Interface Design & Specification

RVMs and Counting Centres

V1.3 Updates

30th January 2023

Version history:

Version	Date	Author	Summary of changes made
1.0	28/02/2022	CSL IT	First Release
1.1	29/04/2022	CSL IT	Added Bin Emptying receipt API
1.2	09/06/2022	CSL IT	Update to Emptying Receipt API – Shared bin ZeroDeposit code update.
1.3	30/01/2023	CSL IT / RLG	Spec has been updated to support Countining Machines and RVMs. RVM Integration model change - CSL will only support integrating with RVM Vendors central system, not individual RVMs. Simplified Data Format Codes Remove BarcodeType CodeList table - Not used. Changed API Authentication from X.509 certs mutual authenticaton to OAuth 2.0 Added API Response Codes Added Changed all Identifier attributes (E,g. MessageId, SchemeArticleId, ReturnPointerId), to be Alphanumeric with length up to 40 characters to future proof. Changed to Scheme Article Data Attributes– • [Diameter] Changed to [Width] • [GLN] now Optional • Added [BarcodeSticker] indicator

Version	Date	Author	Summary of changes made
			Scheme Article API – removed [changedate] parameter, API will provide latest article list every call. Changed all Boolean types to use true / false rather than 1 or 0 Transaction API Changes • Removed [TransactionId] not required • Changed [CollectionContainerId] to [BagToteId] and moved to Header Message • Changed [RVMIdentifier] to [MachineId] • Changed [ReturnPointId] to [RPid] • Removed TotalRejected. Will ask RVM Vendors for Separate report Emptying Receipt API changes • Changed [ReturnPointId] to [RPid]

Document References:

Version	Document Name	Author	Description
0.1	DRS Platform Interface Security & Authentication	RLG	Describes authentication method for connecting to DRS APIs.

1. DEFINITIONS

Term	Definition
API	Application Programming Interface
CSL	Circularity Scotland Ltd
Count Machine	Industrial RVM used by CSLs operations partner to count the containers returned in bags from manual return points.
DRS	Deposit Return Scheme
EAN	European Article Number
GTIN	Global Trade Item Number
HTTPS	Hypertext Transfer Protocol Secure
IP	Internet Protocol
JSON	JavaScript Object Notation
OAuth2.0	OAuth 2.0, which stands for “Open Authorization”, is a standard designed to allow a website or application to access resources hosted by other web apps on behalf of a user.
REST	Representational state transfer
RLG	Reverse Logistics Group, CSL DRS Core platform provider
RPO	Return Point Operator, (E.g. Retailer), a retailer may have 1 or more Return Points e.g. Stores.
RP	Return Point - The site, i.e Retail store, where an RVM is located.
RVM	Reverse Vending Machine. Owned by an RPO, used by consumers to return containers
Scheme Article	• A drink (regardless of whether sold alone or as a unit in a multipack) • Contained and sold in single use packaging that is made wholly or mainly from PET plastic, glass, steel or aluminium • Sealed and containing at least 50 ml and no more than 3 litres of liquid • First available to be marketed, donated, offered for sale or sold by the producer, on or after the Deposit Return Scheme start date, in Scotland
HTTPS	HyperText Transfer Protocol Secure

2. INTRODUCTION

This document describes the specifications for interfaces required to provide scheme article data to RVMs and counting centres and to receive counting transactions from them.

- Scheme Articles
- Container Transactions
- EmptyingReceipt (RVM Only)

3. TECHNICAL NOTES

Technical Requirements

Each interface is published as a REST-style API call with JSON payload, accessible over the internet via https. Whitelisted IP addresses will be used for additional security.

Interfaces will ordinarily be available 24x7 except for pre-scheduled downtime.

Further elaboration of technical requirements will be needed for detailed design.

Data Formats

All data payloads will be in JSON format. The data format tables in the body of the document are compliant with this by describing a base Object that comprises the data associated with the message. That Object contains data in one of the base JSON types (String, Number, Boolean) or where there is an embedded list, this is included as an Array of Objects. Where it is logical to group items together, a single Object is also embedded.

The data format tables include the JSON type of each attribute and any specific formatting applying to it. These additional format codes are described in the table below.

Code	Description
A	Alphabetical characters only
N	Numerical characters only
AN	Alphanumerical characters
[above code].X	precisely 'X' alpha/numerical characters, where 'X' is the number of characters. Eg. N.3 is 3 numeric characters such as 112.
[above code]..X	Up to 'X' alpha/numerical characters, where 'X' is the number of characters. Eg. AN..3 is 3 alphanumeric characters eg. '1' or '33' or 'AV6' are valid
ISO 8601	Represents Date & Time in ISO 8601 format without UTC relation information (local time). Time Accuracy is Seconds
T/F	Boolean true/false
CodeList	An A.3 with a small set of predefined values.

Reponse Codes

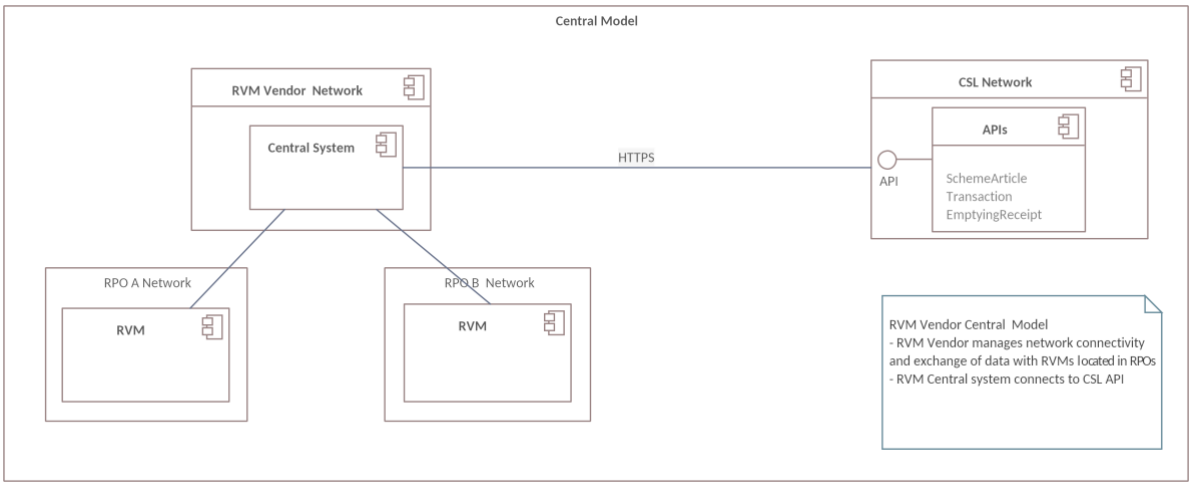
200 **OK:** The request was fulfilled with no error, result in response body.
400 **Bad Request:** Request has bad syntax, or the URL provided doesn't exist
401 **Unauthorised:** Authentication failed (wrong credentials, or token too old)
404 **Not Found:** The server is not able to find the resource. The URI is incorrect, i.e. could be referring to a non-existent endpoint
406 **Not Acceptable:** Accept header missing or invalid: it must be supplied and end with json
500 **Internal Server Error:** The server encountered an unexpected error.

Interface Security

See: *DRS Platform Interface Security & Authentication Specification*

4. RVM INTEGRATION MODEL

- CSL will integrate with an RVM Vendors central system only.
- The RPO is responsible for providing network connectivity between the RVM Device and the RVM Central system.
- The RVM vendors central system is responsible for communicating with the RVM(s) installed at RPO Return Point location(s).
- The RVM Vendor will work with CSL to establish secure network connectivity between systems.
- It is acceptable for both RVM Monitoring and transaction data to use this connection.
- The RVM vendor will integrate their central system with CSL APIs over the Internet using a secure communication based on HTTPS



4.1 Central System Integration Diagram

5. Code Lists

PackageType

Code	Description
01	Bottle
02	Can

DepositCode

Code	Description
100	20p deposit
101	No deposit

MaterialTreatment

Code	Description
01	Compactor must be used
02	Material must not be compacted
03	Broken – specific for glass

MaterialType

Code	Description
01	Polyethylene terephthalate (PET)
40	Steel
41	Aluminium
73	Glass

MaterialColour

Relating Counting Machine and used for MaterialType PET.

Code	Description
01	Natural and light blue
99	All other colours

Source

Code	Description
01	Counting Machine
02	RVM

ProcessResult

Counting Machine Only

Code	Description
01	Refundable – Articles with deposit
02	Non-refundable – Articles known (provided on INT-008) but Deposit = 0 or Start Date > today(), Scheme Product = F, Suspend = T
03	Unknown – Barcode was readable, but never added to INT-008
04	Not Readable – Number of articles without barcode or barcode damaged and not readable

PaymentMethod

RVM Only

Code	Description
VCH	Voucher - Cash,
ELE	Electronic payment - Cash
VNC	Voucher Non-Cash
CHR	Charity Donation
LOY	Loyalty Card / Points

6. INT-008 Provide Scheme Articles

Business Process Context

The Scheme Article interface provides a list of approved Scheme Articles that a RVM or Counting Machine uses to validate against to ensure containers are part of the scheme and the count is made correctly.

The source data is populated from Producers populating the DRS system with details of their Scheme Articles and a subsequent internal quality check and approval. It is expected to always provision a full article list rather than incremental.

Summary

Formal Name	SchemeArticles
Frequency	Called by counting machines and RVMs daily
Publisher	DRS
Consumers	Counting Centres, RVM Vendors
HTTP Verb	GET
REST Parameters	none

REST Header

Attribute Name	JSON Type	Format	Required	Description
Version	String	AN	M	Version of the Message being used. Format v1.0
DateTime	String	ISO 8601	M	Date & Time that the message was sent.
MessageId	String	AN..40	M	Message Identifier

Scheme Article (Array of Objects)

M = Mandatory, O = Optional, C = Conditional

Attribute Name	JSON Type	Format	Required	Description
SchemeArticleId	String	AN..40	M	Unique identifier for the product. Barcode EAN-13, EAN-8, plus potential for 2D barcode.
BarcodeSticker	Boolean	T/F	O	Used to identify if a scheme article has a barcode printed on a sticker. Will mainly be used for Specialist Wine bottles produced at low volume.
GLN	Number	N..13	O	Global Location Number (GLN) of the scheme article producer. GLN is provided by GS1. As GS1 barcodes are mandated all Producer should have a GLN.
SchemeProduct	Boolean	T/F	M	True if the product is included in the scheme. An RPO can choose to accept a non-scheme articles or Not. The RVM Vendor

				should use this attribute to filter out non-scheme articles for the RPO
PackageType	String	CodeList	M	Denotes the container type - e.g. Bottle, Can. See PackageType Code list table
Description	String	AN..20	M	Description of the product. Format: Brand, Sub-Brand (if applicable), Functional Name, Variant and Net Content/Volume
ShortDescription	String	AN..12	O	Short description e.g. voucher print
DepositCode	String	CodeList	M	Amount of deposit associated to the package type. E.g. 20p for Scotland.
Logo	Boolean	T/F	O	Indicates that the container has a DRS logo and must be used as part of the recognition methods.
MaterialTreatment	String	CodeList	M	Describes the treatment of a container by an RVM e.g. should it be compacted or not by an RVM. CSL will determine how this attribute is populated based on Rules. E.g. PET & Metal will be compacted, Glass will be naturally broken See See MaterialTreatmentType list table
Weight	Number	N	M	Weight (g) of the container without liquid measured in grammes.
Height	Number	N	M	Height (mm) of the container including cap
MaterialType	String	CodeList	M	Material type, (AKA Fraction), of the Container – e.g. Glass, PET, Aluminium, Steel. See: MaterialType list table
Volume	Number	N	M	Volume (ml) / Net Content of the Product. Valid size between 50 ml to 3 Litre
Width	Number	N	M	Width (mm) of the Container
StartDate	String	ISO 8601	M	The date the scheme packaging becomes active in the DRS system.
MaterialColour	String	CodeList	C	The item colour Required for Counting Machines. Not required RVMs.
Shape	Boolean	T/F	M	Indicates if Shape Silhouette must be used. Each RVM vendor will calculate the shape Silhouette profile using their own RVM.
Suspend	Boolean	T/F	M	Indicates if a container should be temporarily suspended from processing.
LastModified	String	ISO 8601	M	Timestamp the scheme article definition was last modified

7. INT-019 CONTAINER TRANSACTIONS

Business Process Context

This interface is to be used by both Counting Machines and RVMs. Certain data attributes are specific to the Counting Machine OR the RVM. The Conditional flag “C” in the [Required] column is used to identify these.

As count centre machines process bags or totes of manually collected materials, a message will be generated for each bag including the details of each container processed.

As RVMs process material submitted by consumers, a message will be generated for each consumer session including the details of each container processed

Summary

Formal Name	ContainerTransactions
Frequency	Counting machines will call this once per bag processed through a machine RVMs will call this once per consumer session hosted
Publisher	DRS
Consumer	Counting Centres, RVM vendors
HTTP Verb	POST
REST Parameters	None

REST Header

Attribute Name	JSON Type	Format	Required	Description
Version	String	AN	M	Version of the Message being used. Format v1.0
DateTime	String	ISO 8601	M	Date & Time that the message was sent.
MessageId	String	AN..40	M	Message Identifier

Transaction Base Object

M = Mandatory, O = Optional, C = Conditional

Attribute Name	JSON Type	Format	Required	Description
Source	String	CodeList	M	Indicates if from counting machine or RVM.
MachineId	Number	AN..40	M	Id of the counting machine or RVM
BagToteId	String	AN..40	C	Id of the bag being counted. This Mandatory for counting machine, Not required by RVMs
TransactionStartDate	String	ISO 8601	M	Start time of the counting machine count or RVM session
TransactionEndDate	String	ISO 8601	M	End time of the counting machine count or RVM session
RPId	String	AN..40	C	Required by RVMs for their hosted Return Point

				Not required by the Counting Machine
PaymentMethod	String	CodeList	C	Required by RVMs only. Method used to reimburse the consumer Not required by Counting Machine
Transactions	Array of Objects		M	Object containing details of each of the scheme articles processed

Transaction Object (1 or more)

M = Mandatory, O = Optional, C = Conditional

Attribute Name	Type	Format	Required	Description
SchemeArticleId	String	AN..40	C	Barcode of the container, i.e. EAN Mandatory for RVM. Only Optional for Counting Machines if the EAN ProcessResult is 04 – see code list
ScanTimeStamp	String	ISO 8601	M	Date & Time the physical container was processed by the counting machine or RVM
ProcessResult	String	CodeList	C	Outcome of the scan – Accepted or rejection reason. Mandatory for Counting Machines. Not required for RVMs.

8. INT–073 EMPTYING RECEIPT

This Interface is only required for an RVM. The RVM creates a record of the bin contents when it is emptied by an operator. This is called the Emptying Receipt. The CSL Emptying Receipt interface accepts Emptying receipt messages send by the RVM.

- The Emptying receipt is linked to a bin used by one of more RVMs. Each bin must have a unique identifier and be linked to the RPO identifier and each RVM Identifier that uses the bin.
- Where a bin is shared by 2 or more RVMs, the RVM manufacturer must provide the bin total based on adding the data from each of the RVMs.
- The message payload can contain one or more bin emptying receipts
- The RVM or RVM Central system must invoke the CSL Emptying Receipt API
- For failed message CSL will provide error details within the response message, it is the responsibility of the RPO and RVM vendor to investigate and re-send once fixed.

- RVM should send the Bin Emptying Receipts for a specific time period

Summary

Formal Name	EmptyingReceipt
Frequency	RVMs should be call this on a daily basis
Publisher	DRS
Consumer	RVM vendors
HTTP Verb	POST
REST Parameters	None

REST Header

Attribute Name	JSON Type	Format	Required	Description
Version	String	AN	M	Version of the Message being used. Format v0.1
DateTime	String	ISO 8601	M	Date & Time that the message was sent.
MessageId	String	AN..40	M	Message Identifier

Base Object

M = Mandatory, O = Optional, C = Conditional

Attribute Name	JSON Type	Format	Required	Description
RPId	String	AN..40	M	Unique Return Point Identifier. E.g. Retail Store identifier
EmptyReceiptObjects	Array of Objects			One or more Emptying Receipt Objects

Emptying Receipt Object (1 or more)

M = Mandatory, O = Optional, C = Conditional

Attribute Name	Type	Format	Required	Description
MachineId	Array of Strings	AN..40	M	Unique identifier(s) for each RVM associated to the Bin. One or More MachineIds.
BinId	String	AN..40	M	Unique RVM internal Bin Identifier
BinReceiptDate	DateTime Accurate	ISO 8601	M	Date & Time the physical container was successfully accepted by the RVM.
TotalBinWeight	Number	N	M	Weight of bin in kg
TotalContainers	Number	N	M	Total amount of containers in the bin.
BinMaterialTypes	Array			One of more Bin Material Type Objects

Bin Material Type Object (1 or more)

M = Mandatory, O = Optional, C = Conditional

Attribute Name	Type	Format	Required	Description
MaterialType	Number	Codelist	M	Material type, (AKA Fraction), of the Container – e.g. Glass, PET, Aluminium, Steel. See: MaterialType list table
TotalContainers	Number	N	M	Total count of containers by the associated material type