

New Hampshire
Department of Transportation
Bureau of Turnpikes
Interface Control Document
ORT to Host



Version 1.3

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1 Introduction

1.1 Host-VECTOR Interface

The following interfaces are defined in this document:

- Transaction (XOTX) interface for sending customer toll transactions to VECTOR
- Retransmit (XOTX_RET) interface for re-sending the XOTX file to VECTOR

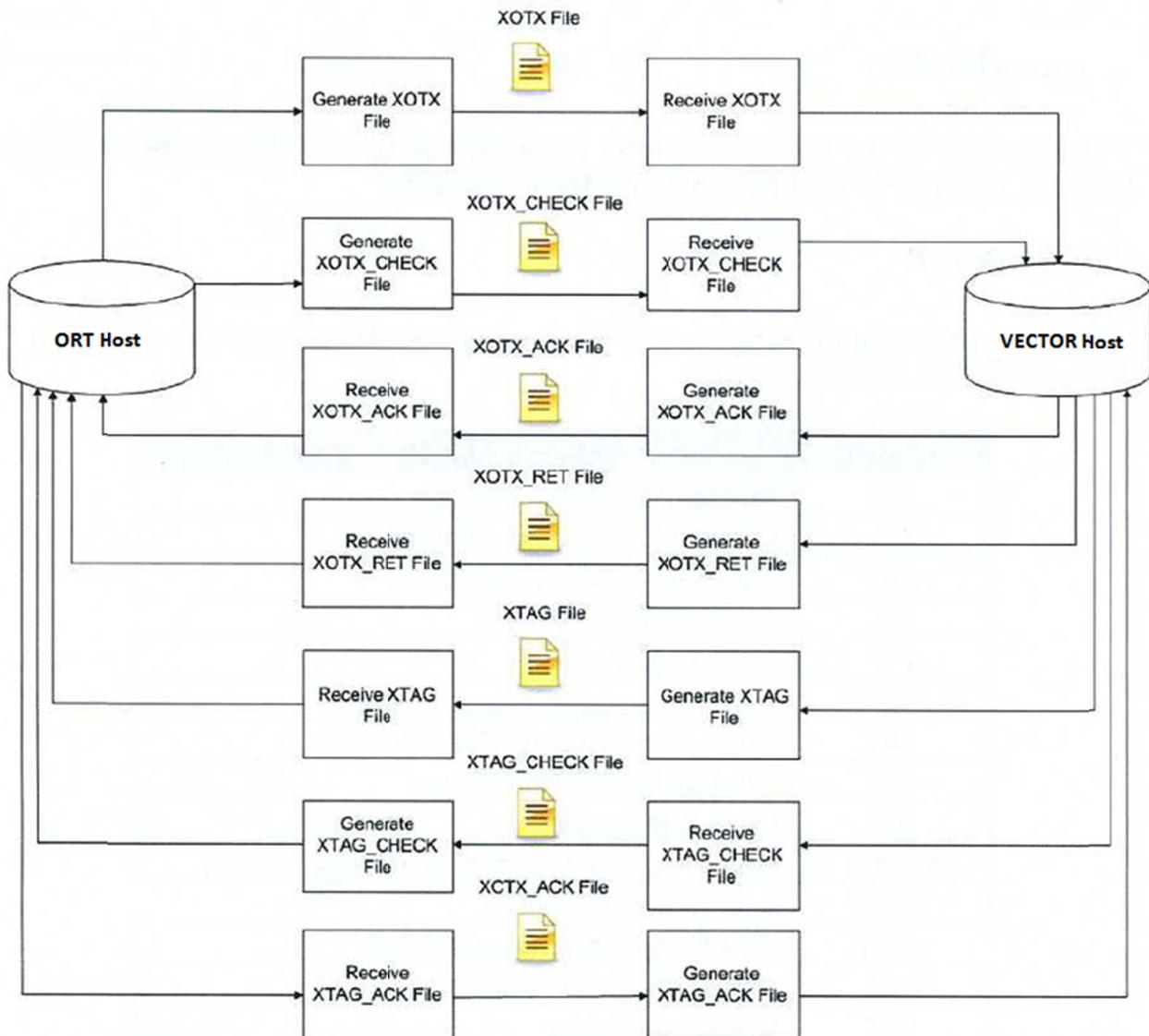


Figure 1-1: ORT to VECTOR Interface

1.2 Host-VECTOR CSC Interface

The following interfaces are defined in this document:

- Violation Enforcement System (VES) Interface for sending images of the violators to VECTOR CSC

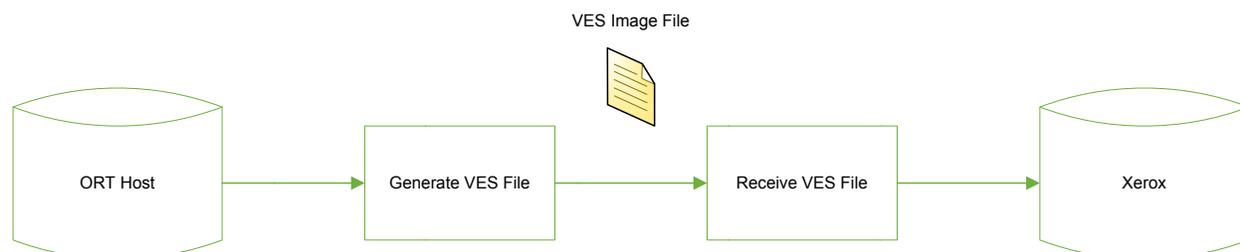


Figure 1-2: VES to VECTOR File Interface

1.3 File Exchange Process

All file transfers will be through FTP protocol to designated servers. Each system should be capable of transmitting the same file to multiple servers at each site. This allows redundant servers to process the same data.

The ORT FTP server will maintain the generic folder structure identified below for every type of file being exchanged. If an external process picks up a file from this folder structure it is that process's responsibility to move the file to the archive folder after picking up the file.

- Top-level
- Top-level/sending
- Top-level/archive

All files are processed from the top-level folder for that file type. The sender will transmit the file to the sending folder to prevent the receiver from processing the file before transmission is completed. When the file has been successfully transmitted, the sender will move the file from the sending folder to top-level folder

The receiver will process each file in the order received. Once processing is completed, the file will be moved to archive folder. If a transaction file is received out of sequence, then a return file will be sent with the missing sequence number.

Table 1-1: FTP Server File and Folder Types

File Type Label	Folder Type	FTP Path
X	Top-Level	/receive/XOTX
X	Sending	/receive/XOTX/sending

File Type Label	Folder Type	FTP Path
X	Archive	/receive/XOTX/archive
R	Top-Level	/receive/XOTX_RET
R	Sending	/receive/XOTX_RET/sending
R	Archive	/receive/XOTX_RET/archive
C	Top-Level	/receive/XTAG
C	Sending	/receive/XTAG/sending
C	Archive	/receive/XTAG/archive
V	Top-Level	/receive/VES
V	Sending	/receive/VES/sending
V	Archive	/receive/VES/archive

1.4 File Exchange Frequency

Full XTAG files will be transmitted by VECTOR to the ORT Host system every time they receive a file from VECTOR CSC. Normally there will be one file per day, but if multiple files are transmitted in a single day they will be processed. The contents of each full XTAG file should replace all tag account status records on the host.

Transaction (XOTX) files will be sent at frequencies determined by traffic volumes at the NHDOT ORT Lanes. The transaction files will be generated every hour if the transactions are available. Transactions from all the lanes will be combined into one file per plaza.

Violation images will be uploaded to VECTOR CSC in JPEG format as individual files. VES image files will be sent to VECTOR CSC in near real time.

1.5 Network Topology

The FTP Server setup at Hampton and JOM locations will serve as the drop boxes for the respective locations. Files older than 7 days will be purged from this server.

2 File Formats

All transfer files follow similar file naming conventions. These may be adjusted to meet specific customer requirements.

LabelAuthority_YYYYMMDDHHMISS.ext

Label = File Type Label (See below table for complete list)

Authority = Authority ID (26)

YYYY = Year

MM = Month

DD = Day

HH = Hour

MI = Minute

SS = Second

Ext = File Extension (See below table for complete list)

Example: C26_20091001123456.XTAG

All times are in the Eastern Time Zone.

Table 2-1: Supported Transfer File Types

Name	Description	Label	Extension
Transaction File	A file containing transaction to upload to VECTOR	X	XOTX
Transaction File Check File	Check file containing the full file name of the transaction file	X	XOTX_CHECK
Transaction File Acknowledgement File	A transaction file acknowledgement file will be generated by VECTOR to send to ORT Host system.	X	XOTX_ACK
Regenerate Transaction File	This file will contain the sequence number of the TRX file that needs to be regenerated.	R	XOTX_RET
Tag Status File	A list of customer tag account statuses that are supported by VECTOR CSC	C	XTAG (see NOTE)
Tag Status Check File	Check file containing the full file name of the tag status file	C	CHECK
Tag Status Acknowledgement File	A tag status acknowledgement file is sent to VECTOR CSC after the tag status file processing is complete	C	ACK
Violation Image File	Violation images are uploaded in the JPEG format. The image file names are specified in section 2.4	V	JPG

NOTE: Tag status files are transmitted in GZIP compressed format with XTAG.ZIP as the file extension of the compressed file.

2.1 Transaction File Format

ORT Host system will create one transaction file every hour. The file will contain all the transactions generated since the last time the transaction file was created. This file will upload to the TRCS Host system.

Table 2-2: Transaction (XOTX) File – Header Structure

Field Name	Type/Size	Description/Valid Values
FILE_TYPE	CHAR(4)	XOTX
FROM_AGENCY_ID	CHAR(3)	T26
TO_AGENCY_ID	CHAR(3)	X26 = All Transactions
FILE_DATE	CHAR(8)	Date file created. Format: YYYYMMDD
FILE_TIME	CHAR(6)	Time file created: Format: HHMMSS
RECORD_COUNT	CHAR(8)	Count of all tags in file. Does not include header record. Values: 00000000 – 99999999
XOTX_FILE_NUM	CHAR(6)	For files sent to the VECTOR = A number used to identify the XOTX file to the VECTOR that is sequential across all transactions when received by the VECTOR. Values 000001 – 999999. Rolls over to 01 and continues when fully used.
DELIMITER	CHAR(1)	LF
Header Total	39	

Table 2-3: Transaction (XOTX) File – Detail Structure

Field Name	Type/Size	Description/Valid Values
ETC_TRX_SERIAL_NUM	CHAR(12)	Unique fully sequential transaction identifier assigned across all normal toll, Type 2 violation, and Type 1 violation transaction records by the ORT Host. Values:000000000001-999999999999 which roll over to 01 and continue when fully used
ETC_REVENUE_DATE	CHAR(8)	The revenue date of the transaction as determined by the ORT Host. Format: YYYYMMDD Revenue date is calculated from 23:45 to 23:45
ETC_FAC_AGENCY	CHAR(3)	T26
ETC_TRX_TYPE	CHAR(1)	B

Field Name	Type/Size	Description/Valid Values
AVI_TAG_AGENCY	CHAR(3)	From AVI or *** for untagged violation
AVI_TAG_SERIAL_NUMBER	CHAR(8)	From AVI or ***** for untagged violation
AVI_READ_PERFORMANCE	CHAR(2)	The total number of times the AVI tag was read while in the capture zone as obtained from the AVI reader. Values: 00 – 99 or ** for untagged violation or if data is not available
AVI_WRITE_PERF	CHAR(2)	The total number of times the AVI tag was written to while in the capture zone as obtained from the AVI reader. Values: 00 – 99 or ** for untagged violation or if data is not available
AVI_TAG_PGM_STATUS	CHAR(1)	The result of the AVI tag program cycle. Obtained from the AVI reader. Values: S = Success U = Unverified F = Failed * = untagged violation or data is not available
ETC_LANE_MODE	CHAR(1)	The mode the lane was operating in at the time of the transaction. Values: O = ORT
AVI_VALIDATION_STATUS	CHAR(1)	1 = Valid (report use to VECTOR) 2 = Low Balance (report use to VECTOR) 3 = Invalid (report use to VECTOR)(Type 1 Violation) 4 = Lost/stolen (report use to VECTOR)(Type 1 Violation) 5 = NH non-revenue
VES_CONFIDENCE	CHAR(2)	For an untagged violation when lane is in ETC-only or ORT mode: Overall OCR confidence level of ETC_LIC_NUMBER field. Values 00 to 99 Otherwise: **
VES_LIC_PLATE	CHAR(10)	For an untagged violation when lane is in ETC-only or ORT mode: License plate characters from OCR. “*”, a blank space, or no character may be inserted wherever a license plate character is unavailable or OCR for that character is below the confidence level threshold. Otherwise: *****

Field Name	Type/Size	Description/Valid Values
IAG_CLASS_READ	CHAR(4)	<p>IAG class read from AVI tag when lane is in ETC-only or Manned/ETC mode.</p> <p>**** For untagged violation when lane is operating in ETC-only mode.</p> <p>Values: 0000 – 2047 and ****.</p>
AVC_ACTUAL_AXLES	CHAR(2)	<p>Values:</p> <p>00 to 96 = AVC axle count</p> <p>97 = possible AVI failure</p> <p>98 = reserved for future use</p> <p>99 = possible AVC failure</p>
ETC_EXIT_SPEED	CHAR(3)	The speed in MPH of the vehicle as it exited the facility. Values: 000 – 999
ETC_OVER_SPEED	CHAR(1)	<p>Y = Speed is over threshold while lane is in ORT mode (Type 2 violation)</p> <p>N = Speed is at or under threshold while lane is in ORT mode (transaction without speed violation)</p> <p>* = possible speed detect failure</p>
ETC_EXIT_PLAZA	CHAR(3)	<p>001 = Hooksett Main</p> <p>003 = Rochester</p> <p>004 = Dover</p> <p>005 = Hampton Main</p> <p>006 = Hampton Ramp</p> <p>007 = Hooksett Ramp</p> <p>008 = Bedford Toll</p> <p>009 = Exit 11</p> <p>011 = Exit 10</p> <p>012 = Bedford Road</p>
ETC_EXIT_LANE	CHAR(3)	<p>ORT Lane numbers in the form DNN, where D is direction,(1 to 4, 1=N,2=S,3=E,4=W) and NN is the two digit Lane number.</p> <p>The ORT Lanes will be numbered from 50 to 69. Refer to the lane list label for Hampton Main and Hooksett Main ORT Lane numbers</p> <p>The transactions from shoulder lane will be combined into the adjacent travel lane.</p>

Field Name	Type/Size	Description/Valid Values
ETC_EXIT_DATE	CHAR(8)	The date of the transaction as determined by the ORT Host, indicating the date when the vehicle left the lane. Format: YYYYMMDD
ETC_EXIT_TIME	CHAR(6)	The time of the transaction as determined by the ORT Host, indicating the date when the vehicle left the lane Format: HHMMSS
ETC_EXIT_MICROSECONDS	CHAR(6)	Transaction Microsecond. In the ORT Host system, the transactions can be uniquely identified using ETC_EXIT_PLAZA,ETC_EXIT_LANE,ETC_EXIT_DATE,ETC_EXIT_TIME ,ETC_EXIT_MICROSECOND
ETC_DEBIT_CREDIT	CHAR(1)	+
AVI_NHDOT_CLASS	CHAR(2)	Value: 01 to 12 for the standard NHDOT classes (IAG class read from AVI tag converted to NHDOT class) or class 1 for invalid IAG codes or ** where AVI is not available.
AVI_NHDOT_FARE	CHAR(5)	Value: 00000 (\$000.00) to 99999 (\$999.99) for 1 of the 12 standard E-ZPass fare due as mapped from AVI_NHDOT_CLASS or ***** where AVI is not available.
AVC_NHDOT_CLASSES	CHAR(2)	Value: 01 to 12 for standard NHDOT classes (corresponding fare value for measured axle count and dual tire indications) or ** where AVC is not available.
AVC_NHDOT_FARE	CHAR(5)	Value: 00000 (\$000.00) to 99999 (\$999.99) for the E-ZPass fare due as calculated from AVC (with dual tires and extra axles factored in) or ***** where AVC is not available
VIOLATION_TYPE	CHAR(1)	0 = Normal Transaction 1 = Type 1 violation 2 = Type 2 violation
TKT_NUM	CHAR(11)	Unique (non-sequential) violation image identifier Values: 00000000001-99999999999. The first two characters are plaza (01 to 12), the next two characters are lane (50-69), the next character is direction ,(1 to 4, 1=N,2=S,3=E,4=W), and the six least significant characters are sequential, roll over to 1, and continue when fully used ***** for normal and Type 2 violation transaction records
DELIMITER	CHAR(1)	LF
Record Total	118	

Table 2-4: Lane Number Descriptions

Traffic Direction	Lane Number	Description
North	59	North Bound Left Shoulder
North	58	North Bound Lane (Left)
North	57	North Bound Lane (Right)
North	56	North Bound Lane (Future)
North	50	North Bound Right Shoulder
South	69	South Bound Left Shoulder
South	68	South Bound Lane (Left)
South	67	South Bound Lane (Right)
South	66	South Bound Lane (Future)
South	60	South Bound Right Shoulder

2.1.1 Transaction File Check File

A transaction check file is created by the ORT Host system for every transaction file. The ORT host system will upload the check file immediately after uploading the transaction file

Table 2-5: Transaction Check File Description

Field Name	Type/Size	Description/Valid Values
XOTX_FILE_NAME	CHAR(50)	The exact character sequence from the name of the XOTX file.
XOTX_CHECKSUM_VALUE	CHAR(32)	Checksum values of XOTX file as calculated using the md5sum algorithm
DELIMITER	CHAR(1)	LF
Total	83	

2.1.2 Transaction File ACK File

ORT Host expects an acknowledgement file from TRCS Host system. The Structure of the acknowledgement file is as below.

Table 2-6: Transaction ACK File - Header Structure

Field Name	Type/Size	Description/Valid Values
FILE_TYPE	CHAR(4)	ACK
FROM_AGENCY_ID	CHAR(3)	C26
TO_AGENCY_ID	CHAR(3)	T26
ORIG_FILE_NAME_TYPE	CHAR(50)	The exact character sequence from the name of the XOTX file received by the VECTOR from the ORT system.
FILE_DATE	CHAR(8)	Date VECTOR creates the ACK file. Format: YYYYMMDD
FILE_TIME	CHAR(6)	Time VECTOR creates the ACK file. Format: HHMMSS
RETURN_CODE	CHAR(2)	A code indicating the status of the XOTX files being acknowledged. Values: 00 – File successfully received and verified. 01 – File Error; unable to process the file, file not processed 02 – Detail record(s) have invalid data, these records are not processed 05 – Duplicate file sequence number, file not processed 06 – Gap in sequence number, file processed
DELIMITER	CHAR(1)	LF
Total	76	

Table 2-7: Transaction ACK File - Detail Structure

Field Name	Type/Size	Description/Valid Values
XOTX_FILE_NUM	CHAR(6)	XOTX_FILE_NUM from the original transaction XOTX file
ETC_TRX_SERIAL_NUM	CHAR(12)	ETC_TRX_SERIAL_NUM from the original transaction XOTX file for every transaction that failed to load into TRMI database
DELIMITER	CHAR(1)	LF
Total	19	

2.2 Retransmit File Format

The TRCS host system will request regeneration of transaction file by uploading the retransmit file. The retransmit file will have the list of file IDs that has to be retransmitted.

Table 2-8: Retransmit File Description

Field Name	Type/Size	Description/Valid Values
XOTX_FILE_NUM	CHAR(6)	Transaction File ID
DELIMITER	CHAR(1)	LF
Total	7	

2.3 Tag File Format

This section describes the Tag file format.

2.3.1 Tag Status File

VECTOR will transfer every TAG status file it receives to the ORT Host System. The tag status file is normally expected around 3 AM. In most cases, download should arrive at the ORT Host within 36 hours of prior download. The TAG status file is simple ASCII file. The ORT Host system will perform the sanity check, load it into the database and download the tag file to the ORT Zone controllers.

The file naming convention is defined as:

Uncompressed naming convention: C26_{FILE_NAME}.XTAG

Uncompressed naming formats: C26_YYYYMMDDHHMMSS.XTAG

Uncompressed naming example: C26_20100601033000.XTAG

Table 2-9: Tag Status (XTAG) File – Header Structure

Field Name	Type/Size	Description/Valid Values
FILE_TYPE	CHAR(4)	XTAG
FROM_AGENCY_ID	CHAR(3)	C26
FILE_DATE	CHAR(8)	Date file created. Format: YYYYMMDD
FILE_TIME	CHAR(6)	Time file created: Format: HHMMSS
RECORD_COUNT	CHAR(8)	Count of all tags in file. Does not include header record. Values: 00000000 – 99999999

Field Name	Type/Size	Description/Valid Values
COUNT_STAT1	CHAR(8)	Count of all tags with status code 1. Values: 00000000 – 99999999
COUNT_STAT2	CHAR(8)	Count of all tags with status code 2. Values: 00000000 – 99999999
COUNT_STAT3	CHAR(8)	Count of all tags with status code 3. Values: 00000000 – 99999999
COUNT_STAT4	CHAR(8)	Count of all tags with status code 4. Values: 00000000 – 99999999
COUNT_STAT5	CHAR(8)	Count of all tags with status code 5. Values: 00000000 – 99999999
DELIMITER	CHAR(1)	LF
Header Total	70	

Table 2-10: Tag Status (XTAG) File - Detail Structure

Field Name	Type/Size	Description/Valid Values
TAG_AGENCY_ID	CHAR(3)	Tag agency ID. Values: 000 – 127
TAG_SERIAL_NUMBER	CHAR(8)	Tag serial number. Values: 00000001 – 16777215
TAG_STATUS	CHAR(1)	1 = Valid (report use to VECTOR) 2 = Low Balance (report use to VECTOR) 3 or 4 = Invalid or lost/stolen (report use to VECTOR) (Type 1 Violation) 5 = NH non-revenue (report use to VECTOR)
TAG_ACCOUNT_INFO	CHAR(6)	Hard coded to 000000
DELIMITER	CHAR(1)	LF
Record Total	19	

The header section will appear once for the entire file. The detail structure will be repeated for every tag. The tag file will be compressed before transmission

The file naming convention is defined as:

Compressed naming convention: C26_{FILE_NAME}_{FILE_TYPE}.ZIP

Compressed naming formats: C26_YYYYMMDDHHMMSS_TAG.ZIP

Compressed naming example: C26_20100601033000_XTAG.ZIP

2.3.2 Tag Status Check File

VECTOR will be sending a check file for every tag status file. The check file will have one entry of the tag status file name. This file receipt will trigger the tag file loading process in the ORT Host system. The VECTOR should download the tag status file first and then download the check file. The check file is not compressed.

The file naming convention is defined as:

Naming convention: C26_{FILE_NAME}_{FILE_TYPE}.CHECK

Naming formats: C26_YYYYMMDDHHMMSS_XTAG.CHECK

Naming example: C26_20100601033000_XTAG.CHECK

Table 2-11: Tag Status Check File Description

Field Name	Type/Size	Description/Valid Values
ORIG_FILE_NAME_TYPE	CHAR(80)	The exact character sequence from the name of the XTAG file sent by VECTOR to the ORT Toll system.
Total	80	

2.3.3 Tag Status ACK File

The ORT Host system will upload the tag status acknowledgement file to VECTOR after processing the tag status file. The ACK file is not compressed.

The file naming convention is defined as:

Naming convention: T26_{FILE_NAME}_{FILE_TYPE}.ACK

Naming formats: T26_YYYYMMDDHHMMSS_XTAG.ACK

Naming example: T26_20100601033000_XTAG.ACK

Table 2-12: Tag Status ACK File Description

Field Name	Type/Size	Description/Valid Values
FILE_TYPE	CHAR(4)	ACK
FROM_AGENCY_ID	CHAR(3)	C26
TO_AGENCY_ID	CHAR(3)	T26
ORIG_FILE_NAME_TYPE	CHAR(50)	The exact character sequence from the name of the XTAG file sent by VECTOR to the ORT toll system. Format: C26_{FILE_NAME}.XTAG
FILE_DATE	CHAR(8)	Date the toll collection system created the ACK file. Format: YYYYMMDD

Field Name	Type/Size	Description/Valid Values
FILE_TIME	CHAR(6)	Time the toll collection system created the ACK file. Associated tag status is sent to the lanes after this time. Format: HHMMSS
RETURN_CODE	CHAR(2)	A code indicating the status of the XTAG files being acknowledged. Values: 00 – File was successfully received and verified 01 – Header record found with data preventing file's use. 02 – Detail record(s) found with data preventing file's use. 07 – General file structure defect preventing file's use.
DELIMITER	CHAR(1)	LF
Total	77	

2.4 VES File Format

The ICD system will capture the images and store them in the JPEG format. The ORT Host system will assign a unique 11 character TKT_NUM for every Type 1 Violation transaction. The VES Server will collect the images from Image Capture Station (ICS) system and assign the ORT Host system TKT_NUM to each image. The VES server will rename the image files in the below format before transmission.

PPLLDNNNNNNN_Camera.jpg

Where:

PP - 2 Digit Plaza ID

LL - 2 Digit Lane Number

D – Traffic Direction 1 for North, 2 for South, 3 for East and 4 for West

NNNNNN – Six digit sequence number starts with 1, rolls over when fully used.

Camera – FRONT for front camera and REAR for rear camera

Example:

05581014562_REAR.jpg

VES Server will upload the violation image captured to the Telvent Caseta FTP Server in near real time. The Telvent Caseta FTP Server will upload the violation images to VECTOR VES server using FTP protocol in near real time. The Telvent Caseta FTP Server will purge the images immediately.

Appendix A: Acronyms

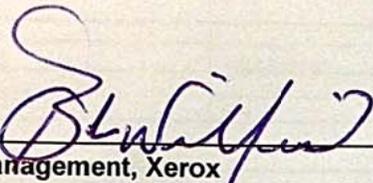
The following is a list of acronyms and their definitions.

Acronyms	Definition
AVI	Automatic Vehicle Identification
AVC	Automatic Vehicle Classification
ETC	Electronic Toll Collection
FTP	File Transfer Protocol
GZIP	GNU Zip
IAG	Interagency Group (E-ZPass)
ICD	Interface Control Document
ICS	Image Capture Station
NHDOT	New Hampshire Department of Transportation
JOM	John O. Morton Building
JPEG	Joint Photographic Experts Group
OCR	Optical Character Recognition
ORT	Open Road Tolling
VES	Violation Enforcement System
VPC	Violation Processing Center

Sign-Off Sheet

Submittal Number: NHDOT_CDRL_13_Final_ICD_ORT_Host_20130626
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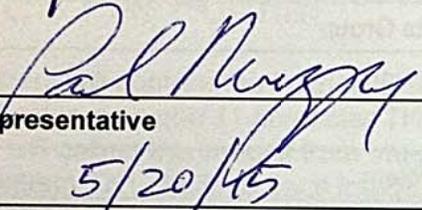
The NHDOT has reviewed this document, and based on our review, we accept this document as final. A copy of the approved submittal is attached.

Signature 
Project management, Xerox

Date 5/27/15

Signature _____
Program Management.

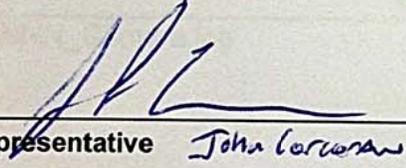
Date _____

Signature 
Telvent Representative

Date 5/20/15

Signature _____
Telvent Representative

Date _____

Signature 
NHDOT Representative *John Corcoran*

Date 5/20/15

Signature _____
NHDOT Representative

Date _____