to be provided at the time the player enters into the contract, to be provided (e.g., in increments or based on another basis) during a period of time defined by the contract, at the end of a contract, or another time, as appropriate and / or desirable. As described herein, in various embodiments, a gaming contract may be provided only if a player (i) pays or agrees to pay a premium, fee or surcharge, which may be associated with one or more game plays and / or wager amounts, and / or (ii) agrees to a predetermined contract period.

Accordingly, in one example, a contract fee may comprise a flat fee associated with the contract (e.g., a player agrees to pay $30 in exchange for the activation of a contract). In another example, a player may agree to pay an incremental fee, which may be based on (i) one or more game plays initiated during contract play (e.g., a player agrees to pay a fee of 5¢ for each hand of video poker played during the contract period), and / or (ii) one or more wager amounts provided during contract play (e.g., a player agrees to pay 1¢ for every 25¢ wagered during the contract period). Again, a contract fee may be paid (i) before a gaming contract is provided (e.g., a player pre-pays a flat $30 contract fee); (ii) during a contract period (e.g., a player establishes a debit

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account with a casino, such that the debit account is deducted by an incremental fee amount in accordance with each game play); (iii) after a contract period concludes (e.g., a player provides a credit card before a gaming contract is activated, but the card is not charged until contract play concludes and the contract is reconciled); and / or (iv) at another time.

As stated, in some embodiments, a player may agree to a predetermined contract period in lieu of, or in addition to, a monetary fee. A player may thus provide consideration other than money in exchange for being entitled to earn or otherwise qualify for a benefit defined by the contract. For example, a player may agree to 12 hours of slot machine play in exchange for a contract offering a 100% refund of all losses at a premium of 1¢ per every 25¢ wagered. In another example, a player may agree to six hours of slot play in exchange for a contract offering a 50% refund of all losses with no associated contract fee. It should be noted that a casino may agree to such an arrangement, whereby a player agrees to an amount or period of game play in addition or as an alternative to providing a contract fee, because a house edge metric associated with play of one or more gaming devices may provide a casino with a statistically predictable amount of profit should players play such devices for prolonged periods of time (e.g., even though a contract fee was not received, revenue may still be generated through players' repeated play of such devices).

In one embodiment, a contract fee for a particular contract may comprise a first fee for a first player and a second fee for a second player. For example, the first player may receive a reduced fee due to a favorable characteristic associated with the player (E.g., the player is a member of a loyalty club of the casino, the player is a frequent gambler, an average maximum wager amount associated with the player is at least a predetermined amount, the player is a hotel guest, etc.).

Another example of a term of a contract may comprise a period of time defined by a contract. The period of time may comprise, for example, a period of time during which the contract is active, a period of time during which game plays participated in by the player count towards the player earning or otherwise qualifying for a benefit defined by the contract, etc.

A period of time may comprise, for example, (i) a minimum period of time, (ii) a maximum period of time, (iii) a specific period of time, or (iv) a range of time. In one or more embodiments, a term of a contract may define when the period of time defined by the contract begins (e.g., upon purchase of the contract, at 2:00 p.m., upon a player initiating a game play covered under the terms of the contract, etc.) and when it ends.

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In some embodiments, a period of time defined by a contract may be defined in terms of one or more of (i) a predetermined, minimum, and / or maximum number of game plays, or (ii) an indeterminate number of game plays to be initiated within a predetermined, minimum or maximum period of time (e.g., one hour). Thus, in one example, a period of time defined by a contract may comprise 5,000 handle pulls of a slot machine (e.g., a player agrees to receive a 50% refund on all losses incurred at any eligible slot machine, so long as the player initiates 5,000 game plays in total). In another example, a period of time defined by a contract may comprise six hours (e.g., a player agrees to receive a 75% refund on all losses incurred during six hours of gaming device play). In a further example, a period of time defined by a contract may comprise a specific period of hours during one or more days (e.g., contract play comprises any game plays initiated between 8 a.m. and 1 p.m. on a particular day).

Another example of a term of a contract may comprise one or more play restrictions or play requirements. A play requirement and / or a play restriction may comprise a condition associated with play of one or more gaming devices that a player may be required to satisfy in order to earn or otherwise qualify for a benefit defined by a contract. A variety of play requirements and play restrictions are contemplated. In some embodiments, a play requirement of a contract may specify that a player must maintain a predefined rate of play while participating in game plays covered under the contract. For example, a player may receive a 50% refund on any losses incurred during a six-hour contract period, so long as the player agrees to maintain a minimum rate of three game plays per minute. Methods and apparatus for determining a gaming device player's rate of play and providing a benefit based at least thereon are described in Applicant's issued U.S. Patent No. 6,238,288, entitled "METHOD AND APPARATUS FOR DIRECTING A GAME IN ACCORDANCE WITH SPEED OF PLAY," filed December 31, 1997, the entirety of which is incorporated herein by reference for all purposes.

In other embodiments, a play requirement may define a wager amount to be posted for a game play (e.g., in order for the game play to be covered under the contract and / or in order for the game play to "count" towards the player satisfying the contract). For example, a play requirement may specify (i) a particular wager amount that a player must post for a game play, (ii) a minimum wager amount that a player must post for a game play, and / or (iii) a maximum wager amount (e.g., an average wager amount calculated based on all game plays covered under the contract) that a player must post for a game play. For example, a play requirement may require a player to wager at least 25¢ per game play of a slot machine. In another example, a play requirement may require a player to wager a maximum of 75¢ per game play of a slot machine.

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In further embodiments, a play requirement may specify a particular manner of game play. For example, a play requirement may specify one or more of (i) a number of slot machine paylines which a player must activate in accordance with each game play; (ii) a strategy which a player must employ for a game play; and / or (iii) a feature of a gaming device which a player must active during a game play. For example, a play restriction may indicate that a player must activate a maximum of three slot machine paylines in accordance with each game play initiated during contract play.

It should be understood that a play requirement may apply to all or a subset of game plays covered under a contract.

Accordingly, step 1405 (or another step of another process performed in accordance with embodiments of the present invention) may comprise determining one or more contract terms. In some embodiments (whether a contract is being pre-defined prior to any player requesting the contract or whether the contract is being defined for a particular player in response to the player's request for a contract (e.g., based on specifications input by the player)), one or more contract terms may be determined such that the establishment of the resultant contract defined by the terms may be profitable for a casino. As described, in one or more embodiments a casino may pre-define and make available one or more "pre-packaged" contracts that may then be marketed as products to prospective customers (e.g., signs positioned on a casino floor advertise: "100% CASH REFUND – Get all your losses back – Play 12 Hours of Slots During Your Trip – Just 1¢ per Spin!").

In one example, a casino (e.g., a casino-maintained computer system programmed to execute various processes of the present invention) may calculate that at a contract fee of 1¢ per every 25¢ wagered, a casino may stand to generate a profit even after reimbursing a player for 100% of the player's losses, so long as the player plays at a reasonable rate of play (e.g., 500 game plays per hour) for a period of 12 hours. Assuming the player wagers an average of 75¢ per game play and a house edge metric of .08 (e.g., gaming devices are programmed to statistically hold 8% of coin-in for the house), it may be determined that, statistically, the player will generate $180 in contract fees and accumulate $360 in losses during the contract period. Accordingly, as the player will be refunded the $360 loss amount, the casino may generate $180 in profit from the gaming contract. It should be noted that though gaming devices may be programmed to statistically maintain a house edge, thereby generating an 8% loss on average for players, some players may achieve a win amount as the result of contract play (such a win amount may have decrease casino profits). While there may be some players who will generate a win amount during a period of time defined by a contract, by requiring the period of time to be relatively long and / or to encompass a relatively large number of game plays, a casino may reduce the number of such winners.

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It should also be noted that, in some embodiments, while such an amount of profit may be comparably less than would have been generated had the player played for 12 hours without a contract (e.g., wherein the player's losses would have been held by the casino), the contract may be advantageous in that it may (i) motivate a player to play only at the gaming establishment wherein the player's losses are "covered," thereby decreasing the likelihood that the player will gamble at a competitor's property, (ii) motivate a player to gamble for longer periods of time, (iii) increase the likelihood that a gaming establishment will derive additional revenue from the player's patronage of non-gaming casino activities (e.g., eating at restaurants, attending shows), as the player is motivated to gamble only within the establishment that provided the contract, (iv) increase the likelihood that a player afraid of losing a large sum of money will gamble within a gaming establishment, as the cost of playing gaming devices may be considered fixed (e.g., a player may play five hours of slot machines, with a chance to win a large jackpot, for only a flat cost of $50), and so on.

In another example of a contract that a casino or other entity may pre-define and market as a product to players, a gaming establishment may advertise that a player may receive a 50% refund on all losses incurred within a given time period (e.g., any game play between 6 a.m. and 1 p.m.) without paying any associated contract fee. Thus, a gaming establishment may benefit by maintaining 50% of the financial losses incurred by the player, as well as by ensuring that the player's business is captured for a period of several hours.

In yet another example of a contract that a casino or other entity may pre-define and market as a product to players, a contract may allow a player to pay an up-front contract fee of $50 for a contract lasting a period of six hours. The contract may define a benefit comprising a 100% refund of all losses incurred as a result of game plays completed during the period of time defined by the contract.

In yet another example of a contract that a casino or other entity may pre-define and market as a product to players, a contract may allow a player to pay an up-front contract fee of $20 for a contract defining a period of time of one hour. The contract may define a benefit comprising a 100% refund of all losses incurred as a result of game plays completed in accordance with the terms of the contract. The contract may further define a play requirement requiring the player to only use a particular type of gaming device (e.g., only Nickel Frenzy machines are eligible).

In yet another example of a contract that a casino or other entity may pre-define and market as a product to players, a contract may allow a player to provide a credit card when signing up for the contract, in exchange for which the player will be authorized to initiate 1,000 game plays

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(e.g., at 25¢ per game play) on any eligible gaming device. The contract may define a benefit comprising a 75% refund of all losses incurred as a result of the 1,000 game plays. The contract may define a contract fee of $60, to be charged to the provided credit card once a contract has ended. In one embodiment, the amount, if any, to be charged to the credit card at the end of the contract may be determined by subtracting the $60.00 from a refund amount due to the player as a result of the losses incurred by the player.

Thus, as some pre-defined contracts may be associated with a variety of pre-defined contract terms (e.g., "Contract A" has a refund rate of 100%), certain pre-defined contracts may be unavailable to players characterized by certain player data. For example, a player eligibility rule of a player eligibility rules database may indicate that a player who is not a registered hotel guest may not receive a contract with an associated refund rate of greater than 75%. Accordingly, in some embodiments, a player requesting a contract defining a benefit of a refund rate greater than 75% may be denied an opportunity to establish the contract if the player is not a registered hotel guest. Alternately or additionally, in some embodiments, an identified player (e.g., a player inserting a player tracking card or providing a last name, such that player data may be accessed) requesting generally to establish a contract (e.g., a player selects "Show me Gaming Contracts" or "I'd Like Loss Insurance" as an option of a menu output by a touch-screen kiosk or IVRU) may not receive the option of selecting certain contracts. For example, contracts which the player is not eligible to establish (e.g., contracts characterized by certain terms) may not be included in a menu of contracts output to the player. Alternatively, the contracts for which a player is not eligible may be "grayed out" or otherwise indicated as unavailable on a menu of contract output to the player.

In some embodiments, a player may request to receive a "custom gaming contract." For example, a player may desire to select or adjust one or more contract terms or values thereof (e.g., contract period, refund rate, etc.). In one such embodiment, various contract terms (and / or certain values of certain contract terms) may be made available to a player based on the player's eligibility (e.g., as determined by analyzing player data). Thus, in some embodiments, players characterized by certain data (e.g., players that have established long-standing player accounts, generated large amounts of theoretical win, etc.) may select certain contract terms or certain values of certain contract terms (e.g., higher refund rates, longer/shorter contract periods, fewer play requirements, lower contract fees, etc.) as indicated by player eligibility rules. For example, a player may approach a booth dedicated to administering contracts, and communicate verbally to a casino representative a desire to receive a custom contract. The casino representative may then, for example, use a computer device in communication with any or all of the databases described herein (e.g., a player database, a player eligibility rules database, a gaming device eligibility rules

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database, etc.) to determine which contract terms or which certain values of certain contract terms the player may be eligible to select.

It should be noted that, in some embodiments, a contract characterized by certain predetermined combinations of contract terms may not be offered or made available to any player. For example, no player may be offered or approved for a contract wherein the associated contract terms comprise the following combination: a refund rate of greater than 75%, a contract fee of less than $10 and a period of time defined by the contract that is shorter than one hour or twenty-five (25) game plays. In another example, no player may be offered or approved for a contract that defines a minimum rate of play requirement of fewer than 300 game plays per hour. In yet another example, no player may be offered or approved for a contract wherein an associated contract term comprises a refund rate of greater than 100%. Such rules may be stored, read from and / or written to a database, such as the contract customization rules database 900 (FIG. 9). It should be noted that, in some embodiments, such rules may have the effect of establishing the boundaries of contracts, setting the boundaries for contract terms in order to exclude from approval contracts that will not result in an acceptable level of profit for a casino. Use of such a database, or a similar methodology, may help ensure that contracts with a low likelihood of generating a minimum acceptable level of profit for a casino and / or other entity may not be provided. As described previously, such rules may be enabled and / or disabled as desired and / or appropriate. In this manner, a player may identify, select and / or define a contract characterized by a number of contract terms and values thereof that are desirable to the player.

In some embodiments (e.g., before a customized contract is established or before any contract is established), step 1405 may comprise receiving a confirmation from a player that the player desires a contract characterized by indicated contract terms.

A confirmation may be received in a variety of manners. In one example, a player may actuate an input device of a kiosk or other electronic device (e.g., gaming device, PDA) so as to signal confirmation (e.g., the player actuates a "YES" graphic of a touch-sensitive display screen, above which text reads "By pressing YES below, I agree to pay $50 and receive a contract card. By inserting the contract card before I play a slot machine, I will receive a 100% refund of any losses incurred between 11 a.m. and 5 p.m. today"). In another example, a player may signal confirmation verbally (e.g., by speaking to a casino representative, saying "YES" when prompted by an IVRU, etc.). In yet another example, a player may signal confirmation by actuating an appropriate button of a telephone, as prompted by an IVRU (e.g., "If you would like to purchase this contract, press 1"). In yet another example, a player may signal confirmation by signing or initialing a physical contract

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agreement form (e.g., a paper form which describes contract terms and includes an area for receiving a signature).

Additionally, in some embodiments, step 1405 (or another process consistent with embodiments of the present invention) may comprise receiving a contract fee or portion thereof, such that establishing a contract may comprise receiving the contract fee or a commitment to the contract fee. In one embodiment, establishing a contract may comprise determining that a contract fee has been received and / or determining that a commitment to a contract fee has been received. In one example, a player may tender a cash payment (e.g., a player provides cash to a casino representative, a player inserts cash into a bill acceptor of a kiosk, etc.). In other embodiments, a player may provide a credit card, which may be billed immediately. In further embodiments, a contract fee associated with a contract may be added as a charge to a hotel bill associated with a player.

As described, in some embodiments, step 1405 may comprise receiving a commitment from a player to pay a contract fee at a later time and / or determining that a player has provided a commitment to pay a contract fee at a later time. For example, in one embodiment, before a contract is activated (e.g., before a player is authorized to participate in play in order to earn or otherwise qualify for a benefit defined by a contract), a player may provide a credit card and sign a contract agreement form describing contract terms, one of which is an incremental contract fee of 1¢ for every 25¢ wagered. Thus, at the end of the contract period, if the player wagered a total of $247.25, the player's credit card may be charged $9.89. In some embodiments, a player may provide a credit card before activating a contract, and a pre-authorization process may "freeze" an amount of credit in association with the provision of the contract, such that a gaming establishment or other entity may charge up to the frozen amount of credit upon reconciliation of the contract. In other embodiments, a player may establish a debit account before receiving a contract. For example, a player may provide $50, which may be established as a balance of a financial account associated with the player (e.g., associated with a player identifier and / or contract identifier). Thus, should the player accrue any incremental contract fees during contract play (e.g., a fee of 5¢ per every three game plays), the account balance may be decremented accordingly.

A contract may be established in step 1405 upon a player selecting and / or customizing a contract that the player is eligible to enter into and upon the player providing (or committing to provide at a future time) a contract fee associated with a contract. In some embodiments, establishing a contract may comprise associating a contract identifier with a type of contract and / or a player identifier (e.g., a new record is established in a purchased contracts database, such as the

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example one illustrated in FIG. 11). Thus, in some embodiments, a player may be provided with a contract identifier upon a contract being established with the player. In some embodiments, a player may use a contract identifier so as to signal that one or more game plays should be monitored pursuant to contract play (e.g., a player provides a contract identifier before initiating play of a gaming device, such that all subsequent game play data may be stored in association with a particular gaming contract).

Referring now to step 1410, a contract initiation signal is received from a gaming device (e.g., by a device monitoring play of the gaming device, in order to monitor, analyze and / or store game play data associated with a contract, for purposes of calculating and / or providing a benefit defined by the contract). A contract initiation signal may comprise, for example, an indication that play of a gaming device has been initiated, which play is associated with a contract. For example, the signal may indicate that one or more game plays to be initiated after the contract initiation signal are covered by a contract or may potentially be covered by a contract (e.g., such that a player's participation in the game plays may aid the player in earning or otherwise qualifying for a benefit defined by the contract associated with the contract initiation signal). In one embodiment, a contract initiation signal includes a contract identifier.

In one example, step 1410 may comprise monitoring a gaming device to determine whether contract play has been initiated on the gaming device. This may be done in lieu of, or in addition to, receiving a contract initiation signal. For example, a device (e.g., computer 110) may monitor a state of a gaming device to determine whether a contract identifier, or other indicator associated with a contract, has been input to the gaming device in a manner that may be interpreted as an initiation of contract play on the gaming device. This determination may comprise, for example, whether an initiation for contract play has been requested at a gaming device (e.g., that a player has inserted a contract or other identifier as an indication that the player desires subsequent play of the gaming device to count towards the player earning or otherwise qualifying for a benefit defined by the associated contract). For example, the gaming device may be monitored to determine whether a contract card has been inserted into the gaming device or a player identifier that is associated with an active contract has been inserted into the gaming device. In one embodiment, determining that contract play has been initiated on a gaming device and / or that a request to initiation contract play at a gaming device has been received at the gaming device may include determining the contract identifier associated with the contract play.

A controller of the present invention (e.g., computer 110) may receive an initiation signal associated with a contract identifier in a variety of manners. For example, a card reader device in

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communication with the controller and / or the gaming device may detect the insertion of a contract card and / or player tracking card (e.g., a player is instructed to "Make sure your play is covered! Insert your Contract Card before you play any slot machine"). The card reader (i.e., a processor thereof, operating in accordance with a program stored in the memory of the card reader) may then determine a contract identifier associated with the card (e.g., by reading an encoded magnetic strip and / or retrieving contract data from a database). Thus, as a controller may communicate with a card reader device, a controller may receive a contract identifier. In some embodiments, a controller receiving a contract identifier may then store game play data associated with the contract identifier (as will be described with reference to step 1415), such that each time a player approaches a gaming device, so long as a contract card is inserted into a card reader device, game play data will be stored (e.g., a controller does not store game play data unless a contract card is inserted). As described, in other embodiments, a controller may receive a contract identifier in any of the manners described above (e.g., a gaming device in communication with a controller receives a PIN code representing a contract identifier via an input device).

In one or more embodiments, step 1415 may further comprise determining whether play of the gaming device from which the contract play initiation signal was received is covered by the associated gaming contract. For example, it may be determined whether play of the gaming device complies with one or more terms of the contract and / or the gaming device is eligible for contract play in accordance with the contract. As described, in some embodiments, one or more gaming devices maintained by a gaming establishment (e.g., slot machines positioned on a casino slot floor) may be ineligible for contract play in association with one or more contracts. Accordingly, in various embodiments of the present invention, an "eligibility indication" may be associated with a gaming device and / or may be determined for the gaming device (e.g., upon receiving a contract initiation signal or determining that a request for contract play has been received at a gaming device). An eligibility indication may comprise an indication of whether the gaming device is eligible for contract play in general and / or for contract play in accordance with certain contracts, certain contract types and / or contracts defining certain terms.

For example, in one or more embodiments, a gaming establishment or other entity may mark, equip or otherwise configure one or more gaming devices to output or display a "static" eligibility indication. A static eligibility indication may inform a prospective player of the eligibility status of one or more particular gaming devices (e.g., a gaming device is or is not eligible for contract play), such that the indication may not change over time (e.g., the associated gaming device is always ineligible for contract play pursuant to any gaming contract). A variety of static eligibility indications are contemplated within the scope of the present invention, including but not

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limited to stickers, signs or other physical objects affixed to or placed on or near a gaming device, such that text, graphics and / or icons indicate an eligibility status (e.g., a sticker reads "This machine eligible for Contract Play"). In one example, a gaming establishment or other entity may fit all eligible machines with such eligibility indications before any gaming contracts are provided to players.

In other embodiments, a "dynamic" eligibility indication may be associated with one or more gaming devices. A dynamic eligibility indication may inform a prospective player of the eligibility status of one or more particular gaming devices (e.g., a gaming device is or is not eligible for contract play), such that the indication may change over time (e.g., the associated gaming device may at times be eligible for contract play, and at other times may not be eligible). A variety of dynamic eligibility indications are contemplated within the scope of the present invention. In some embodiments, a dynamic eligibility indicator may comprise a light (e.g., when an LED under which text reads "Contracts OK" is lit, the machine is eligible). In other embodiments, a dynamic eligibility indicator may comprise text, icons and / or graphics output by a gaming device display screen (e.g., while a gaming device is idle, an "attract mode" sequence indicates "This machine eligible for Contract Play"). In further embodiments, a dynamic eligibility indicator may comprise a voice recording output via one or more gaming device speakers (e.g., a voice indicates "This machine eligible for Contract Play"). Such dynamic eligibility indicators may be programmed on a periodic or continual basis such that an eligibility status associated with one or more gaming devices may be changed as desired For example, if a payback percentage or jackpot amount associated with a gaming device changes such that it is outside of an acceptable range, a gaming device eligibility rules database may indicate that the gaming device is no longer eligible for contract play, and thus, a status indicator may change.

In some embodiments, a gaming device may be eligible for contract play in accordance with some contracts or contracts defining certain terms but not others. In such embodiments, the gaming device may indicate which contracts, or contract terms, the gaming device is authorized to support.

In this manner, a player who has established a contract (e.g., a player bearing a contract card) may recognize whether a particular gaming device is eligible for contract play (or eligible for contract play in accordance with the player's particular contract), so as to prevent a situation wherein a player believes a refund is due for a loss amount that was incurred by game play at an ineligible gaming device. Further, in some embodiments, a player may (i) approach an ineligible gaming device, (ii) provide a contract identifier, and (iii) receive an "ineligibility warning indication"

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(e.g., a display screen reads, "You have inserted a Contract Card, but this machine is ineligible for Contract Play. Any losses you incur will not be refunded. Would you still like to play?"). In other embodiments, a casino representative may provide an ineligibility indication warning (e.g., verbally). Thus, in one embodiment step 1410 may comprise determining whether or not an associated gaming device is eligible for contract play, and if not, outputting an ineligibility warning indication.

Referring now to step 1415, data associated with play of the gaming device at which contract play has been initiated is stored. In one embodiment, the data is stored provided it is verified that play of the gaming device is covered under the terms of the contract (e.g., the gaming device is eligible for contract play in accordance with the contract and play of the gaming device complies with one or more the terms of the contract). The data may be stored, for example, in a memory of the device that is monitoring play of the gaming device (e.g., computer 110). For example, computer 110 may, upon receiving the contract initiation signal in Step 1410, open a record in a database used to track sessions associated with contract and / or access the appropriate record of a purchased contracts database based on the contract identifier associated with the subject contract. The data determined based on the play of the gaming device may thus be stored in such a record.

As stated, in some embodiments, a player may establish a contract, approach an eligible gaming device, and indicate a desire to initiate contract play associated with a contract identifier (e.g., the player inserts a contract card into a card reader). Accordingly, a controller (e.g., computer 110) in communication with a gaming device and / or peripheral device may store data (e.g., game play data) associated with a contract identifier.

For example, turning to Fig. 11 and record R1100-3 thereof in particular, a player P-000165 may have been provided with a contract card associated with a contract identified as C-000003. The contract may entitle the player to receive a 100% refund of any incurred losses between 9 a.m. and 3 p.m., provided the player pays an up-front, flat contract fee of $40 and maintains a rate of play of at least 500 game plays per hour. The player may then approach a 25¢-denomination five-reel, video slot machine and insert the contract card into a card reader. The player may then establish a credit balance (e.g., the player deposits a $20 via a bill acceptor device) and begin to gamble. For example, before spinning the reels, the player may activate nine paylines at a cost of 25¢ each, thus establishing a wager amount of $2.25 (i.e., nine credits) in association with the game play. The reels may then spin, and resolve to an outcome of "lime-lime-lime-plum-bell," yielding a payout of $1.00 (i.e., payout amount) associated with the game play. Thus, a loss amount associated with the game play may be $1.25 (i.e., the payout amount subtracted from the wager amount). Play may

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continue in this manner for some period of time, such that a controller may track a wager amount, payout amount and / or win/loss amount associated with each game play. Such data may then be stored in a database in association with the contract identifier. For example, in one embodiment, a controller may store a "total wager," "total win" and "total loss" associated with a gaming contract (e.g., the controller sums data associated with a plurality of game plays, as is depicted by Fig. 11).

Additionally, a controller may determine a "period remaining" associated with a contract, based on the data determined and / or stored in Step 1415. For example, in one embodiment, a contract may define a total period of time a certain number of hours (e.g., six hours of game play). Thus, in one embodiment, upon receiving a contract initiation signal (e.g., a player inserts a contract card), a controller may decrement (e.g., continuously, periodically, in response to a passage of a unit of time or an initiation of a game play, as appropriate) the time played from the total period of time, thereby determining a "period remaining" for a contract. Such a period remaining may be stored in an appropriate record of a database (e.g., a record for tracking a player's play in accordance with the subject contract) in accordance with the time elapsed. Further, in one or more embodiments, a controller may be programmed to determine a contract play termination signal (e.g., the player's removal of a contract card from a card reader device in communication with a controller), as described below with respect to step 1420. Accordingly, in one example, if a period of time defined by a contract comprises a certain number of hours, and a player removes a contract card from a card reader, the controller may no longer decrement a period remaining in an appropriate record of a database (e.g., the appropriate record of the purchase contracts database 1100) in accordance with the time elapsed. In this manner, a player may (i) insert a contract card and initiate a number of game plays associated with contract play at a first gaming device, (ii) remove the card such that a period remaining record is no longer decremented, (iii) re-insert the card at a second gaming device (e.g., a second contract initiation signal is received) and continue game play associated with a gaming contract (e.g., a player may move from slot machine to slot machine, without the time spent traveling between devices being held against him).

In another embodiment, a period of time defined by a contract may define a period of time that is a certain time period during one or more particular days (e.g., a contract period is August 31, 2004 between 9 a.m. and 3 p.m.). In one such example, a controller may decrement a "period remaining" record of a contract database as the end of the period approaches (e.g., "2 hours, 10 minutes" remain before 3 p.m.). In a further embodiment, a period of time defined by a contract may comprise a number of game plays (e.g., 1,000 game plays), in which case a controller may decrement a number of game plays remaining as a player associated with the contract participates in game plays covered by the contract. In another embodiment, a period of time defined by a

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contract may comprise a number of hours within a range of hours (e.g., two hours between 9 a.m. and 2 p.m.). Accordingly, a controller may decrement a period remaining record of a database in accordance with each game play covered under the contract and occurring during the period between 9am and 2pm.

It should be noted that, in some embodiments, a player may have entered into a contract that is active, but may participate in one or more game plays that are not associated with the contract (e.g., a controller may determine "non-contract play" associated with a player, such that inapplicable game plays may not be decremented from a period remaining record of a contract database and the player's participating in the game plays not covered under the contract does not aid the player in qualifying for or otherwise earning a benefit defined by the contract). For example, in one embodiment, a player may approach a gaming device and insert a player tracking card instead of a contract card. Thus, any play that occurs while the player tracking card is inserted may not count towards the player qualifying for or otherwise earning a benefit under the contract. In another embodiment, upon a player inserting a player tracking card into a gaming device it may be determine that the player is associated with an active contract and that the gaming device is eligible for contract play in accordance with the contract. Accordingly, the player may be queried (e.g., via an output device of the gaming device or a component thereof) whether the player would like to have the game play the player participates in on the gaming device be covered under the contract. In one embodiment, such a player may have an option to designate one or more game plays as covered under the contract at any time while playing the gaming device.

It should be noted that an identified player associated with an active contract (e.g., as indicated by a player database) who attempts to initiate a game play without indicating that the play of the gaming device is to be covered under the active contract (or who indicates that the play of the gaming device is not to be covered under the active contract) may receive a warning message via any of the output devices described herein (e.g., "Your losses will not be covered. Are you sure you'd like to continue?", if the benefit defined by the contract is a refund of losses).

In some embodiments, a controller or other device may store a wager, payout and / or win/loss data associated with each game play associated with a contract. For example, a database may comprise a "game play-by-game play" record of wager, win and / or loss data for each game play completed under a contract. In one such embodiment, a controller or other device may also store outcome data, gaming device data and / or time data in association with each game play (e.g., the outcome "cherry-cherry-cherry" was achieved on gaming device D-000192 at 3:10 p.m. on August 31, 2004), irrespective of whether the game play is determined at the time to be associated

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with or covered by a contract. Such data may subsequently be accessed, for example, to determine whether a player has complied with one or more terms of a contract and / or earned or otherwise qualified for a benefit defined by a contract. Thus, in an alternate embodiment, one or more records of a database used for storing game data for game plays completed on one or more gaming devices may store the following example information for each game play (wherein each game play may or may not be associated with a particular gaming contract):

DEVICE	TIME	OUTCOME	WAGER	PAYOUT
D-000192	3:10	Ch-ch-ch	$1.50	$10.00
D-000192	3:11	Pl-pl-bar	$1.50	$0.00

It should be noted that such game play-by-game play records may be used in Step 1140, described below, in determining whether a benefit is due to a player in accordance with a contract. Such data may also be used when printing a contract receipt, such as the example one illustrated in FIG. 13.

As stated, in some embodiments, an incremental contract fee may be associated with a contract (e.g., a player is charged 1¢ for every 25¢ wagered). Thus, in some embodiments, step 1415 (or an additional and distinct step of process 1400) may comprise assessing or determining an incremental fee to be paid by a player. As described, this may be done in a variety of manners. For example, in one embodiment, a player may establish a debit account balance from which incremental fees may be deducted (e.g., a controller tracks wagering activity associated with a contract, such that 1¢ is deducted from an associated account in accordance with every 25¢ wagered). In another embodiment, incremental contract fees may be charged to a player's credit card (though it should be noted that, in some embodiments, it may be preferable to wait and "batch" such charges at once). In an alternate embodiment, a player may provide an incremental contract fee via a gaming device (e.g., during contract play, each payline of a 5¢-denomination slot machine costs 10¢ to activate).

In some embodiments, a player may be provided with a "contract status update." Accordingly, Step 1420 (or another distinct step of process 1400) may comprise outputting a contract status update to a player. A contract status update may comprise, for example, an indication of the status of a player's compliance with one or more terms of a contract, a status of a current value of a benefit earned by a player in accordance with a contract, and / or a status of a player's progress in earning or otherwise qualifying for a benefit defined by a contract. In one or

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more embodiments, a contract status update may be output to a player in response to a player's request for such an update. In another embodiment, a contract status update may be output continuously, substantially continuously, periodically, in response to one or more qualifying events, or on another basis. A contract status update may be provided, for example, via a gaming device or component thereof (e.g., computer 110 may direct a player tracking device to output the contract status update), a contract kiosk, casino personnel, a smart card, a Web site, or via another appropriate and / or desirable means. In one embodiment, a contract card may comprise one or more input devices (e.g., a "check status button") and / or output devices (e.g., a small LED display screen), such that the card may be configured to output contract status updates.

As described, in one embodiment a player may proactively request a contract status update. For example, a player may request a contract status update in a variety of manners (e.g., actuating an input device of a gaming device or kiosk, dialing in to an IVRU, asking a casino representative, etc). For example, in one embodiment, a player may check the status of a contract by inserting a contract card into a kiosk and selecting "See My Contract Status."

As also described, in other, "passive", embodiments, a player may be provided with a status update without proactively requesting an update. For example, a display device in communication with a controller, but affixed to a gaming device (e.g., an LED screen of a player tracking card reader device), may periodically (or on another basis) output a contract status update message.

In various embodiments, a contract status update may comprise a variety of contract terms and the status thereof and / or other data, including but not limited to (i) "period remaining" data, such that a player may learn how much time and / or how many game plays remain in association with the subject contract (e.g., a display indicates "35 minutes remaining"); (ii) contract fee data, such that a player may learn of any incremental fees that have accrued in association with the subject contract (e.g., an IVRU indicates "You have totaled $5.87 in contract fees thus far"); (iii) loss data, such that a player may learn of any losses that a player has incurred during contract play (e.g., a representative accesses contract data using a casino personnel device, and tells the player "You've accumulated $105.40 in losses so far"); (iv) refund data, such that a player may learn of any refund amount which may be due to a player (e.g., a controller multiplies a loss amount by a refund rate, and determines that $45.70 is to be refunded to the customer); and so on.

In one or more embodiments, Step 1420 (or another distinct step of process 1400) may comprise determining whether a player is in compliance with one or more terms of a gaming contract. For example, it may be determined, based on game play data, whether a game play a

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player has initiated, has requested to initiate, or has completed, complies with one or more play requirements or play restrictions defined by the subject contract. As described, in some embodiments, one or more play requirements or play restrictions may be associated with a contract. For example, in one embodiment, a play restriction comprises a maximum wager amount associated with each game play initiated during contract play (e.g., a player must not bet more than 50¢ each time he spins a slot machine). Accordingly, in some embodiments, a controller or another device may be operable to (i) determine a play restriction associated with a contract, (ii) determine whether or not a player is in compliance with the play restriction, and if not (iii) output a "play restriction noncompliance warning." Continuing with the above example, a player who then activates three 25¢-denomination slot machine paylines (e.g., establishes a wager amount of 75¢ associated with a game play, which is greater than the 50¢ maximum as indicated by the contract) and presses "spin" may be prompted with a noncompliance warning via any of the output devices described herein (e.g., a gaming device display screen indicates: "Warning! You are wagering more than is covered by your contract! Any losses you incur for this game play will not be eligible for a refund. Would you like to continue anyway?"). In an alternate embodiment, a player who is not in compliance with a play restriction of a contract may not be permitted to play a gaming device and / or to initiate the game play that would cause the player to not be in compliance with the contract.

Referring now to Step 1420, it is determined whether a contract play termination signal has been received. This determination may comprise, for example, determining whether a player and / or gaming device has caused a signal to be transmitted to the controller or other device monitoring play of the gaming device, the signal indicating a termination of play of the gaming device in accordance with the contract. For example, in one embodiment a contract play termination signal may comprise a signal that a player has removed a contract card and / or a player tracking card from the gaming device. In another example, a contract play termination signal may comprise a signal that the player has indicated that game plays initiated on the gaming device are no longer to count towards the player satisfying the requirements of the contract (e.g., unless and until the player indicates otherwise). In yet another example, a contract play termination signal may comprise a signal that the player has moved away from a proximity of the gaming device (e.g. based on data determined by a proximity, motion and/ or weight sensor associated with the gaming device) or has otherwise discontinued play of the gaming device or play of the gaming device in accordance with the contract.

It should be noted that, in some embodiments in which a gaming device is completely or relatively passive in aiding a controller to monitor play of the gaming device in accordance with a contract, a contract termination signal may not be received from the gaming device. Rather, the

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controller or other device monitoring play of the gaming device may determine that contract play has been terminated at the gaming device by determining one or more of (i) determining that a contract and / or player card has been removed from the gaming device; (ii) determining that a player has indicated to a casino attendant that the player no longer desires to have play of the gaming device covered by the contract; and / or (iii) determining that the player has moved away from the gaming device or otherwise discontinued play of the gaming device completely or at least in accordance with the contract. In such an embodiment, Step 1420 may comprise determining, from data obtained from the gaming device, that play of the gaming device in accordance with the contract has been terminated.

In one embodiment, a player may (i) insert a contract card, (ii) initiate a number of game plays pursuant to contract play, and (iii) leave a gaming device, but forget to remove a contract card. In some embodiments, a controller or other device may be operable to detect such "breaks in play" (e.g., periods of time during which a contract card is inserted during which no game plays have been initiated). For example, a contract card may be inserted at 5:05 p.m. A player may then play a number of game plays, the last of which occurs at 5:23 p.m. If the contract card then sits idle in the reader for a predetermined period of time (e.g., the player leaves, forgets his card, and doesn't come back for more than 10 minutes), a controller may determine that only the period of time during which the gaming device was not idle may count toward the contract (e.g., a period remaining field of a contract database is decremented by only 18 minutes, the time span from when the player inserted the card until the last game play was initiated).

If it is determined in Step 1420 that a contract play termination signal has been received, the process continues to Step 1430. Otherwise, the process continues to Step 1425.

Referring now to Step 1425, it is determined whether an end of a period of time defined by the contract has occurred. For example, it may be determined whether a maximum units of time defined by the contract have occurred (e.g., the contract defines a period of two (2) hours and the player has completed two (2) hours of play under the terms of the contract). In another example, it may be determined whether a maximum number of game plays defined by the contract have been completed in accordance with the contract. In yet another example, it may be determined whether an ending time defined by the contract (e.g., 2 p.m. on July 01, 2005) is a current time. In one embodiment, determining that a period of time defined by the contract has ended may comprise, for example, informing the player associated with the contract of this determination (e.g., causing a gaming device to output a message informing the player that no more game plays will be covered by the contract because the period of time defined by the contract has ended). In one embodiments,

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determining that a period of time defined by the contract may further comprise causing play of the gaming device to be paused, ended or otherwise interrupted (e.g., so as to inform the player that subsequent play of the gaming device is no longer covered by the contract).

It should be noted that, in one embodiment, a gaming device may be operable to determine that a period of time defined by a contract has ended and transmit a contract play termination signal based upon such a determination. In such an embodiment, Steps 1420 and 1425 may effectively be combined and / or performed by different devices (e.g., Step 1425 is performed by a gaming device and prior to Step 1420, while Step 1420 is performed by a controller). It should again be emphasized that the steps of process 1400 (or of any other process described herein) may be performed in an order different from that described, as is practicable, convenient and / or desirable.

If it is determined, in Step 1425, that a period of time defined by the subject contract has not ended, the process 1400 returns to Step 1415, in which data associated with play of the gaming device is stored. Otherwise, the process 1400 continues to Step 1430.

It should be noted that Steps 1430, 1435, 1440 and 1445 may be considered a "reconciliation process" for a contract and, in some embodiments, may be performed as a subroutine distinct from the remainder of process 1400. For example, while one or more of the Steps 1430, 1435, 1440 and 1445 may be performed by a contract kiosk 140 or a contract server, the remainder of process 1400 may be performed by computer 110. A reconciliation process (e.g., a process via which a contract is reconciled) may comprise, for example, a process via which it is determined (i) whether a player has complied with a contract such that a player has qualified for or otherwise earned a benefit defined by the contract; (ii) what the value, if any, is of a benefit to be provided to a player as a result of complying with the terms of the contract; (iii) providing the player with the benefit; and / or (iv) obtaining or attempting to obtain any contract fee or other consideration due from a player in exchange for the contract, if such fee or other consideration has not yet been obtained or has not been attempted to be obtained.

In one embodiment, a reconciliation of a contract may be initiated by a player. For example, a player approaches a casino booth, casino attendant and / or contract kiosk and requests a benefit defined by the contract (e.g., refund amount), thereby requesting reconciliation of the contract. In another embodiment, a reconciliation of a contract may be initiated by a device (e.g., computer 110, kiosk 140) in response to an occurrence of one or more predetermined events. For example, the device may reconcile all contracts every night at midnight or may reconcile each contract as contract play under the contract is terminated and / or a period of time defined by the contract is determined to have ended.

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In some embodiments, reconciling a contract may comprise providing a refund or other benefit based at least in part on the data stored during Step 1415. In general, it may be advantageous to record the refund that is due as a debt, an account payable, or in another form that is readily managed by known accounting systems (e.g., which a casino uses) and / or advantageous to a casino or other entity.

In one example, a player may provide a credit card to purchase a contract with an associated refund rate of 75% and a contract fee of $50. Thus, in some embodiments, a $50 charge may be pre-authorized (or "frozen") in association with the player's credit card, as is known in the art (e.g., $50 in funds are reserved against the card's credit limit, though this may not be the amount that is ultimately charged). After it is determined that a period of time defined by the contract is determined to have ended, it may be determined that the player has accumulated $85 in losses. Accordingly, the player may then approach a contract kiosk 140, insert a contract card, and be presented with a menu of options (e.g., "Purchase a contract extension," "Review your contract," "Settle your contract and receive a receipt"), from which the player may elect to reconcile a contract (e.g., the player selects "Settle your contract"). Thus, as the player may be entitled to a refund amount of $63.75 (i.e., 75% of $85), the player's credit card may be charged $13.75, (e.g., the refund amount owed to the customer minus the $50 contract fee). It should be noted that, in an alternate embodiment, a player may be provided with a refund amount in cash (e.g., a kiosk outputs $63.75 in cash via a benefit output device), while the player's credit card may be charged the contract fee amount (e.g., $50 is charged to the player's credit card).

In yet another example of reconciling a contract, a player may establish an $80 balance in a financial account associated with a contract. The contract may allow the player to receive a 100% refund on any losses incurred over the course of a 12 hours of game play, and a contract fee associated with the contract may decrement the financial account balance by $1 every 150 game plays. Thus, the player may have initiated 9,435 game plays, totaling $62 in contract fees which may be decremented against the account balance (i.e., leaving the player with an $18 account balance). The player may have also accumulated $302.40 in losses during contract play. Accordingly, once the period of time defined by the contract is determined to have ended (e.g., and a display device of a card reader device outputs a "contract complete" indication to the player after 12 hours of play are complete), the player may dial-in to an IVRU operable to facilitate one or more embodiments, and be provided with a menu of options (e.g., "Press '1' to reconcile your contract, press '2' to extend your contract..."), such that the player may indicate a desire to reconcile a contract (e.g., the player presses the appropriate button of a cellular phone keypad). Accordingly, an IVRU in communication with a controller may indicate that a casino representative must be

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dispatched to a particular location on the casino floor (e.g., to a particular gaming device, as identifier by the player when prompted by the IVRU). Thus, a representative may approach the player, and provide a payment of $320.40 (i.e., the refund amount plus the remaining financial account balance), as well as a receipt therefore.

In some embodiments, a player must confirm or acknowledge that the player has received a refund amount. For example, a contract receipt (e.g., such as the example one illustrated in FIG. 13) may require that a player sign to acknowledge receipt of payment and a copy of the signed receipt may be collected by the casino.

Further, in some embodiments, providing a refund amount to a player may comprise updating casino accounting data so as to reflect the payment (e.g., a debit of $53.05 from a casino account is marked as being paid to player P-000529 pursuant to a refund associated with gaming contract C-011245).

Further still, in some embodiments, upon the ending of a period of time defined by a contract, a player may be provided with a "contract period complete" message. Such a message may be output via any of the output devices described herein.

Still further, in one embodiment, a third party may process the management and payment of refunds or provision of other benefits defined by a contract. For example, a third party may (i) determine a refund amount due to a player, (ii) pay the player the refund amount, and / or (iii) charge the casino/operator for the refund amount. Such an embodiment may be advantageous in freeing the casino from the associated operating overhead of managing payment of refunds.

Referring now to Step 1430, it is determined whether the data stored in Step 1415 indicates compliance with the subject contract. Such a determination may comprise, for example, determining one or more terms of the contract (e.g., play requirements or play restrictions defined by the contract) and determining, based on the stored data, whether the one or more terms have been satisfied. For example, if a player requirement specifies a minimum acceptable rate of play, determining compliance with the contract may comprise calculating a rate of play achieved and / or maintained by the player while participating in game plays covered by the contract and determining whether the calculated rate is at least the minimum acceptable rate.

It should be noted that, in one embodiment, a determination of compliance with a contract may be performed during a period of time defined by the contract and / or prior to receiving a contract play termination signal, in lieu of or in addition to being performed after a period of time

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defined by the contract is determined to have ended and / or a contract play termination signal is determined to have been received. For example, while game play data is being determined and stored in Step 1415, the data may be analyzed and compared to the terms of the subject contract (e.g., in a continuous, substantially continuous, or periodic manner) to determine whether the player is complying with the terms of the contract. Accordingly, Step 1430 may be performed earlier in process 1400 than is depicted.

If it is determined, in Step 1430, that the contract has not been complied with, process 1400 continues to Step 1430, in which step an indication of non-compliance with the contract is stored (e.g., in a database, such as the purchased contracts database depicted in FIG. 11). Additionally, a message informing the player of the determined non-compliance (and, for example, the reasons therefore) may be output to the player. If, on the other hand, it is determined that the contract has been complied with, the process 1400 continues to Step 1440.

In step 1440 it is determined whether a benefit is due to a player associated with the contract. For example, if the determination of compliance with the contract has been performed prior to an ending of a period of time defined by the contract (e.g., the determination of compliance was performed during the period of time) and the contract specifies that the benefit is to be provided at the end of the period of time, it may be determined that a benefit is not yet due to the player. If it is determined that a benefit is not yet due, the process 1400 ends (Step 1450). Otherwise, the process 1400 continues to step 1445.

In Step 1445, the benefit due to the player is provided to the player. Providing the benefit to the player may comprise, for example, authorizing a device and / or casino personnel to provide the benefit to the player. For example, if the benefit comprises a monetary amount, a device (e.g., contract kiosk or gaming device) may be directed to dispense an appropriate amount of cash or coins or a cashless gaming receipt redeemable for the appropriate amount of cash. In another example, if a benefit comprises an amount of comp points to be awarded to a player, a device (e.g., computer 110) may cause the appropriate amount of comp points to be added to an account of comp points associated with the player. In yet another example, if a benefit comprises a discount or gift certificate to a retail establishment (such that a player may receive goods and / or services by providing such a gift certificate or voucher), providing the benefit may comprise printing or otherwise providing an instrument entitling the player to the discount or appropriate gift certificate amount. Other manners of providing a benefit would be understood by one of ordinary skill in the art upon reading the present disclosure.

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In one embodiment, providing the benefit to the player may comprise determining a value of a benefit to be provided to the player. Determining a value of a benefit to be provided to the player is described in more detail below with respect to Step 1540 of process 1500.

It should be emphasized again that in one or more embodiments, a benefit may be provided to a player during a period of time defined by a contract (e.g., a number of comp points may be earned by the player and added to an account of comp points associated with the player, a feature of a gaming device is to be activate, a gaming device is authorized and / or directed to allow a player to continue gambling even though a credit meter balance of the gaming device has been depleted below a predetermined level, etc.).

Referring now to FIG. 15, illustrated therein is a flowchart of a process 1500 that is consistent with one or more embodiments encompassed by the present description. The process 1500 illustrates various uses of the various databases described herein. Process 1500 may be performed, for example, by computer 110 that is monitoring activity at gaming devices in order to, among other things, gather data for purposes of determining whether players have earned or otherwise qualified for benefits defined by contracts entered into by the players. It should be noted that, as is true for all processes described herein, a first portion of process 1500 may be performed by a first device (e.g., computer 110) while a second portion of the process 1500 may be performed by a second device (e.g., contract kiosk 140).

Referring now to Step 1505, a determination is made as to whether game play has been initiated at a gaming device. This determination may be made based on, for example, a signal received from a gaming device and / or based on monitoring activity at the gaming device. Determining that game play has been initiated at a gaming device may comprise determining, for example, (i) that a credit meter balance has been established at a gaming device, (ii) that a start button has been actuated or handle has been pulled at the gaming device, (iii) that a player identifier and / or contract identifier has been inserted into the gaming device, (iv) that the presence of a player has been detected within proximity to the gaming device, and / or (v) that a player has begun configuring the gaming device to his preferences. It should be noted that determining that game play has been initiated does not necessarily mean that a particular game play has yet been initiated but may merely indicate that it appears as if a player intends to shortly initiate a particular game play.

In Step 1510 it is determined whether a contract identifier has been received at the gaming device. This determination may comprise, for example, determining whether a player has keyed in a contract identifier to a keyboard of the gaming device, has inserted an instrument (e.g., paper

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receipt bearing machine readable indicia, contract card, player identifier associated with an active contract, etc.) indicating the contract identifier into the gaming device, has spoken the contract identifier into the gaming device, or has otherwise indicated a contract identifier to the gaming device. An indication being received by or input into a gaming device encompasses, of course, the indication being received by or input into a component of the gaming device.

If it is determined that a contract identifier has not been received, the process 1500 ends (process 1515). Otherwise, the process 1500 continues to step 1520.

In Step 1520 it is determined whether the contract associated with the contract identifier applies to the current play of the gaming device (e.g., whether play of the gaming device is covered under the contract). For example, it may be determined (i) whether play of the gaming device would potentially satisfy a play requirement defined by the contract, (ii) whether the gaming device is eligible for contract play in accordance with the contract, and / or (iii) whether a period of time defined by the contract has not yet expired. If these example determinations (or other appropriate determinations) are answered in the affirmative, it may be determined that the contract is applicable to the current play of the gaming device and the process 1500 may continue to step 1530. Otherwise the process 1535 may continue to Step 1535, wherein a warning message may be output to the player (e.g., computer 110 directs the gaming device to output the message), informing the player that play of the gaming device will not be covered under the contract and thus the player may not earn or otherwise qualify for the benefit defined by the contract by playing the gaming device.

In Step 1530, data associated with play of the gaming device is determined. Determining the data may comprise, for example, receiving data associated with one or more game plays initiated and / or completed at the gaming device (e.g., wager posted, outcomes and / or payout received, time each game play is initiated, etc.) and / or determining such data by monitoring the events at the gaming device. Determining such data may further comprise storing such data. Many manners of determining (e.g., monitoring, receiving, storing, etc.) data associated with play of a gaming device have been described with respect to Step 1415 of process 1400, above, and will be described with respect to Step 1605 of process 1600, below. These descriptions are equally applicable to Step 1530 and need not be repeated herein for purposes of brevity.

In some embodiments, Step 1530 may further comprise analyzing such data to determine whether the player is satisfying one or more play requirements defined by the contract, whether a period of time defined by the contract has ended, and / or to determine another piece of information relevant to the contract. In other embodiments, determining the data may not involve any analysis of the data during Step 1530.

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In Step 1535 it is determine whether a benefit is due to a player associated with the contract play of the gaming device for which data is being determined in Step 1535. For example, it may be determined whether a player has earned or otherwise qualified for the benefit defined by the contract. As described, in one or more embodiments, a benefit may be provided to a player while the player is participating in game plays covered by the contract and before a period of time defined by the contract has ended. For example, assume a benefit defined by the contract entitles the player to complete 500 game plays in exchange for a single pre-payment of a predetermined amount (e.g., $20.00) and irrespective of whether the credit meter balance of a gaming device on which the player is participating in the game plays is depleted below a predetermined level. In such an example, Step 1535 may comprise determining whether the credit meter balance has been depleted below the predetermined level and, if so, whether the player has any game plays remaining to be completed under the terms of the contract. If so, an additional amount of credits may be added to the credit meter balance of the gaming device (e.g., by computer 110), without requiring payment therefore from the player, and / or the gaming device may be authorized to allow the player to continue posting wagers and track the posted wagers by continuing to subtract them from the credit meter balance and allowing the credit meter balance to reflect an amount less than zero. In another example, a benefit defined by a contract may comprise an earning of comp points at an accelerated rate and / or access to a bonus round or other feature of the gaming device that would not otherwise be accessible to the player (e.g., without providing additional payment therefore or not at all). In such an example, determining whether the benefit is due to the player may comprise determining whether the player has satisfied the play requirements defined by the contract such that the appropriate amount of comp points (calculated at the accelerated rate) should be added to the player's comp point account and / or whether the player should be granted access to the bonus round or other feature of the gaming device.

If it is determined, in Step 1535, that a benefit is not due, the process 1500 continues to Step 1550. Otherwise, the process 1500 continues to Step 1540, in which the benefit due to the player is determined. Determining the benefit may comprise, for example, calculating a value of the benefit (e.g., calculating a number of comp points to be provided to the player, calculating a monetary amount to be provided to the player, calculating an amount of free additional game plays to be provided to the player, etc.). This may comprise, for example, retrieving a formula from a memory (e.g., the formula may be stored in an available contracts database or a purchased contracts database, which may be accessed based on the contract identifier and using the formula to determine the value of the benefit. In other embodiments, the value of the benefit may be static and not dynamic (e.g., the value of the benefit is predetermined and does not vary based on any behavior or activity of the player). In such an embodiment, determining the benefit may simply

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comprise determining the nature and value of the benefit based on data stored in memory (e.g., by retrieving it from an available contracts database or a purchased contracts database, based on the contract identifier).

In step 1545, the benefit is provided to the player. Providing the benefit may comprise, for example, causing the gaming device to provide the benefit to the player (e.g., causing the gaming device to activate a feature, causing the gaming device to add credits to the credit meter balance, causing the gaming device to dispense a cashless gaming receipt, coins and / or tokens, etc.). In another example, providing the benefit may comprise crediting an account (e.g., a financial account, a comp point account, an account of accumulated free game plays, etc.) associated with the player and causing the gaming device to inform the player of the provided benefit. In yet another example, providing the benefit may comprise directing a casino attendant to approach the player and provide the benefit to the player. Many other manners of providing a benefit have been described with respect to Step 1445 of process 1400, are equally applicable herein and need not be repeated herein for purposes of brevity.

Once the benefit has been provided, process 1500 continues to Step 1550. In Step 1550 it is determined whether an additional game play has been initiated and / or completed at the gaming device (e.g., while the Steps 1535 – 1545 were being performed and / or since the Step 1530 was last performed). If so, the process 1500 returns to Step 1520, in which it is determined whether the contract is applicable to the game play. Otherwise, the process 1500 ends (Step 1525).

It should be understood that many variations on the above-described embodiments are encompassed by the spirit and scope of the present invention. Some of these variations will now be described.

It should be noted that in some embodiments more than one player identifier may be associated with a contract identifier. For example, two players may together receive a multiplayer contract (e.g., two player identifiers are associated with a single contract identifier, and two contract cards comprising the same contract identifier are issued, one to each of the two players). Accordingly, two or more players may simultaneously engage in contract play (e.g., game plays initiated by either of the two players are associated with contract play). In one embodiment, a game play initiated by two or more players may have a cumulative effect of decrementing a "period remaining" associated with the associated contract. For example, if two players receive a contract defining a period of time comprising eight hours, a first player may insert a contract card into a card reader associated with a first gaming device, and a second player may simultaneously or soon thereafter insert a second contract card into a card reader associated with a second gaming device.

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Each player may then play for 30 minutes with the contract card inserted, such that a "period remaining" record of a purchased contracts database may be decremented by one hour. Further, in some embodiments, other data may be aggregated in association with a contract provided to more than one player (e.g., two or more loss amounts are totaled, two or more wager amounts are totaled, etc.), such that a refund amount may be provided to one or more players (e.g., one player accepts a refund amount on behalf of two players, a first and second player each receive half of a total refund amount, etc.) based on the aggregate of the play data associated with the two players.

In some embodiments, a player may be provided with a "cash advance amount." For example, in one embodiment, a player may have paid $100 to establish a contract entitling the player to receive a 100% refund on all losses incurred by game play between 11 a.m. and 9 p.m. Accordingly, the player may incur a substantial amount of losses before the period of time defined by the contract ends (e.g., by 5 p.m.), such that the player may have spent through a gambling budget. Thus, the player may have no more cash with which to wager, though the player may desire to play further, as the player may be entitled to a 100% refund on all losses (e.g., the player thinks, "Even if I spend more cash, I'll get a refund for it all anyway at the end of the contract, so I can't really lose any more money than the $100 contract fee I spent already"). Accordingly, the player may request a cash advance amount. A request for a cash advance may be received by a variety of entities described previously herein (e.g., gaming devices, kiosks, casino representatives operating computing devices, etc.). In some embodiments, a cash advance may comprise a payment of a refund amount (e.g., or portion thereof) that is already due to a customer. For example, a player may have incurred $200 in losses before a period of time defined by a contract ends. Thus, the player may approach a casino representative or contract kiosk and may receive $200 in cash (e.g., in one embodiment, a cash advance comprises an "early and partial reconciliation" of a contract, such that the player may no longer be entitled to receive a refund for the $200 he was paid). In other embodiments, a player may be loaned a cash advance amount, such that the loan amount may be reflected during a contract reconciliation process described herein (e.g., when a player reconciles a contract, a player owes any contract fees and loan amounts, less any refund amounts due). In some embodiments, a fee may be associated with a cash advance (e.g., $1 per cash advance). In one such embodiment, a cash advance fee amount may agreed upon as a term of a contract (e.g., before a contract is established with the player, the player agrees to pay a $2 fee associated with any cash advance subsequently provided to a player).

In one embodiment, a play restriction may indicate a period of time during which one or more particular gaming devices or type of gaming devices must be played. For example, a play requirement defined by a contract may specify that a first gaming device type (e.g., "Any video poker

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machine") must be played for at least a specified first portion of the period of time defined by the contract (e.g., at least one hour out of four hours defined by the contract), and a second gaming device type (e.g., "Wild West Win Slots") must be played for at least a second specified portion of the period of time defined by the contract (e.g., at least 20 minutes out of the four hours defined by the contract).

In some embodiments, a contract may be valid at more than one gaming establishment. For example, a player may purchase a gaming contract entitling the player to receive a 50% refund on any losses incurred during the month of April at any "Casino XYZ" property. In this manner, the player may gamble at a first property maintained by Casino XYZ on a first day in April, and gamble at a second property maintained by Casino XYZ on a second day in April, and expect to have 50% of all the player's losses refunded.

In another embodiment, a player may purchase a gaming contract from a contract facilitator (e.g., "Gaming Contract Company X"), such that the contract is valid at any indicated properties with which the contract facilitator has partnered (e.g., a player purchases a "Las Vegas Casino Pass" from Gaming Contract Company X). In this manner, various systems (e.g., controllers, kiosks, etc.) that are produced, operated, owned and / or operable to communicate with a device operated by the contract facilitator may be installed in one or more participating casinos.

As described, in some embodiments a controller may be operable to detect various "breaks in play" (e.g., a player leaving a contract card in a card reader device without initiating a game play for a period of time), such that the time which a player is not playing a device may not count against a contract (e.g., a value in a "period remaining" field of a purchased contracts database is not decremented). In one such embodiment, the time a player spends in a "bonus round" or other secondary game may not be counted against a period of time defined by a contract.

As is known in the art, player tracking cards typically provide players with an amount of "complimentary points" based on game play (e.g., a player earns one point for each game play, such that a player may later redeem such points for merchandise or other benefits). In one embodiment of the present invention, a player may earn such traditional "comp points" during contract play. In another embodiment, a player may not earn such traditional comp points during contract play. For example, a player associated with an active contract who desires to earn comp points may be required to insert a traditional player tracking card. Accordingly, a controller may be operable to detect whether a player wishes to play for comp points, or engage in contract play (e.g., depending on the type of card the player inserts into a reader device).

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In some embodiments, a player may receive a "contract extension" that entitles the player to an extension of the period of time defined by the contract. For example, a player may have purchased a contract entitling the player to receive a 100% refund of all losses incurred within six hours of game play. As described previously, after six hours have elapsed (e.g., a "period remaining" field of a purchased contracts database is completely decremented), the period of time defined by the contract may be considered to have ended, such that a player may not receive a refund associated with any further play. Thus, a contract extension may allow a player to receive a longer contract period (e.g., the player gains another hour of play during which any losses will be covered by a 100% refund). A player may be provided with a contract extension in a variety of manners. In one example, a player whose period of time defined by a contract has ended may approach a casino representative and pay a fee (e.g., $10 per hour) to receive a contract extension (e.g., such that the representative uses a computer device in communication with one or more databases of the present invention to update one or more terms associated with the player's contract). In another example, a player may approach a contract kiosk 140 and select an "Add time" option from a menu of options output via a display screen. In some embodiments, a player establishing a contract may select or otherwise be provided with an "automatic extension" option, such that should the period of time defined by the contract end (e.g., the player completes six hours of play), the player may remain eligible to earn a refund amount based on subsequent play initiated after the end of the period of time if the player continues to play. For example, an automatic extension term associated with a contract may stipulate that once an initial period of time defined by a contract has ended, a player may be entitled to one or more "contract extension periods" (e.g., one hour increments of time), with which a "contract extension fee" may be associated (e.g., $10 for the first additional hour, $15 for the second additional hour, etc.). Additionally, similar or different contract terms may be associated with one or more contract extension periods (e.g., a refund rate is 100% during an initial contract period, but falls to 90% during a contract extension period). Thus, in one example, a player may purchase a contract for six hours of play with a 100% refund rate. After the six hours elapse, the player may continue to play (e.g., a contract card remains inserted in a card reader device and the player continues to play even after a "contract period complete" message is output to a player as described). Accordingly, contract data (e.g., game play data) may then be stored in association with (i) the original contract identifier or the initial period of time, and / or (ii) a newly-created contract extension identifier or an additional period of time by which the initial period of time has been extended.

In one embodiment, a player may win a contract extension (e.g., on a random basis and / or in response to certain desirable gambling behavior by the player). For example, a player may be provided with a "bonus contract extension" if certain criteria are met (e.g., a contract extension for

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which no fee is associated). For example, a player may be provided with a "free extra hour" of coverage if the player (i) plays during a certain period of time (e.g., "Play for one hour before 7 a.m., and get an extra hour FREE after 5 p.m."); (ii) maintains a certain rate of play (e.g., "Average more than 600 spins per hour, and get an hour of coverage for FREE"); (iii) wagers a certain amount in association with one or more game plays (e.g., "Wager more than $4000 during your contract and get an hour FREE"), and / or (v) otherwise qualifies for the contract extension.

In accordance with some embodiments, gaming device output device(s) may be configured to output information (e.g., received from the controller and / or contract kiosk) pertaining to one or more statuses (and / or other information) associated with a contract. For example, a gaming device LCD (or other output device) may display information pertaining to the status of a particular contract to an associated player (e.g., based on a player identifier, gaming device identifier and / or contract identifier). Such status information may include, for example, an indication of one or more of the following: (i) an amount of elapsed time or number of elapsed game plays associated with the contract; (ii) an amount of time or number of game plays remaining subject to the contract; (iii) a net present refund amount associated with the contract (e.g., a dollar amount and / or percentage of total session wager or session loss that may be refunded to the player); (iv) net present win/loss associated with the contract; (v) an amount of wager remaining subject to the contract; (vi) an indication of one or more game play parameters required to fulfill the contract; (vii) offers or instructions to renegotiate or reestablish an existing contract; (viii) offers or advertisements outlining other available contracts or contract terms; (ix) the status of another contract (e.g., the status of a wife's contract may be output to her husband at a gaming device associated with the husband's player identifier); (x) information indicating that the terms of a contract have been fulfilled; and / or (xi) information indicating that the player is in breach of one or more terms of a given contract (e.g., a text message indicating "In order to be eligible a loss refund, you may wager only one coin per line").

Such information may be provided and / or updated on a continuous basis (e.g., after each wager or handle pull) and / or periodic basis (e.g., the information may be updated twenty times or at regular intervals over the course of a given contract). Accordingly, players may be apprised of various statuses or other information associated with one or more contract(s) while executing play at a gaming device. Alternatively, the execution of game play may not be necessary in order for a player to inquire or ascertain the status of his or her contract at a gaming device. For example, various functions of a contract kiosk 140 (described above) may be incorporated into that of a gaming device 130, such that a player may utilize a gaming device in order to inquire about and ascertain (e.g., status) information pertaining to a particular contract (e.g., by inputting a contract

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card to a gaming device card reader and actuating an "acquire contract status" button of a gaming device). Further, in some embodiments, status information may be output to a player's cellular phone (e.g., an IVRU may be configured to periodically dial a player's number and output status information) or other device associated with the player (e.g., to an e-mail account associated with the player viewable by a portable computing device). Contract status information may be output at a gaming device via a dual-use output device (e.g., an LCD capable of outputting both a player's current credit balance and various contract status information) and / or via a dedicated output device (e.g., a peripheral device with display screen dedicated to solely outputting contract status information).

In some embodiments, a player may be allowed to indicate whether a game play is to be covered by a contract (e.g., or be used to decrement a period remaining associated with a contract) essentially on a game play-by-game play basis. For example, prior to initiating a particular game play (e.g., if the player is feeling unlucky and has entered into a contract which defined a benefit comprising a refund amount), the player may indicate that this particular game play is to be covered under the contract (e.g., by inserting his contract card or actuating an appropriate button on the gaming device). In such an embodiment, unless the player provides an appropriate indication prior to or at the time of initiating a game play, the game play may not be covered by the contract. In another embodiment, once a player provides an indication that a game play is to be covered under a contract, all subsequently initiated game plays are covered by the contract (if the game plays qualify for coverage under the contract) unless and until the player indicates otherwise.

In some embodiments, a player may be restricted from establishing a contract if the player has previously abused a previously entered contract as determined by a gaming establishment. For example, in some embodiments, a player may initiate a number of game plays that is not consistent with an acceptable manner of play (e.g., a player initiates no game plays during the first several hours of a period of time defined by a contract, then initiates a large amount of game plays during the final 30 minutes). Accordingly, such a player may be "flagged" as a problem player, such that the player is no longer to eligible to enter into a contract and / or no longer eligible to enter into a contract defining a certain contract term. For example, a "problem flag" may appear in association with a player identifier of a player database, and a rule of a player eligibility rules database may indicate that should there be a "problem flag," the player may not be eligible to establish a contract. A process for determining whether a player should be prevented from establishing a contract in the future will now be described in more detail with respect to FIG. 16.

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Referring not to FIG. 16, illustrated therein is a flowchart of an example process 1600 that is consistent with one or more embodiments encompassed by the present description. In general, the process 1600 may be performed in order to avoid or reduce a likelihood of players gaming a casino or other entity via purchase of contracts consistent with the present invention. In another aspect of the embodiments encompassed by the process 1600, the process 1600 may be helpful in determining which types of contracts and / or contract terms a player should be eligible for (or restricted from) in the future.

For example, in accordance with one or more embodiment, apparatus, systems and methods may be provided for monitoring a contract (e.g., an agreement between a player and a casino establishment relating to game play within the casino). In one or more embodiments, one or more devices (e.g., computer 110, a contract kiosk 140, a gaming device 130, and / or a contract server) may be operable to (i) provide a contract associated with a contract identifier (e.g., establish a contract and provide a player a contract card), (ii) receive a contract initiation signal (e.g., detect the insertion of the contract card into an eligible gaming device), (iii) monitor play data associated with the contract identifier (e.g., track actions by the player), and / or (iv) determine whether to prevent the player from purchasing one or more contracts in the future based on the monitored play. Such a system may be advantageous in that contracts may be administered with less risk that a player may intentionally or unintentionally violate the terms or spirit of the contract (e.g., since a player who knows his game play is being monitored for such a purpose may desire avoiding any activity or behavior that may cause the player to be prevented from purchasing a contract in the future).

For example, in one scenario a player may be tempted to "game" a casino via abuse of a contract be removing a player tracking card during certain game plays (e.g., in order to maximize losses incurred under the contract) and / or by inserting a contract card into a gaming device being played by another player (e.g., unbeknownst to the other player), in order to earn a refund based on losses incurred by the other player. The embodiments described with reference to FIG. 16 aim to prevent or at least lessen the likelihood of a player gaming a casino in such a manner.

Referring now to Step 1605, play of a gaming device is monitored by a device (e.g., by a computer 110, contract kiosk, 140, gaming device 130, a contract server). The game play may comprise game play associated with a contract. For example, it may first be determined (e.g., as described with respect to Steps 1405 and 1410 of process 1400 and / or as described with respect to Steps 1505 through 1520) that a contract has been established and that play of the gaming device is covered under the contract. This may comprise, for example, determining that a player of

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the gaming device is engaged in contract play. In one embodiment, monitoring of play of a gaming device may include storing and / or analyzing data associated with the monitored play. It should be noted that monitoring play of a gaming device may comprise monitoring play of several gaming devices (e.g., gaming devices that a player plays consecutively, simultaneously or at various times).

Monitoring the play of the player who is engaged in contract play of a gaming device may be performed in a variety of manners. For example, in one embodiment, a controller or other device may receive game play data from the gaming device and store it in an appropriate record of a database (e.g., a record for recording game play data in association with a particular contract identifier). Such game play data may include:

(i) Outcome achieved (e.g., bar-bar-bell, As Qh Qs 3d 2h in video poker);

(ii) Payout amount (e.g., three coins paid for a pair of jacks or better);

(iii) Wager amount (e.g., player wagered two quarters);

(iv) Game actions (e.g., player drew three cards to a pair of queens, player selected first of three locations in a bonus round selection stage);

(v) Type of gaming device played (e.g., stepper, video poker, five reel video);

(vi) Denomination of gaming device played (e.g., nickel, quarter, dollar);

(vii) Manufacturer of gaming device played;

(viii) Location of gaming device played;

(ix) Rate of play (e.g., number of handle pulls per unit time);

(x) Acceleration of play (e.g., rate of increase or decrease in rate of play);

(xi) Variation in wager amount (e.g., increases or decreases in the amount of the wager over time);

(xii) Player tracking card and / or contract card usage (e.g., is the player frequently removing and re-inserting his player tracking card and / or contract card, has the card been inactive for a long period of time, etc.);

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(xiii) Precision of player strategy (e.g., is the player playing jacks or better 6/9 video poker according to optimum play); and / or

(xiv) Strategy variations (e.g., has the player switched from an optimal video poker strategy to a strategy of sacrificing optimal play to maximize his chances at completing a royal flush).

In one embodiment, Step 1605 includes monitoring of player behavior and / or activities other than game play activity at a gaming device. For example, actions that the player makes while establishing and / or reconciling a contract may be monitored as well.

In one embodiment, the monitoring of play of a gaming device may include comparing a player identification presented when establishing and / or reconciling a contract (e.g., at a slot booth) with identification information stored at a controller. This may be done, for example, to check that the same person who purchased the contract is the person attempting to reconcile the contract and / or who has participated in game plays covered by the contract.

In one embodiment, the monitoring of play need not rely on data received from a gaming device. For example, some or all of the data may stored at a controller (*e.g.*, a slot server) or other device (e.g., contract kiosk). In some embodiments, data related to monitored play may be observed and / or input by casino personnel. Some types of data may be received via a contract kiosk or other type of terminal (*e.g.*, player inputs a contract password at a contract kiosk in order to receive a refund amount defined by a contract).

Data associated with monitored play of a gaming device may be stored in a database (e.g., a player database, a purchased contracts database, and / or another database) or other memory means of a device. A player database, for example, may be accessed in accordance with a particular player identifier or player name (e.g., a casino representative keys-in a player name, swipes a player tracking card through a card-reader device in communication with a casino personnel device, etc.) so as to determine information about the player and / or play by the player.

In Step 1610, a determination is then made as to whether or not the player should be prevented from purchasing or otherwise entering one or more contracts in the future. This determination may be made based on play of the gaming device (and / or other behavior or activities of a player) monitored and / or stored in Step 1605. In one embodiment, determining whether a player should be prevented from purchasing a contract in the future may comprise determining

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