APPENDIX B
RTCS/OBOS ICD OVERVIEW
V4.0

Abstract

A summary of RTCS / OBOS communication requirements

Operational Back-Office System
Appendix B – RTCS-OBOS ICD Overview

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INTRODUCTION

The purpose of this document is to define data type, file formats and communication protocols for the Authority RTCS to OBOS interface. The data exchange (message) types are listed in the Table below:

Data Exchange	Name	Data Direction	Data Format	Method/ Protocol	Frequency	Description
Tag Status	POSI List	OBOS->RTCS	Text File	SFTP	Bulk (Daily) Inc as required	Bulk - Full list of valid transponder numbers with statuses. Incremental – Transponder Numbers with new or changed statuses.
Transactions	TRAN	RTCS->OBOS	JSON	REST API	Every Vehicle	Initial Transaction record sent by RTCS to OBOS in real time
Plate Info	PLATE	RTCS->OBOS	JSON	REST API	Every IBT OR Convert Request	Result of RTCS image review or Convert Request (below): (1) Plate information OR (2) "Uncollectable"
Image Request	IREQ	OBOS-> RTCS	JSON	REST API	Every IBT or other OBOS processes or interactive functions	Image requested by OBOS based on Transaction ID
Image Response	IMAGE	RTCS->OBOS	JPEG	REST API	Every Image Request	Image returned to OBOS based on Transaction ID
~~**Video Request**~~	~~VREQ~~	~~OBOS-> RTCS~~	~~JSON~~	~~REST API~~	~~On Demand~~	~~Manual request of video surrounding transaction.~~
~~**Video Response**~~	~~VIDEO~~	~~RTCS->OBOS~~	~~Mp4~~	~~HTTP~~	~~Every Video Request~~	~~DVAS video associated with transactions made available on demand. Based on Transaction ID.~~
Convert Request	CREQ	OBOS->RTCS	JSON	REST API	On Demand	Convert ETC to IBT (Tran ID)
CCSS License Plate Correction	CLPCORR	OBOS > RTCS	JSON	REST API	Daily	A list of incorrect license plate numbers discovered at CCSS. Used to inform RTCS of incorrect plate number extraction.
Reconciliation	REC	RTCS->OBOS	JSON	REST API	Daily Automatic	Transaction counts by type & lane
Dispositions	DISP	OBOS->RTCS	JSON	REST API	Daily Automatic	Transaction Disposition Status
Fare Table	FARE	OBOS->RTCS	JSON	REST API	Yearly	Fiscal Year Fare Table
Acknowledge	ACK	Receiver to Sender	JSON	REST API	Every API Message	Acknowledgement of file received and an indication of accepted or rejected

TAG STATUS (POSI List)

The OBOS shall send to the RTCS the daily Bulk and incremental POSI List files received from the FTE CCSS. Following is the structure of one record from the Posi List received from the CCSS.

TAG ID								Agency		State		Tag Status		Tag Class		Rev Code		Low Bal	NA	NA
0	0	0	0	2	0	2	2	0	1	1	0	0	1	0	2	0	1	N	N	N

Tag Status Codes	
Tag Status	Description
00	Inactive
01	Active
02	Lost/Stolen
03	Returned
04	Terminated

Tag Class	
Tag Class	Description
NN	Indicated Axles

Revenue Codes	
Rev Code	Description
00	UNKNOWN
01	STDPATRON
02	COMMERCIAL
04	NONREV
05	BAY ISLE PASS ONLY
06	BAYWAY COMMUTER PASS ONLY

A file name shall be appended to the POSI List (Bulk and incremental) as received from the CCSS, and then passed directly to the RTCS via SFTP.

Bulk POSI List File Name: YYYY-MM-DD HH:MM:SS BLK.txt
Incremental POSI List File Name: YYYY-MM-DD HH:MM:SS INC.txt

The date and time in the file name are when the POSI List is sent to the RTCS

Following is a sample Bulk POSI List File with 6 Tags.:

2024-07-06 04:30:36 BLK.txt CR
0000202201100102O1NNN CR
0000202301100102O1NNN CR
0000202401100402O1YNN CR
0000202501100102O1NNY CR
0000202601100102O2NNN CR
0000202801100102O1NNN CR

The format is the same for the incremental POSI list but with a different file name as indicated.
The method of acknowledging receipt of this and all SFTP files shall be determined in the design phase.

TRANSACTIONS and PLATE INFO

Overview

The RTCS vendor will be responsible for the complete roadside transaction including any necessary image review (previously called "fully formed"). All transactions, complete or incomplete, will be sent immediately to OBOS.

The RTCS will update any transactions that are missing plate and state information when it becomes available. Upon receipt of a license plate number the OBOS will retrieve the associated image from the RTCS.

The following is a list of OBOS/RTCS transaction rules and requirements.

- OBOS and the RTCS communicate over a VPN.
- One and only one transaction is created for each vehicle that passes through a tolling point.
- One and only one designated tag number for each transaction with a valid tag(s).
- One and only one plate number and image associated with each plate-based transaction.
- RTCS transactions are sequentially numbered and sent to OBOS in real time[1].

Transaction IDs are unique, sequential, and assigned to transactions throughout the system prior to sending to the OBOS in real time. However, it is not required that Transaction IDs be in the exact time sequence that the transactions occurred on the roadside.

License Plate Processing

In the OBOS system there are license plate numbers and license plate images. Images are retrieved from the RTCS by request from the OBOS. While a license plate image is hypothetically only necessary for customer invoices or collection notices, they can also aid in spot checking, ITOL verification, accuracy confirmation, etc. Therefore, all IBT images are requested by the OBOS as soon as a valid license plate number is received from the RTCS. License Plate *numbers* are sent from the RTCS to the OBOS under three scenarios:

1. Automatically for each IBT. Results are: Valid Plate # (PLATE message) or Uncollectable.
2. Upon a "Convert" request from OBOS due to a rejected ETC transaction. Results are: Valid Plate # (PLATE message) or Uncollectable.
3. To correct mistakes found by an audit or review of the RTCS image processing system. These fall into two categories:
    a. IBT Transactions that had been deemed Uncollectible. In this case the RTCS will send a PLATE message to the OBOS and upon verification of current Uncollectable status the OBOS will immediately request the corresponding plate image and process the transaction as an IBT.

[1] Transaction IDs are unique, sequential, and assigned to transactions as they happen throughout the system in real time. However, it is not required that Transaction IDs be in the exact time sequence that the transactions occurred in the lane.

b. IBT Transactions that had previously been sent to the OBOS with a valid license plate number (IBTs) and were incorrect upon review by RTCS. In this case the job of the OBOS is to recall the transaction from the CCSS or Collections depending on its current state. Transactions are recalled from Collections via a defined API message. Transactions are recalled from the CCSS via the daily CCSS Recall file containing the UFM ID and plate number.

In summary, the RTCS may send a PLATE message to the OBOS at any time, and it will be up to the OBOS to determine if it is due to a new IBT, a Convert request, a previously Uncollectable Transaction, a recall, or a duplicate, and process accordingly.

Test Transactions

The RTCS may at times utilize transactions with a TEST indicator. These test transactions shall have a transaction ID that cannot be confused with the transaction ID of actual transactions. The data in a test transaction message may be simulated or data from actual traffic.

Transaction Message

The Transaction message shown below contains all possible information in a transaction. However not every transaction contains all fields. For example, a valid ETC transaction does not contain the fields related to license plates. The chart below indicates the fields associated with each transaction type.

Color Key

Transaction ID	In all TRAN, PLATE, and IMAGE messages sent to OBOS
General UFM Information	In all TRAN messages sent to OBOS
Tag Information	In all ETC (valid tag) and IBT (if available) TRAN messages sent to OBOS
Plate Information	In all PLATE messages sent to OBOS
Supplemental Information	In all TRAN messages sent to OBOS, if available.

RTCS Transaction Data Elements

Field Name	Description/Values
Msg Type	"TRAN"
(Start UFM Data)	
Transaction ID	Unique Transaction ID from lanes
Lane Type	"S"
AVC Class	Axle count (2-15)
Time Stamp	Time (UTC) and Date of transaction in lane
Plaza ID	Predefined values
Lane ID	Predefined values
Tran Type	ETC, IBT
Lane Mode	"AUTO"
Lane State	OPEN, CLOSED, MAINTENANCE
Full Fare	Published "IBT" toll for vehicle class
ETC Fare	Published "Tag" toll for vehicle class
Indicated Fare	Calculated toll based on all variables
Exemption Codes	Used only if there are exceptions (from list)
Revenue Type	"UNKNOWN", "STDPATRON","COMMERCIAL","NONREV", (from POSI List)
State/Region Code	2-digit code (See Agency Conversion Rules below)

Tag Agency ID	2-digit code (See Agency Conversion Rules below)
Tag ID	10 -digit code
Tag Status	From POSI List (e.g. "ACTIVE")
Plate Jurisdiction (State)	State where plate is registered
Plate Number	License Plate number
Plate Type	Plate type (public, govt, etc.)
Plate Country	Country of plate reg (US, CA, MX)
Horizontal Plate Position	Plate Position on image
Vertical Plate Position	Plate Position on image
Plate Number Confidence	OCR Engine (s) 0 to 4095
Jurisdiction Confidence	OCR Engine (s) 0 to 4095
(End UFM Data)	
Name Location of Image used	Name/path: URL:location (F or R):index #
Front or Rear Image (F, R)	Location of plate on Vehicle
LPN Manual (Y/N)	Was this plate number manually derived?
Uncollectable Flag	True = Uncollectable (do not send to CCSS)
Uncollectable Reason Code	Codes to be developed. Includes ZFO or Exempt
Exempt Flag	Exempt from toll due to plate number
Exempt Reason Code	Determined by Authority
Tag Protocol	SeGo, TDM, 6C
Switchable	Switchable Tag (can indicate # of occupants)
Indicated Occupants	# of occupants indicated by tag
Tag Count	The number of tags read in the vehicle
POSI List Class (indicated Axles)	2 char decimal from POSI list
POSI List Rev Code	2 char decimal from POSI list
POSI List Low Bal	1 char from POSI list
POSI List ID	ID of POSI list used for this transaction
Actual Occupants	# of occupants determined by roadway devices
Degraded Code	One of more lane sensors is inoperable (0 – OK)
Zero Fare Override Flag	Transaction occurred while in this mode.
Vehicle Speed	Vehicle speed through gantry
Vehicle Length	Vehicle Length in feet
Vehicle Height	Vehicle height in feet
Vehicle Width	Vehicle width in feet
Trailer (Y/N)	If Y vehicle is pulling a trailer.
Fare Table Version	Version number of Fare Table used for transaction
TEST	Test transaction indicator

Agency Conversion Rules

The inclusion of TDM and 6C transponder protocols requires a conversion to keep the same format for all tag types. The current 4-character structure for State and Agency in the Transaction message is populated as follows:

For SeGo (SunPass) tags:

- State ➔ 2 char decimal converted from 8-bit binary State field on tag.
- Agency ➔ 2 char decimal converted from 8-bit binary Agency field on tag.

For TDM (IAG) tags:

Agency codes 0 thru 99

- State ➔ 65 decimal
- Agency ➔ 2 char decimal converted from 7-bit binary agency field on tag.

Agency codes 100 thru 199

- State ➔ 66 decimal
- Agency ➔ 2 char decimal subtracting 100 from 7-bit binary agency field on tag.

For 6C tags:

Agency codes 0 thru 99

- State ➔ 20 decimal
- Agency ➔ 2 char decimal converted from 12-bit binary agency field on tag.

Agency codes 100 thru 199

- State ➔ 21 decimal
- Agency ➔ 2 char decimal subtracting 100 from 12-bit binary agency field on tag.

Agency codes 200 thru 299

- State ➔ 22 decimal
- Agency ➔ 2 char decimal subtracting 200 from 12-bit binary agency field on tag.

Continue up to 2549.

- State ➔ 45 decimal
- Agency ➔ 2 char decimal subtracting 2500 from 12-bit binary agency field on tag.

Examples

SeGo Tag: State = 10; Agency = 01 as read from tag (FTE)
Transaction fields: State = 10; Agency = 01

TDM (IAG) Tag: Agency = 125 as read from tag (BestPass)
Transaction fields: State = 66; Agency = 25

6C Tag: Agency = 0171 as read from tag (Nassau County Bridge Authority (NCBA))
Transaction fields: State = 21; Agency = 71

IMAGE REQUEST

License plate images (300KB, JPEG) shall be retrieved directly from the RTCS using the IREQ message. License Plate images are requested by the OBOS for every IBT (including uncollectable) and as needed by other OBOS processes. It is incumbent on the RTCS to identify and provide the best human readable image appropriate to the vehicle type. The Image Request message (IREQ) is valid only if the OBOS has previously received a PLATE message. The reason for this is that while images of ETC transactions may exist, there is no defined mechanism for the RTCS to provide the best human readable image.

Field Name	Description/Values
Msg Type	“IREQ”

Field Name	Description/Values
Transaction ID	Unique Transaction ID

IMAGE RESPONSE

The RTCS will respond, synchronously, to the IREQ message with the IMAGE message which is a JPG file comprising a human readable image.

Field Name	Description/Values
Msg Type	"IMAGE"
Transaction ID	Same Transaction as in IREQ
Status	0 – Image not available 1 – Image available
Image	A JPG binary file required if Return Code is "1".

~~VIDEO REQUEST~~

~~The OBOS will request video from the RTCS showing before and after a Transaction as needed to process Transactions and perform other business operations such as researching Transaction information. The video clip may be requested from the RTCS at any time by sending the Transaction ID to the RTCS. Video clips will be of a fixed length determined by the RTCS. Video of transactions are captured at the roadside and stored for at least 90 days.~~

~~Field Name~~	~~Description/Values~~
~~Msg Type~~	~~"VREQ"~~
~~Transaction ID~~	~~Unique Transaction ID~~
~~Video type~~	~~DVAS video~~ ~~0 – Front DVAS~~ ~~1 – Rear DVAS~~

~~VIDEO RESPONSE~~

~~Field Name~~	~~Description/Values~~
~~Msg Type~~	~~"VIDEO"~~
~~Transaction ID~~	~~Same Transaction as in VREQ~~
~~Status~~	~~0 – Video not available~~ ~~1 – Video available~~
~~Video Blob~~	~~A binary video stream of the requested video. Required if Status is "1".~~

CONVERT REQUEST

When an ETC Transaction is rejected by the CCSS or Interoperable Home Agency with a 'Return to Originating Agency' Amendment Type with Amendment Reason as Invalid Account or Invalid Transponder, the Transaction may be converted to an IBT transaction.

Upon receiving the Convert Request message, the RTCS will respond, asynchronously, with PLATE message as defined above which the OBOS shall process normally using the original UFM and Transaction ID. The amended UFM will be resent to CCSS with Amendment Reason code "ETC to VIOLATOR MOP", only if the amended UFM satisfies eligibility for revenue collection through image-based tolling.

Field Name	Description/Values
Msg Type	“CREQ”
Transaction ID	Unique Transaction ID

LICENSE PLATE CORRECTION (CLPCORR)

The following message structure is used to send incorrect license plate information from the OBOS to the RTCS. The reason for this message is to provide feedback to the RTCS that may be used to discover potential issues or trends in the image review or automatic license plate number extraction function. The source of this information is from a CCSS PLATE_MISREAD amendment with a reason code of CUST_DISPUTE.

Field Name	Description/Values
Msg Type	“CLPCORR”
Transaction ID	Transaction ID
Incorrect License Plate	Plate letters/numbers/special characters associated with the incorrect license plate.
Incorrect License Plate Jurisdiction	Jurisdiction code (State/Province) associated with the incorrect license plate.
Incorrect License Plate Type	License plate type associated with the incorrect license plate.
Incorrect License Plate Country	Country code associated with the incorrect license plate.
Correct License Plate	Plate letters/numbers/special characters associated with the correct license plate.
Correct License Plate Jurisdiction	Jurisdiction code (State/Province) associated with the correct license plate.
Correct License Plate Type	License plate type associated with the correct license plate.

Field Name	Description/Values
Correct License Plate Country	Country code associated with the correct license plate.

RECONCILIATION

The RTCS shall send a daily file to the OBOS indicating the total transactions by lane and type that were sent to and accepted by the OBOS on the previous day. Totals are provided in a daily file sent to the RTCS via SFTP. The data format is fixed length text records separated by a carriage return. The record structure is shown in the following chart.

Field Name	Description/Valid Values
Lane ID	Unique Lane ID
ETC	Total ETC transactions
IBT	Total image-based transactions
UNCOLL	Total uncollectable transactions
NON-ACKED	Total unsuccessful transactions

DISPOSITIONS

To aid in the diagnosis of lane level issues, feedback shall be provided from the OBOS to the RTCS regarding the disposition of Transactions. A single disposition shall be provided for each completed transaction record received and accepted by the OBOS. Dispositions are provided in a daily file sent to the RTCS via SFTP. The data format is fixed length text records separated by a carriage return. The record structure is shown in the following chart. Disposition code examples are shown at the end of the chart.

Note: **Final Disposition Codes will be developed during the design phase of the project.**

Field Name	Description/Valid Values
TRANS ID	Unique Transaction ID
DISPOSITION	Primary Code, Secondary Code. Example 0302
DATE	Format (ISO-8601): YYYY-MM-DDThh:mm:ssZ

Disposition Codes Examples

DISPOSITION CODES			
PRIMARY CODE		SECONDARY CODE	
01	PAID	01	ETC
		02	ITOL
		03	INV
		04	COLL

02	ADJUST	01	AXLE
		02	FARE
03	REJECT	01	INTEROP
		02	IMAGE
		03	DUP
		04	DATA
04	RTOA	01	TAG LOST
		02	TAG STOLEN
		03	INVTAG
05	UNCOLL	01	INFO
06	UNBILLABLE	01	EXEMPT
		02	ZFO
07	WRITE OFF	01	REASON

FARE TABLE

The Fare Table, will be manually uploaded in Microsoft Excel format, and stored in the OBOS as the system of record at least once per year. The latest version of the Fare Table shall be sent to the RTCS via a manually entered command built into the OBOS and presented to the USER when the Fare Table is viewed on the OBOS. The OBOS shall generate an Alert if the latest version of the Fare Table has not been sent to the RTCS. The OBOS Contractor shall define the message structure for the Fare Table API which shall include the effective date and time. A Fare Table example is in Appendix H.