



**DEPARTMENT OF TRANSPORT (NDOT)  
AUTOMATED FARE COLLECTION DATA  
STRUCTURE**

**REPORT FOR ALMEX TERMINAL AND  
VALIDATOR CERTIFICATION WITH  
MASTERCARD PAYPASS**

March 2012

**TECHGO**

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**KEITH SMITH CONSULTING**

*Payment Systems and Technologies*

## DOCUMENT CONTROL SHEET

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# 1 INTRODUCTION

This report describes the NDOT AFC Data Structure certification done by the NDOT Compliance Agency for terminals and validators supplied by ALMEX. The certification tests were done using Mastercard MICA PayPass cards issued by Standard Bank.

The report includes detail on the work activities performed, the test methodology used, the results of the certification test cases for each terminal and validator as well as a conclusion based on the outcome of the test cases.

The report will be submitted to the NDOT Compliance Agency and if approved, a Letter of Compliance will be issued to ALMEX.

## 1.1 Related Publications

The following publications contain information related to the contents of this document:

*AFC v1.0* NDOT AFC Datastructure V1.0 R.05

*MCTC v2.0* Mastercard Card Test Cases for NDOT AFC Data Structure Certification V2.0 R0.2

*TTC V1* Terminal Test Cases for NDOT AFC Data Structure Certification V1.0 R0.5

*VTC V2* Validator Test Cases for NDOT AFC Data Structure Certification V2.0 R0.5

## 2 CHANGE RECORD

### 2.1 Version 1.0 Revision 0.1 (20 Mar 2013)

Paragraph	Action
Document released	N/A

## 3 TEST SUMMARY

### 3.1 Work Activity summary:

8 March:

- ❖ Introductory and Planning meeting
- ❖ Mastercard PayPass Card verification to confirm DES keys
- ❖ ALMEX Ticket Office Machine (TOM)
- ❖ ALMEX OBU (On Board Unit for bus) Validator
- ❖ Closeout Meeting

### 3.2 Summary of Test Methodology

For each test case (excluding invalid card test cases), the following test methodology was followed:

1. Obtain a printout of the status of transit products stored in the NDOT AFC Data Structure on the card
2. Present the card to the terminal/validator
3. Obtain a printout of the status of transit products stored in the NDOT AFC Data Structure on the card. Compare the printouts to confirm that the card transaction was correctly processed

For invalid card test cases, the following cards were used to confirm that the terminal and validators correctly respond to the invalid card:

- ❖ A card with the AFC Data Structure and the Frame Revision = 0
- ❖ A card which does not have the AFC Data Structure
- ❖ A card with the AFC Data Structure, Frame Revision = 1 and rest of AFC Data Structure populated with random binary data

The test outcomes are recorded based on the witnessing of the tests.

## 4 TERMINAL CERTIFICATION TESTS: TICKET OFFICE MACHINE

Test Case	Pass/ Fail	Comments
TSCF-01: NOTIFY COMMUTER OF INVALID CARD IF SECURE CARD FRAME (SCF) IS NOT FOUND	Pass	
TSCF02-01: NOTIFY COMMUTER IF FRAME REVISION IS INVALID	Fail	The TOM accepts the card even if the FRAME REVISION is invalid
TSCF03-01: PERSONALISE CARD BY WRITING TO SCF	Pass	
TSFF01-01: WRITE TRANSIT PRODUCT INFORMATION TO SFF	Pass	
TSFF02-01: OVERWRITE VALID PRODUCT ONLY WITH COMMUTER'S CONSENT	Pass with Comments	If all three products on the card are still valid, the ALMEX system notifies the operator that the card is full and no further products can be loaded.
TVVF01-01: WRITE TRANSIT PRODUCT INITIALISATION INFORMATION TO VVF	Pass	
Frame Revision = 1 and random binary data on card	Pass	
Transit Product Load on non-Standard Bank cards (i.e. multiple issuer support)	Deferred	Requires bank systems and AFC vendor systems integration. ALMEX to develop accordingly. Will be tested post ALMEX completing development and internal QA Testing

## 5 VALIDATOR CERTIFICATION TESTS: OBU

Test Case	Pass/ Fail	Comments
VCS01-01: Notify Commuter of invalid card if Secure Card Frame (SCF) is not found	Pass	
VCS02-01: Notify Commuter if Frame Revision is invalid	Fail	The OBU accepts the card even if the FRAME REVISION is invalid
VGVF01-01: Write Tap-On Information to GVF	Pass	
VGVF02-01: Write Tap-Off Information to GVF	Deferred	eThekwini implementation is "Tap-On" only
VVVF01-01: Write Transit Product usage information to VVF	Pass	
VGVF03-01: Write Tap-On and Tap-Off Information in one transaction to GVF if "Tap-On Only" system	Pass	
Frame Rev = 1 and random binary data on card	Pass	
Transit Product Usage on non-Standard Bank cards (i.e. multiple issuer support)	Deferred	Requires bank systems and AFC vendor systems integration. ALMEX to develop accordingly. Will be tested post ALMEX completing development and internal QA Testing
EMV Distance Based fares on non-Standard Bank cards (i.e. multiple issuer support)	Deferred	ALMEX to develop. Will be tested post ALMEX completing development and internal QA Testing



## 6 CONCLUSION

The outcomes described in this report demonstrate that the terminal and validator tested for NDOT AFC Data Structure compliance using Mastercard MICA PayPass cards (issued by Standard Bank) have passed the certification tests on the following conditions:

- ❖ The ALMEX software be changed to reject cards having an incorrect FRAME REVISION

Subsequent to the certification testing, ALMEX has confirmed that the above has been resolved.

ALMEX must still ensure that the following functionality is supported in order to apply for full NDOT AFC certification:

- ❖ Transit Product Load on non-Standard Bank Cards (i.e. multiple issuer support)
- ❖ Transit Product Usage on non- Standard Bank Cards (i.e. multiple issuer support)
- ❖ EMV Distance Based fares on non- Standard Bank Cards (i.e. multiple issuer support)
- ❖ Support for Mastercard MCA Cards issued by Standard Bank and other banks
- ❖ Visa support for all test cases including multiple issuer support