POL00439364

Network Banking Automation Debit Card Project

Testing Strategy (Version 0.5 – Draft)

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POL00439364

POL00439364

1. Document control

1.1. Version history

VERSION	DATED	DESCRIPTION
0.1	13 September 2002	Initial issue for comment
0.2	20 September 2002	Issued for 1st informal review following comments from Andrew Thompson, Barry Forest and Peter Jones 18/9/2
0.3	30 September 2002	Comments from Andrew Thompson, Lee Farman, Torstein Godeseth
0.4	22 October 2002	Incorporating S30 aspects and updates from a Debit Card test planning review
0.5	25 October 2002	Incorporating updates from informal review by test team and Barry Forrest

1.2. Change co-ordinator

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1.3. Related documents

REFERENCE:	DOCUMENT REF.	TITLE	VERSION	DATE
[1]		POL High Level Testing Strategy	1.0	November 2001
[2]		Debit Card Service Requirements Catalogue	1.1 (draft)	June 2002
[3]		Debit Card Requirements with Acceptance Criteria for each impacted system	None	None
[4]		Compliancy Matrix	TBA	TBA
[5]		POL Incident Management Procedures	1.4	September 2002
[6]	VI/STR/052	Supplementary PTU Test Strategy for Debit Card	0.5 (draft)	October 2002
[7]		Fujitsu Debit Card High Level Test Plan		

POL00439364

2. Contents

[TOC \o "1-3" \h \z]

POL00439364

3. Executive summary

This document outlines the approach to be adopted by Post Office Ltd. for testing Debit Card functionality as part of the S30 release of Horizon and the accreditation of Horizon by Streamline. It is understood that the S30 release will include:

- Debit Card (including Streamline Accreditation)
- American date format
- Modulus 11 (stage 2 fix)
- MAILS enhancement (excluding any external interfaces)
- Remote key management
- Bug fixes for NBA R1 banking infrastructure (BI3) release

Post Office Ltd. testing will be based on witnessing supplier testing and executing additional tests where necessary. Testing will be in four distinct test threads, namely:

- **Supplier testing** – witnessing of supplier testing at Fujitsu. This will involve the agreement and execution of a witnessing plan, where we will witness tests from Fujitsu's High Level Test Plan during cycles 3, 4 & 5 of their Business Integration Testing (BIT).
- **Integration testing** – testing the interfaces between systems in supplier domains (e.g. Horizon to Streamline). This will be undertaken prior to E2E testing to prove that messages and files are transferred in accordance with the agreed AIS and TIS. It will also include a practice Streamline Accreditation.
- **E2E testing** – performing E2E functional testing across supplier domains (i.e. including Post Office Ltd, Horizon and Streamline systems and processes). E2E testing will be undertaken with code from the end of the 3rd cycle of Fujitsu's BIT. E2E testing will be undertaken in a series of 5 days cycles with the systems operating in real time (i.e. there will be no manipulation of dates or times).
- **Non-functional testing** – witnessing and auditing of testing in the areas of security (including remote key management), performance and disaster recovery. This will be undertaken by witnessing Volume and Integrity (V&I) testing at Fujitsu, and auditing evidence from Streamline.

Separate test plans will be produced for each test thread. For supplier and non-functional testing, these will be witnessing plans. For E2E and integration testing, we will produce test scenarios and scripts for each test thread.

Process walkthroughs will be conducted separately from the testing described in this document. This will be undertaken by the Business Change team within the NBA R1 programme.

POL00439364

4. Introduction

As part of the Network Banking Automation Release 1 (NBA R1) programme, the Post Office is introducing counter facilities to support the receipt of payments using Debit Cards. This facility requires connection to the Merchant Acquirer service from Streamline and an enhancement to Horizon. This will allow Horizon to operate as a Debit Card acceptance terminal. The introduction of Debit Card payment facilities is being managed as a separate project within the NBA R1 programme, with a separate business case.

It has been proposed by Fujitsu that the Debit Card is implemented as part of the S30 release which is scheduled for 1 April 2003. It is understood that the S30 release will include:

- Debit Card (including Streamline Accreditation)
- American date format
- Modulus 11 (stage 2 fix)
- MAILS enhancement (excluding any external interfaces)
- Remote key management
- Bug fixes for NBA R1 banking infrastructure (BI3) release

This document sets out to identify the scope and approach for the testing required to prove that Debit Cards can be processed successfully, both functionally and non-functionally, and to ascribe those tests to agreed testing threads.

The testing of Debit Card, however, must incorporate an element of testing for the other components of the S30 release. Also, it must be recognised that whilst extensive testing has been undertaken for BI3 (including functionality shared with Debit Card), there is a need to undertake regression testing for banking and existing Horizon functionality.

The testing will be used to support acceptance of the Debit Card functionality from Fujitsu and release authorisation of the service by Post Office Ltd. It will also be used complete Streamline Accreditation for Horizon.

The Post Office is buying a service from Fujitsu and Streamline. Fujitsu will undertake their own testing of Horizon, which we will witness. Streamline is an existing service and we will audit various aspects of their service to ensure that they meet the Post Office's requirements. In addition, we will conduct end-to-end (E2E) functional testing to ensure that the facility works within a Post Office context and to achieve full Streamline Accreditation.

4.1. Purpose of Debit Card testing

The specific purpose of Debit Card testing is to demonstrate that:

POL00439364

- valid Debit Card transactions are proved capable of being swiped or keyed and that an appropriate authorisation message is received by the originating outlet and progression to confirmation of the transaction is possible
- invalid Debit Card transactions are rejected, either at the outlet, or at the Merchant Acquirer with the appropriate error message returned to the originating outlet
- RDS updates will enable the control of Debit Card transactions through the system, but RDS itself is not being tested
- all valid Debit Card transactions are accounted for and that accurate settlement and full reconciliation is possible
- the Debit Card reference data can be maintained
- error situations (e.g. duplicate transactions) can be resolved for all impacted parts of the process (e.g. incorporating settlement adjustments)
- management information (e.g. bank analysis and outlet outcome analysis) is produced correctly
- Horizon meets Streamline Accreditation requirements
- the system meets agreed functional and non-functional acceptance criteria

4.2. Assumptions

There are a numbers planning assumptions for Debit Card testing:

- Individual (hardware and software) components will have been tested, proved and stable, as an outcome of testing BI3, before this phase commences.
- Fujitsu will undertake testing during development and will have undertaken a number of test cycles as part of their Business Integration Testing (BIT) and Volume & Integrity (V&I) testing.
- A stable testing infrastructure is in place.
- A Debit Card requirements, functional and non-functional, are defined and agreed.
- Debit Card compliancy matrix has been defined and agreed with Fujitsu.
- Debit Card acceptance criteria, functional and non-functional, are defined and agreed. These will only be agreed within Post Office Ltd., as they are not contractually binding on Fujitsu.
- The necessary resources (people, environments, test data and test cards) are available from Post Office Ltd., Fujitsu and Streamline to support the agreed testing schedule.

POL00439364

- Only signature based Debit Cards are being tested. No testing will be done for PIN based Debit Cards.
- Fujitsu are using Retail Logic which has already been type accredited by Streamline. This means that Horizon will be using a pre-validated interface to Streamline, which should reduce integration testing requirements.
- Fujitsu will undertake sufficient regression testing to demonstrate that the existing Horizon functionality, including the banking solution, will continue to work.
- Testing will use Fujitsu's NBE simulator, such that there is no involvement of IBM, LINK, Card Account or A&L.
- OPTIP and CBDB systems will not be within scope for E2E testing, although we will check the OPTIP files from Fujitsu at the POL gateway.
- The period-end and year-end reconciliation process is the same as for network banking and has been proved as part of BI3 testing.

In addition, for testing the S30 release, it is assumed that MAILS has been fully tested and released as a pilot. Hence, we are only doing a regression test for MAILS as part of Debit Card testing.

POL00439364

5. Testing approach

5.1. Overview

As Horizon is a managed service, Fujitsu will perform all the necessary testing to assure the delivered product. Post Office Ltd. will witness Fujitsu testing as required to support acceptance of the system from Fujitsu. Witnessing of Fujitsu testing will be in accordance with a witnessing plan that has been agreed between Post Office Ltd and Fujitsu. The witnessing plan will identify the relevant tests from Fujitsu's High Level Test Plan [7] that we will observe to demonstrate that Fujitsu have met the Debit Card Compliancy Matrix [4]. Witnessing of functional testing will be conducted during cycles 3, 4 & 5 of Fujitsu's BIT testing.

Non-functional testing will cover security, performance and disaster recovery (DR). This will be achieved by witnessing V&I tests at Fujitsu and auditing evidence from Streamline and Fujitsu. Witnessing of non-functional testing will be undertaken as part of cycles 2 & 3 of Fujitsu's V&I testing.

In addition, Post Office Ltd. will conduct E2E functional testing to support release authorisation and complete acceptance of the system from Fujitsu. The POL High Level Testing Strategy [1] dictates that duplication of testing should be avoided. This principle is followed within the Debit Card testing strategy, but it is recognised that E2E testing may duplicate testing already carried out by suppliers. The testing context for E2E testing, however, is such that it undertakes business scenario testing, including Post Office Ltd. systems and operational areas.

Prior to E2E testing, there will be a need to conduct integration testing to prove connectivity and messaging between Fujitsu's BTC 7 test environment and the Streamline test system. This will consist of connectivity testing and sufficient Direct Interface Testing (DIT) to prove that messages and files are being transferred with the correct data format and content. DIT will be based on the relevant Application Interface Specification (AIS) and Technical Interface Specification (TIS). This will also incorporate a practice Streamline Accreditation.

Process walkthroughs will be conducted separately from the testing described in this document. This will be undertaken by the Business Change team within the NBA R1 programme.

5.2. Test organisation

The testing will be organised into test threads, each reporting to the NBA R1 Programme Test Manager. The threads will be:

- **Supplier testing** – witnessing of supplier testing at Fujitsu. This will involve the agreement and execution of a witnessing plan, where we will witness tests from Fujitsu's High Level Test Plan during cycles 3, 4 & 5 of their Business Integration Testing (BIT).
- **Integration testing** – testing the interfaces between systems in supplier domains (e.g. Horizon to Streamline). This will be undertaken prior to E2E

POL00439364

testing to prove that messages and files are transferred in accordance with the agreed AIS and TIS. It will also include a practice Streamline Accreditation.

- **E2E testing** – performing E2E functional testing across supplier domains (i.e. including Post Office Ltd, Horizon and Streamline systems and processes). E2E testing will be undertaken with code from the end of the 3rd cycle of Fujitsu's BIT. E2E testing will be undertaken in a series of 5 days cycles with the systems operating in real time (i.e. there will be no manipulation of dates or times).

- **Non-functional testing** – witnessing and auditing of testing in the areas of security (including remote key management), performance and disaster recovery. This will be undertaken by witnessing Volume and Integrity (V&I) testing at Fujitsu, and auditing evidence from Streamline.

5.3. Testing scope

The table below identifies, at a high level, the types of testing required for Debit Cards and assigns the tests to various testing threads. A description of each test area is included in Appendix A.

Testing Area	Supplier Testing (witnessed by POL)	Integration Testing	E2E Testing	Non- Functional Testing
Interface connectivity testing	•	•		
Direct Interface Testing (DIT)	•	•		
Reconciliation and reporting	•		•	
Cash Account (including debit card transactions)	•		•	
Payment file submission & EMIS retrieval	•		•	
Card format and content validation	•		•	
Counter dialogue	•		•	
Regression testing	•		•	
Credit card transactions	•		•	
Streamline Accreditation	•		•	
MI reporting	•		•	

POL00439364

Testing Area	Supplier Testing (witnessed by POL)	Integration Testing	E2E Testing	Non- Functional Testing
MID/TID maintenance and outlet data management	•		•	
Security testing (including remote key management)	•			•
Performance testing	•			•
Volume testing	•			•
Disaster recovery & business continuity	•			•
Rollback testing	•			•

There are a numbers of areas that are out of scope, these include:

- Usability testing. No specific usability testing will be undertaken as it is assumed that the system will work to specification and that process walkthroughs will cover this area.
- MID/TID Management Set-up. This is the full load of MIDs, TIDs and corresponding FADs to all outlets.
- Validation of MID, TID FAD data.
- Testing of RDS, it is assumed to be fully working.
- Testing of POL systems (including OPTIP and CBDB). We will check files delivered to the POL Gateway, but we will not load them into OPTIP.
- Testing of the POL Gateway.

5.4. Test specification

Testing is designed to:

- Support acceptance of the system from Fujitsu and Streamline.
- Prove the integration of supplier domains.
- Support the achievement of Streamline Accreditation, demonstrating that Horizon meets the requirements for connection to the Merchant Acquirer system.

POL00439364

- Support release authorisation from Post Office Ltd, allowing S30 to go live within the business.

Acceptance of the enhancements to Horizon from Fujitsu will largely be based on witnessing Fujitsu testing against its High Level Test Plan. The development of test cases and scripts for this is a Fujitsu responsibility. The witness plan will be based on the Debit Card Compliancy Matrix [4]. It will developed by Post Office Ltd. and agreed with Fujitsu.

Acceptance of the Merchant Acquirer system will be based on auditing evidence from Streamline. Again, POL will determine the what evidence they require in consultation with Streamline.

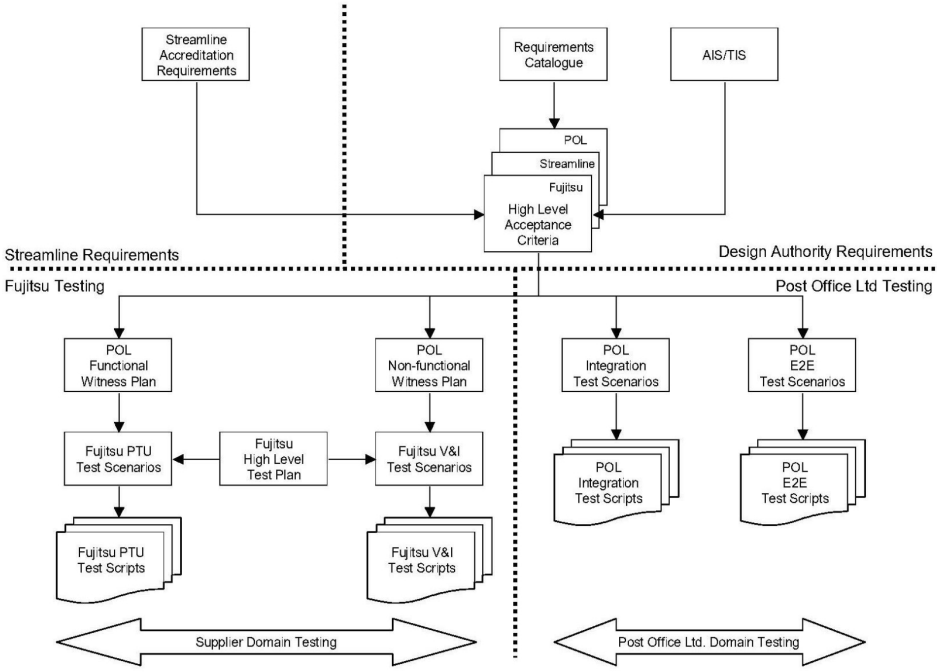
Testing the integration of supplier domains is based on the interface specifications produced by the Design Authority and agreed with the relevant suppliers. There are Application Interface Specifications (AIS) and Technical Interface Specifications (TIS) for the interfaces between Streamline, Horizon, OPTIP and RDS. For Debit Card, there are no changes to the interfaces between Horizon, OPTIP and RDS. Integration testing, therefore will focus on the interface between Horizon and Streamline. For this, we will develop test scenarios and test scripts using the agreed AIS and TIS.

Streamline Accreditation will use the test scripts and test cards developed and supplied by Streamline. Scripts will be executed from Horizon and checking will be undertaken by Streamline. A practice accreditation will be undertaken as part of integration testing, but final accreditation will be undertaken after the final code drop from Fujitsu. The execution of scripts for final accreditation will be undertaken at Fujitsu by a Streamline tester. This will be followed by detailed checking off-site by Streamline.

Release authorisation will be based on a set of high level acceptance criteria that have been defined by the Design Authority. These relate to Streamline, Fujitsu and POL. These acceptance criteria are used as the basis for developing test scenarios and test scripts for E2E testing.

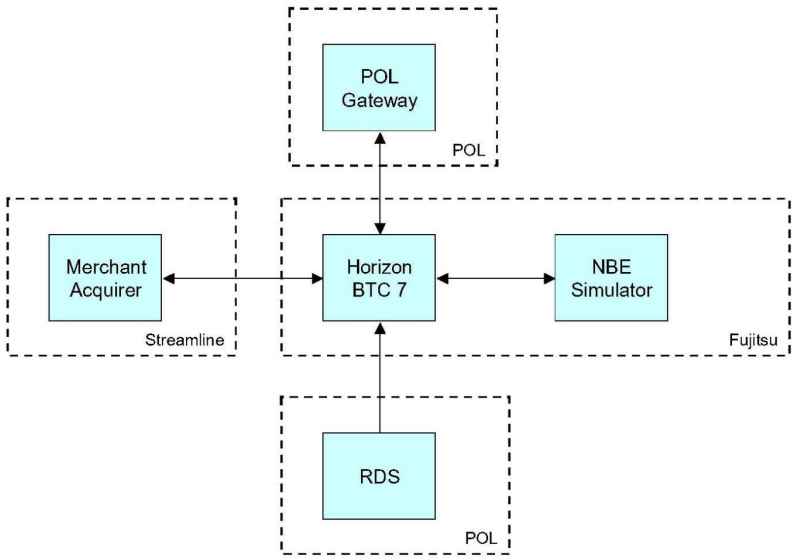
The approach for developing test scenarios and scripts is outlined in the diagram below. Test scenarios and test scripts developed by POL will be held in TestDirector, together with the Requirements Catalogue and High Level Acceptance Criteria for Debit Card.

POL00439364



5.5. Test environment

The diagram below outlines the test environment required for E2E Debit Card testing.



POL00439364

The test environment for E2E testing will consist of the BTC 7 test rig at Fujitsu, interfaced to the Streamline test system and the POL Gateway. It will not extend to include the NBE, LINK, LINK FIs, A&L or Card Account test systems. Rather, an NBE simulator will be connected to the BTC 7 rig to handle banking transactions. A more detailed schematic of the test environment is that shown in Appendix B

5.6. Incident management

The management of incidents will be supported by the use of TestDirector. Incidents will be classified and managed in accordance with the NBA R1 Test Incident Management Process [5].

5.7. Test schedule

Debit Card testing is covered in the Level 1 NBA R1 Programme Plan. It is also included in the Debit Card Project Plan.

5.8. Testing resources

Testing resources for Debit Card are documented separately in the Integration and Acceptance Testing Resource plan.

POL00439364

6. Appendix A – Testing Areas

6.1. Interface connectivity testing

Connectivity testing will be required to prove the connections between the Horizon BTC 7 test rig and Streamline prior to Direct Interface Testing (DIT).

6.2. Direct Interface Testing (DIT)

Direct Interface Testing will ensure that messages and batch files are successfully transferred with the correct format and content. This needs to be completed prior to E2E testing. It will also include a practice Streamline Accreditation.

6.3. Reconciliation & reporting

Reconciliation and reporting will be undertaken to ensure that all transactions for which Debit Card is the method of payment are fully reported and accounted for in the back end systems and reconciled with the financial institution. Testing will demonstrate that settlement figures generated at Streamline can be agreed with those in the POL gateway. This should include the settlement reports NB101, 102 and 103.

6.4. Cash account

All Debit Card payments at an outlet will be clearly identifiable on the cash account for that outlet. Debit Card transactions for payment for goods and refunds will be shown separately on the cash account.

6.5. Payment file submission & EMIS retrieval

The contents of the payment file and the EMIS will be proved by comparison of the Streamline transaction totals against Fujitsu Data Reconciliation Service.

6.6. Card format and content validation

[to be added]

6.7. Counter dialogue

[to be added]

6.8. Regression testing

Additional, limited, end-to-end testing of banking functionality will be required to ensure that the additional Debit Card functionality will not adversely impact the banking solution or existing Horizon infrastructure.

6.9. Credit card transactions

Although the Post Office does not currently intend to accept payment by credit card, testing needs to prove their acceptability. Streamline will have credit cards "turned on" in their system. We need to prove that RDS will allow us to turn the facility on and then off for live running. These will also be included in reconciliation testing to

POL00439364

prove correct accountability for credit card transactions. Testing of credit cards must also prove their rejection at the outlet, when 'turned-off' by reference data.

6.10. Streamline Accreditation

Streamline will provide a set of test cards and test scripts to support accreditation. We will need to give Streamline notification that we wish to do accreditation. Testing should only take about half a day to execute, but it will require a Streamline tester to execute the scripts at Fujitsu. It will then take Streamline about 10 days to verify the results. A practice accreditation will probably be undertaken as part of DIT, but full accreditation needs to be undertaken using the final code drop.

6.11. MI reporting

In the context of Debit Card Testing, there are two MI reports (bank analysis and outlet outcome analysis) produced in the Fujitsu domain and transmitted to Post Office Ltd. for financial control purposes. These will be verified against the Fujitsu Data Reconciliation Service for accuracy and content.

6.12. MID/TID maintenance and outlet data management

[to be added]

6.13. NBSC

As part of functional testing, a series of tests will call upon the NBSC (Network Banking Service Centre) to simulate calls from branches. This ensure that support procedures and documentation are in place and there is sufficient to support the network.

6.14. Security

There is need to assure the business that the security of the system is such that fraud can be prevented and attempted fraud detected.

- **Streamline -** Security at financial institutions such Streamline is taken very seriously and as a consequence they are reluctant to share detailed information on the subject. We therefore need acceptance criteria and formal assurance, via the contract, from Streamline that the Post Office criteria will be met. They should also be able to present evidence to support their claim, which we will audit.

- **Fujitsu** - The majority of the Horizon infrastructure will be tested satisfactorily for the banking solution. This leaves the areas of key management, encryption and authentication to be proved. It is envisaged that all these areas would be subject to witness testing by the Post Office. Security being a specialist subject means that the Post Office witness will need the appropriate level of expertise to validate the Fujitsu test results.

- **Post Office Systems** - There are no new security implications affecting Post Office Systems.

POL00439364

6.15. Performance testing

The purpose of this testing is to prove that the system will withstand and successfully process peak transaction loading, within the appropriate response times back to the outlet. Witness testing of tests using a Fujitsu transaction simulator will suffice.

There are three components involved:

- **Horizon infrastructure** – It is assumed that banking will have stressed the infrastructure sufficiently to provide confidence that this component will support peak loads for Debit Cards.
- **Retail logic** – As this is within the Fujitsu domain, Fujitsu must run tests using a simulator and provide a witnessing facility to Post Office Ltd.
- **Streamline** – A testing facility for this purpose is not available from Streamline. We will need a formal statement from Streamline that they will be capable of processing peak loads within our predicted transaction volumes. Performance testing will audit this evidence.

6.16. Volume testing

The purpose of this testing is to prove that all the system's storage components will be capable of holding and processing the data to a volume at least equal to highest predicted volumes.

There are three components involved in volume testing:

- **Streamline** - As no facilities exist from Streamline to conduct volumes testing of their system we will require a contractual item to assure the Post Office of Streamline's ability to support the predicted volumes. Streamline will be expected to provide evidence to support their assurance and POL will audit the evidence. Acceptance criteria should be documented for this.
- **Fujitsu -** As part of the banking solution Fujitsu will have conducted volume testing, to the Post Office's satisfaction, for the major part of the Horizon infrastructure. However, there remains the interface from Horizon, via the Retail logic application to Streamline. The suggested test environment for this would be for Fujitsu to use two simulators. One simulator to inject Debit Card transaction into Horizon and another simulator to simulate Streamline. The Post Office will document acceptance criteria and witness the testing in this area.
- **Post Office Systems -** As part of the banking solution testing, a "double day" test will be performed. This test involves loading two day's worth of data (high volume days are chosen) and ensuring that all processing can be completed successfully within the appropriate production window. The success of this test will be taken as sufficient evidence that the systems will cope with Debit Card transaction to the currently predicted volumes

POL00439364

6.17. Disaster recovery and business continuity

The loss of Debit Card acceptance for a finite period is not likely to be business critical therefore, in that context, testing will be limited to auditing of the plans available from the suppliers, as described below.

There are three major components at risk in this area. They are:

- **Loss of Fujitsu campus** - This part of the infrastructure has built in resilience with two sites and multiple clusters. Extensive testing will have been carried out for the general Horizon infrastructure and the banking application. Therefore no additional, Debit Card specific testing is required.

- **Loss of Merchant Acquirer site -** Streamline does not provide facilities to do DR testing. They have a second site to which they switch transactions in the event of the failure of the primary site. What Post Office Ltd. require is an assurance that adequate plans and procedures are in place and audit evidence to support the assurance. We will also need to prove connectivity to the DR site.

- **Loss of Retail Logic application -** There are four separate instances of the application each supporting about one quarter of the outlets. The application is subsumed into the Horizon infrastructure. Witnessing of Fujitsu testing by Post Office Ltd. will be necessary to ensure that that controlled recovery of data is achieved or reconciliation possible if the application fails.

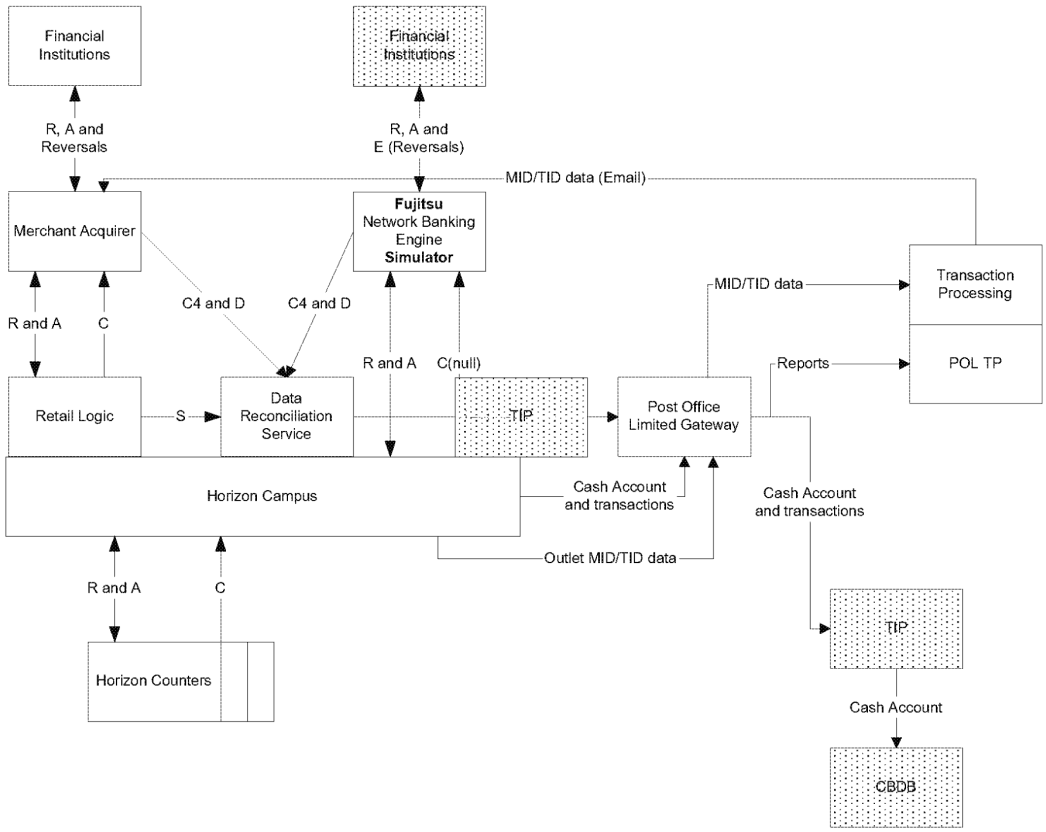
6.18. Rollback testing

Fujitsu will demonstrate to Post Office Ltd. that they have adequate version control in place.

POL00439364

7. Appendix B - Overview of systems scope

Shaded boxes will not be directly involved in the testing. The NBE would be simulated for regression testing. Files from the MA will be delivered to the POL gateway for input to TIP and CBDB and would be checked manually for accuracy at the Gateway.



POL00439364

POL00439364

8. Appendix C - Risks

The following table details the potential risks for the business associated with using the above approach and the imposed constraints.

Constraints/ Considerations	Risk	Mitigating Factors
Real-time testing	• Unable to develop all Ref Data changes in advance as date will be always moving • The planning of key events is dependent upon no slippage in start date of each run • The planning of key events is dependent upon no slippage within each run once started • This restricts options if better than planned progress occurs • If slippage occurs prior to commencement re-planning and Ref Data changes will be required which may not be achievable • If slippage occurs during a cycle re-planning and Ref Data changes will be required which may not be achievable • Some key events, e.g. financial year end will not be possible • Limited ability to produce weekly/monthly reports with accurate expected results • Opportunities to run some tests which rely on cash account week/period ends will be limited and may be missed altogether if the system is unavailable that day. Some weekly/monthly reports therefore may not be fully tested. • NB103 not fully tested and anomalies cause discrepancies between Post Office limiter's financial ('T' and 'S' ledger reconciliation) ledgers.	• Reference Data changes for Bank Card data (of which Debit Cards is a subset), will have been tested as part of the NB Release 1 testing • Daily reconciliation reports would be fully tested and the weekly NB103 would have been tested as part of the NB Release 1 testing. • Witnessing of Fujitsu system testing could be performed to give confidence in areas of concern, e.g. reconciliation.

POL00439364

Constraints/ Considerations	Risk	Mitigating Factors
No TIP involvement	• Debit Card transactions cause TIP to reject transaction files	• Unlikely - Debit Card transactions could be checked for correct format/content manually as part of testing. • No change to Horizon to TIP interface
No CBDB involvement	• Debit Card cash account lines rejected by CBDB	• Highly unlikely – existing interface/process between TIP and CBDB.
No Reference Data Changes tested	• Debit Card data changes not correctly actioned by Horizon	• Interface to Horizon from RDS not changing for Debit Cards, all changes will be tested as part of NB Release 1. • Witnessing of Fujitsu system testing could be performed to give further confidence for Debit Card changes.

POL00439364

9. Glossary of Terms

AIS	Application Interface Specification
BI3	Banking Increment 3
BIT	Business Integration Testing
DIT	Direct Interface Test
E2E	End-to-end
EMIS	Electronic Management Information System
FAD	Financial Account Division – unique per outlet allocated by Post Office Ltd.
MA	Merchant Acquirer – Streamline
MID	Merchant Identifier – unique code per outlet allocated by Streamline
NBE	Network Banking Engine
PTU	Pathway Test Unit – test cycles defined and executed by Fujitsu
RDS	Reference Data System
TID	Terminal Identifier unique code per outlet terminal allocated by Streamline
TIS	Technical Interface Specification
V&I	Volume & Integrity