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EMV – Banking and Retail

NBX- CAPO Application Interface Specification (AIS)

ROLE	NAME	AREA OF RESPONSIBILITY	SIGNATURE	DATE
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1 Document Control

1.1 Document Information

Horizon Release No:	S75
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Abstract:	This document details the application interface between the Horizon domain and Post Office Card Account, including the interface to the ICC
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Table 1: Document Information

1.2 Document History

Version	Date	Reason for Issue	Associated WP / CT
0.1	8 Oct 2003	First working draft. Based on document produced by IBM for NBE interfaces and including the interface between Horizon and the ICC	
1.0	15 Oct 2003	First issued version.	
1.1	12 Nov 2003	Updated following comments from Citibank, also update section 1.7 and removal section 2.5	
1.2	02 Dec 2003	Updated following joint review on 27 Nov	
1.3	26 Jan 2004	Updated following actions from joint review 27/11/03, responses to questions and discussions with Citibank on reversals and Appendix B	
1.4	7 Apr 2004	Updated following series of clarifications	
1.5	12 May 2004	Updated following clarification from Citibank	
1.6	17 Aug 2004	Updated with latest agreed changes	

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2.0	08 Oct 2004	Issued for Sign-off	
2.1	25 May 2005	Updated for minor corrections discovered during testing prior to initial release at Horizon release S75	
2.2	04 Aug 2005	Version ready for Sign-off	
3.0	15 Aug 2005	Issued for Sign-off	

Table 2: Document History

1.3 Change Process

Any changes to this issued version of this document will be made, controlled and distributed by: -

David Gray via Post Office Document Management

[IT.Controlled.Document.Review] GRO

1.4 Review Details

Review Comments by :	
Review Comments to :	Rex Dixon, Fujitsu Services

Mandatory Review Authority	Name
Post Office Ltd	Beverley Dunn, David Gray
Fujitsu Services Ltd	
Analysis & Solution Specification	Allan Hodgkinson
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1.5 Changes in this Version

Version	Changes
3.0	Gill Jackson added as signatory for Fujitsu Services
2.2	Changed as a result of comments received: Some persons replaced or removed; copyright statement updated
2.1	Sections 6.4, 6.4.1.1, 6.4.1.2, 6.4.1.3 – Deleted the word "consecutive" when referring to the 6th key synchronisation error, as its use was inconsistent with section 4.7.5 of the TIS [Ref. 5]. [FS Peak 110530]

Table 3: Changes in this Version

1.6 Key Contacts

Name	Position	Phone Number
Bob Booth	Solutions Architect	GRO

Table 4: Key Contacts

1.7 Associated Documents

	Reference	Version	Date	Title	Source
	ISO8583:1987(E)		Aug 1987	Bank Card Originated Messages	ISO
	SU/PLA/016	0.3		NBX Volume Model Comparisons	Post Office
	NB/IFS/031			Horizon – Card Account Mapping	Post Office
	NB/IFS/030			NBX – FI Reconciliation and Settlement File Format AIS	Post Office
	NB/IFS/027			NBX – POCA Technical Interface Specification (TIS)	Post Office
	NB/OLA/001			Horizon – EDS Operational Level Agreement	Post Office
	NB/IFS/035			NBX Business Parameters	Post Office
	ATCRM	424645-002	July 2003	Atalla Banking Command Reference Manual	Hewlett Packard

Table 5: Associated Documents

Unless a specific version is referred to above, reference should be made to the current approved versions of the documents.

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2 Introduction

2.1 Purpose

The purpose of this document is:

- To specify the interface between the NBX and CAPO systems using ISO 8583 (1987), [Ref. 1].
- To provide the development teams with sufficient detail to develop the NBX - CAPO interface.
- To provide a consistent communications vehicle amongst the development teams who have responsibility for developing the various components comprising the application.

2.2 Scope

This document applies to the interface between the NBX and CAPO only. It includes only those financial transaction messages and network messages sufficient to support the financial services being delivered by CAPO via the NBX.

2.3 Structure

Section 3 contains a high level overview of the NBX – CAPO interface and its context.

Section 4 contains a detailed description of the messages to be exchanged, and the derivation and use of the exchanged data items. All data items exchanged are specified in ISO 8583 (1987), [Ref. 1].

Section 5 contains details of the data transfer.

Section 6 contains details of security of the exchanged data items. This section identifies the security needed for each data item (e.g. encryption) and details of the method to be used.

Section 7 contains any relevant details of operational procedures relating to the interface.

2.4 Terms and Abbreviations

Not used.

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3 Overview of the Interface

3.1 Data Description

The following messages are exchanged over the NBX - CAPO interface:

NBX Message ID	Description	Direction
[R3]	Authorisation / Financial Transaction Request: • Balance Enquiry (0100) • Withdrawal with Balance (0200) • Withdraw Limit (0200). Also sometimes referred to as "Withdraw All". • PIN Change (0100)	NBX -> CAPO
[A1]	Authorisation/Financial Transaction Request Response: • Balance Enquiry Response (0110) • Withdrawal with Balance Response (0210) • Withdraw Limit Response (0210) • PIN Change Response (0110) Each of the above will have a response code that indicates approve or decline with reason and any required action (e.g. card retention).	CAPO -> NBX
[E1]	Reversal Request: • Acquirer Reversal Request (0420) • Acquirer Reversal Request Repeat (0421)	NBX -> CAPO
[E2]	Acquirer Reversal Request Response Message (0430)	CAPO -> NBX
0500/0510	Reconciliation control messages These messages are to be excluded.	NBX -> CAPO CAPO -> NBX

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0620	Administration Advice (0620) Administration Advice messages (0620) are sent to/from CAPO when a received message cannot be de-blocked, in order to initiate manual investigation of a problem by either CAPO or the NBX	NBX CAPO	-> ->	CAPO NBX
0800	Network Management Request (0800): • Handshake (also known as Echo tests) • Logon / Logoff (also known as Sign on / Sign off) • Security Key Change	NBX	->	CAPO
0810	Network Management Request Response (0810)	CAPO	->	NBX
REC	Reconciliation File (The REC settlement file and the conditions under which it is sent from the NBX to CAPO are addressed in the NBX – FI Reconciliation and Settlement, [Ref. 4].)	NBX	->	CAPO

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3.2 Derivation and Use of Data

The messages listed in section 3.1 are generally exchanged as a result of a transaction initiated either by a clerk at a Post Office outlet or by CAPO. The NBX acts as a message router, filtering messages based on business rules and transforming received messages into the appropriate format for forwarding to the next system in the message sequence.

The following table shows the derivation and use of each message exchanged between the NBX and CAPO in terms of the received message that causes each NBX - CAPO message to be exchanged, and the transmitted message resulting from the NBX - CAPO message exchange:

Message Sequence						
Horizon Outlet		**Horizon Campus**		**NBX**		**CAPO**
	[R1] →		[R2] →		0100/0200 [R3] →	
	← [A3]		← [A2]		← 0110/0210 [A1]	
[C0] →			Expedited [C2] →		0420/0421 [E1] →	
					← 0430 [E2]	

The messages exchanged over this interface relating to reconciliation and settlement are initiated by the NBX.

Security key exchange messages are initiated by the NBX and acknowledged by CAPO. The NBX will send a new working key, for each of its PIs, to CAPO at least once in every 24-hour period. The business processes with respect to these messages are addressed in section 6.4. The following table shows a high-level description of the security messages exchanged between CAPO and the NBX. The full list of 0800 messages initiated by the NBX, and acknowledged by a 0810 response from CAPO, can be found in section 4.2.10.

Message Sequence						
Horizon Outlet		**Horizon Campus**		**NBX**		**CAPO**
				0800 (Logon 071)	→	
					←	0810
				0800 (Key Change - Acquirer zone code 161)	→	
					←	0810
				0800 (Key Change -	→	

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				Acquirer zone code 161)		
					←	0810

Logoff messages are initiated by the NBX and acknowledged by CAPO, as shown in the following table.

Message Sequence						
Horizon Outlet		**Horizon Campus**		**NBX**		**CAPO**
				0800 (Logoff 072)	→	
					←	0810

Handshake messages are initiated by the NBX and acknowledged by CAPO, as shown in the following table.

Message Sequence						
Horizon Outlet		**Horizon Campus**		**NBX**		**CAPO**
				0800 (Handshake 361)	→	
					←	0810

Administration Advice messages are sent from NBX to CAPO when a received message cannot be deblocked or when a message fails syntax checking, in order to initiate manual investigation of a problem by either CAPO or the NBX. CAPO will not generate Administration Advice messages, but NBX will correctly handle their receipt. The following table shows the possible message flows.

Message Sequence						
Horizon Outlet		**Horizon Campus**		**NBX**		**CAPO**
					←	XXXX
				0620	→	

3.3 Non Computer Data

All data being transported across this interface is originated/received from a connected computer system or from reference data (supplied by the Post Office Limited RDS or held internally within the NBX).

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4 Data Items

4.1 Data Item List

4.1.1 General Message Element Definitions and Abbreviations

The following section summarises the list of CAPO Message Elements for each group of transactions, together with which message(s) they are present in. Each message is classified and identified using the RAC (Request / Authorise / Confirm) model. Each message element references the corresponding ISO 8583 bitmap position.

The ISO 8583 bit map reference has been included for ease of reference.

The abbreviations used to describe the format and attribute of each data element (DE) and Data Sub-elements are shown in the following table (taken from ISO 8583 (1987), [Ref. 1]):

Notation	Explanation
a	Alphabetic characters only (mixed case)
n	Numeric Digits only
s	Special characters
an	Alphabetic (mixed case) or Numeric characters
as	Alphabetic (mixed case) or Special characters
ns	Numeric or Special characters
ans	Alphabetic (mixed case), Numeric or Special characters only
DD	Day
MM	Month
YY	Year
hh	Hour
mm	Minutes
ss	Seconds
LL	Length of variable field that follows represented using two characters
LLL	Length of variable field that follows represented using three characters
VAR	Variable length field
3	Fixed length field (e.g. 3 characters in this example)
.. 10	Variable length field (e.g. up to a maximum of 10 characters in this example). LL or LLL to indicate the actual length of the field will prefix all variable length fields.
h	hexadecimal representation of the data
z	track 2 data as defined by ISO 7811 and ISO 7813
x	Sign – C (credit) or D (debit)

The Field Size column gives the number of characters (octets) required for the data item, as shown in the table below.

Abbreviation	Description
3	Fixed Length field. Numeric fixed length fields are right justified and zero padded. Fixed length string fields are left justified and space padded.
.. 10	Variable length field (up to a maximum of 10 characters in this example).

Notes:

- Fixed length numeric fields are unpacked, right justified and zero filled.
- Fixed length alphanumeric fields are left justified and space filled.

The “Required” column indicates whether the field is Mandatory or Conditional for the messages defined in this AIS. For conditional fields, the field description should indicate under what circumstances the data for the field should be populated or omitted from the message.

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The “Description” column contains a brief description of the field, as used in the messages defined in this AIS, together with any additional comments.

CAPO will operate in Mixed case, and will not validate the Alphabetic characters for case in any field. However, where data is echoed or copied in messages, the echoed/copied fields should be in the same case as the original field.

The POCA Servers and the NBX Servers both use the ASCII English character set (CCSID = 437).

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4.1.2 Messages Data Elements

The ISO 8583 (1987) Data Elements exchanged within messages over this interface are listed below. A fuller description is given in the ISO 8583 (1987) Standard, [Ref. 1]. Note that data elements pertaining to the tertiary bitmap are not used on this interface.

ISO 8583 (1987) Data Element	Bitmap Ref.	Format	Attribute	Field Size	Source	Description	Required								
							[R3] 0100	[R3] 0200	[A1] 0110	[A1] 0210	[E1] 0420 /0421	[E2] 0430	0620	0800	0810
Account Identification 1	102		ans	.. 28		Not used by NBX									
Account Identification 2	103		ans	.. 28		Not used by NBX									
Acquiring Institution Country Code	019		n	3		Not required for NBX transactions									
Acquiring Institution Identification Code	032	LLVAR	n	.. 11	NBX from Ref Data	Code identifying the Acquirer (Post Office Limited), set to 2200040000	M	M	M	M	M	M			
Additional Amounts	054	LLLVAR	an	.. 120	Bank	The Ledger and Available balances if the request was authorised (Response Code=00), or declined because of insufficient funds (Response Code=51), in the following format: Account Type (n2) = 00 (Funding (default) account) Amount Type (n2) = 01 (Account ledger balance) Currency Code (n3) = 826 (GB Pounds) or 978 (Euros) Amount (x+n12), where x = 0, C (Credit amount) or D (Debit amount) Account Type (n2) = 00 (Funding (default) account) Amount Type (n2) = 02 (Account available balance) Currency Code (n3) = 826 (GB Pounds) or 978 (Euros) Amount (x+n12), where x = 0, C (Credit amount) or D (Debit amount) Not required for PIN Change transaction. This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].			C	C					

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Additional Response Data	044	LLVAR	an	.. 25	Bank	Mandatory if Response Code=30. Positions 1-3 are the bit number of the field in error. This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].			C	C		C			
Advice / Reversal Reason Code	060	LLLVAR	an	.. 9	NBX	This field will only be used for reversal reason. Bytes 1-2 will always be set to 80 Bytes 3-4 will be used to give a meaningful reason for the reversal. See Appendix A for the list of Reversal Reason Codes. The remaining bytes will not be transmitted. This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].					M				
Amount, Cardholder Billing Fee	008		n	8		Not required.									
Amount, Settlement	005		n	12		Not required.									
Amount, Transaction	004		n	12	Clerk at Outlet	Decimal amount in smallest unit of the specified currency (i.e. GBP pence or EUR cents) Not required for Balance Enquiry or PIN Change. For Withdraw Limit, this will be set to the Product Limit, passed by Horizon in the Maximum_Withdrawal message element.		M		M	M	M			
Amount, Transaction Fee	028	x+n8	an	9		Not required.									
Amount, Transaction Processing Fee	030	x+n8	an	9	Bank	Used to indicate the fee charged by CAPO. If no fee is to be charged, the field will be set to zero. This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].			M	M	M				
Approval Code Length	027		n	1		Not required.									
Authorisation Identification Response	038		an	6		CAPO will issue an authorisation number for every transaction processed, and will want it returned in 0420/0421 processing requests.			M	M	M				
Authorisation Identification Response Length	027		n	1		Not required as the Authorisation Identification Response length is to always be set to 6 characters.									

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Card Acceptor Name / Location	043		ans	40	NBX from Ref Data	First 40 characters of outlet address in format: 01-23 first 23 characters of Name and Address (= first 23 chars of ADDRESS 1) 24-36 first 13 characters of City (= first 13 characters of ADDRESS 4) 37-38 spaces 39-40 spaces	M	M			M				
Card Acceptor Terminal Identification	041		ans	8	Outlet from system	Comprises 6 digit outlet id (group_id) + 2 digit terminal id (node_id)	M	M	M	M	M	M			
Card Sequence Number	023		n	3		Not required.									
Conversion Rate, Settlement	009		n	8		Not required.									
Currency Code, Settlement	050		an	3		Not required.									
Currency Code, Transaction	049		an	3	Clerk at outlet	Only 826 (GBP) will be accepted by CAPO initially. NBX will translate GBP code received from Horizon to 826 (using ISO 4217 standard) for CAPO. Other values (e.g. 978/EUR) may be added to Currency Code CPF Table if required at a later date, and will be translated in the same way.	M/O	M	M/C	M	M	M			
Date, Conversion	016		n	4		Not required.									
Date, Expiration	014		n	4		Not required.									
Date, Local Transaction	013	MMDD	n	4	Outlet from System	As printed on receipt, transaction request date in Local Time.	M	M	M	M	M	M			
Date, Settlement	015	MMDD	n	4	NBX	NBX always set the Settlement Date. Set to system date if before settlement cutover time (from Ref Data), or system date + 1 if after settlement cutover time. This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].		M		M	M	M			
Forwarding Institution Country Code	021		n	3		Not required.									
Forwarding Institution Identification Code	033		n	.. 11		Not required, since NBX is an Acquirer									

[1] Conditional on ICC point of service

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ICC Data	055		h	510		Mandatory where point of service entry mode (bit 022), digits 1 and 2 = 05 ICC Data elements for this bit field are in Appendix B.	[1]C	C							
Info Text	124	LLLVAR	ans	.. 255	Sender	Contains the first 255 bytes of the message rejected by the sender (either NBX or CAPO). This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].							M		
Message Security Code	096		an	8	Sender	Password to network management requests Required for key change, logon and logoff Note – Not used by CAPO								C	
Network International Identifier	024		n	3		Not required.									
Network Management Information	125	LLLVAR	ans	.. 60	Sender	Additional information required for key change and verification. Positions 01-32=32 byte working key (encrypted under the Acquirer Zone Master Key using Atalla variant 1), 33-36=check value (4 bytes), 37-38 check value padding (zeroes),39-60 Spaces (optional). [Note – 4 byte check value used because Atalla only returns 4 bytes] This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].								C	
Network Management Information Code	070		n	3		Codes to be used for 0800/0810 messages are defined in section 4.2.10							M	M	M
New PIN (Reserved for Private Use)	123	LLLVAR	ans	.. 999	Customer at Outlet	This field will be used to hold the Customer choice of new PIN on PIN Change. Positions 1-2 set to Authorization Type=NP, positions 3-18 set to the new PIN (encrypted using ISO 9564-1 Format 0 as defined in ANSI X9.8). This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].	C									

[1] Conditional on ICC point of service

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Original Data Elements	090		n	42	NBX	Set by NBX to be a concatenation of the following five data elements from the original 0100/0200 message: Message Type Identifier (n4), Systems Trace Audit Number (n6), Transmission Date and Time (n10), Acquiring Institution Identification Code (n11), Forwarding Institution Identification Code (n11, and set to 00000000000 for CAPO)					M	M			
Personal Identification Number (PIN) Data.	052		h	16	Outlet from customer	Customer PIN Entered by customer & encrypted using ISO 9564-1 Format 0 as defined in ANSI X9.8. This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].	M	M							
Point of Service Condition Code	025		n	2	Outlet	The value should initially always be 00.	M	M	M	M	M	M			
Point of Service Data	061		ans	20		Not required.									
Point of Service Entry Mode	022		n	3	Outlet from system	Digits 1-2 will be: 01 (Manual entry) or 05 (ICC entry (including track 2 read and transmitted)) or 90 (Mag Stripe, Track 2 read and fully transmitted) Digit 3 = 1 (PIN entry capability).	M	M			M				
Point of Service PIN Capture Code	026		n	2		Not appropriate to messages passed on this interface - POS Transactions Only									
Primary Account Number	002	LLVAR	n	.. 19	System or Clerk at Outlet	Either extracted from Track 2 data or entered manually.	M	M	M	M	M				
Primary Account Number, Extended	034		ns	28		Not required.									
Primary Account Number Extended, Country Code	020		n	3		Not required - foreign currency transactions are not supported by NBX									

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Processing Code	003		n	6	NBX	Derived by NBX from Txn_type passed by Horizon. NBX will set digits 1 and 2 to 01 for Withdrawal with Balance, 91 for Withdraw Limit, 90 for PIN Change and 31 for Balance Enquiry. Digits 3 to 6 will be set to zero (default). All 6 digits passed by NBX and CAPO.	M	M	M	M	M	M			
Receiving Institution Country Code	068		n	3		Not required - foreign currency transactions are not supported by NBX									
Receiving Institution Identification Code	100		n	11		Not required.									
Response Code	039		an	2		Code indicating transaction step outcome. Source dependent on transaction type. See Appendix A for the list of Response Codes.			M	M		M			M
Retrieval Reference Number	037		an	12	NBX	Additional transaction identifier, assigned by NBX. It will be unique for a terminal ID, at least within 10 years. Bytes 01-04 set to date (YDDD) Byte 05 set to value A or B (upper or lower case) to record which of two agents processed the message (the case differentiates between instances of the agent) Digit 06 set to value 0 through 3 (being agent hash value used in routing transactions) Digits 07-12 set to a 6-digit cycling number generated at each counter	M	M	M	M	M	M			
Systems Trace Audit Number	011		n	6	NBX	Transaction identifier, assigned by NBX within the request, and included in all subsequent messages relating to that transaction ([A1] response and [E1] / [E2] reversal messages). The STAN is a 6 digit numeric field 0 to 999999. Each PI manages its own STAN which increments by one to provide a sequential identifier for each message. The STAN may cycle within the day but will be unique within the period of the NBX PI context file. EBT does not use this field directly, but it is used by Citibank's back office operations' tracking systems Gaps in the STAN sequence have no significance (and thus will not cause alerts in EBT)	M	M	M	M	M	M	M	M	M
Time, Local Transaction	012	hhmmss	n	6	Outlet from System	As printed on receipt, transaction request time in Local Time	M	M	M	M	M	M			

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Transmission Date and Time	007	MMDDhhmmss	n	10	Sender	Date and time of transmission of the message (not carried forward from previous messages)	M	M	M	M	M	M	M	M	M
Track 2 Data	035	LLVAR	z	.. 37	Outlet from card	Mandatory if track 2 data available (card successfully swiped or ICC processed). Track 2 data does not include the start/end sentinels nor the LRC (longitudinal redundancy check) This usage of the field is an extension to the base ISO 8583(1987) standard, [Ref. 1].	C	C			C				

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4.2 Data Interpretations

This section contains the definition of each message type to be sent over this interface. The Message Element column lists those elements required for the message, and relate to the list in Section 4.1.2.

The Required column in the message definition tables within this section contain the following codes:

Code	Meaning
M	The element is mandatory and must be present in this message
C	The element is conditional for this message, and the condition to be applied is stated in the Conditions column. If the condition is true, the element must be present in the message; otherwise the element must not be present in the message. It should be noted that the receiving system may not be able to assess whether the condition has been met, in which case it must be able to interpret the presence or non-presence of the element according to appropriate business rules.

The Conditions column lists the conditions for inclusion of a conditional message element; inclusion of the element may depend on details of the transaction type, or simply whether the data is available to the sending system.

Where Message Elements exist in the ISO8583 standard (1987 Version), [Ref. 1] as either Mandatory or Conditional, but are not required for the CAPO interface, they have been included in the message definition tables, but have been shaded out and labelled as “Not required”.

It is essential that developers of this interface also refer to ISO 8583 (1987), [Ref. 1] and the Horizon – Card Account Mapping, [Ref. 3] for further details of data derivation and use. The message definitions do not explicitly show the bitmaps as individual message elements, because they are an essential part of the ISO 8583 (1987) transfer structure. However, all messages passed over this interface will include bitmap 1. Bitmaps will be formatted as binary.

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4.2.1 [R3] - Balance Enquiry

4.2.1.1 Overview

This message is sent by the NBX to CAPO. The message requests a Balance Enquiry transaction.

The [R3] Balance Enquiry message maps to the following ISO message:

- 0100 – Authorisation Request

4.2.1.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Primary Account Number	002	M	
Processing Code	003	M	310000 for Balance Enquiry.
Amount, Transaction	004		Not required.
Transmission Date and Time	007	M	
Systems Trace Audit Number	011	M	
Time, Local Transaction	012	M	
Date, Local Transaction	013	M	
Date, Expiration	014		Not required.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Point of Service Entry Mode	022	M	
Card Sequence Number	023		Not required.
Point of Service Condition Code	025	M	
Point of Service PIN capture code	026		Not required.
Approval Code Length	027		Not required.
Amount Transaction Fee	028		Not required.
Acquiring Institution Identification Code	032	M	
Forwarding Institution Identification Code	033		Not required.
Primary Account Number, Extended	034		Not required.
Track-2 Data	035	C	Mandatory if track data is available (ICC processed or card successfully swiped).
Retrieval Reference Number	037	M	
Card Acceptor Terminal Identification	041	M	
Card Acceptor Name / Location	043	M	
Currency Code, Transaction	049	M	
Personal Identification Number (PIN) Data	052	M	
ICC Data	055	C	Mandatory if ICC processed
Point of Service Data	061		Not required.
Receiving Institution Country Code	068		Not required.
Receiving Institution Identification Code	100		Not required.

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4.2.2 [R3] - Financial Transaction Request

4.2.2.1 Overview

This message is sent by the NBX to CAPO. The message requests a financial transaction of one of the following types:

- Withdrawal with Balance.
- Withdraw Limit.

The [R3] Financial Transaction Request message maps to the following ISO message:

- 0200 - Financial Transaction Request.

4.2.2.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Primary Account Number	002	M	
Processing Code	003	M	010000 for Withdrawal with Balance. 910000 for Withdraw Limit.
Amount, Transaction	004	M	Requested Amount for "Withdrawal with Balance". For "Withdraw Limit", this will be set to the Product Limit.
Amount, Settlement	005		Not required.
Transmission Date and Time	007	M	
Conversion Rate, Settlement	009		Not required.
Systems Trace Audit Number	011	M	
Time, Local Transaction	012	M	
Date, Local Transaction	013	M	
Date, Expiration	014		Not required.
Date, Settlement	015	M	
Date, Conversion	016		Not required.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Point of Service Entry Mode	022	M	
Card Sequence Number	023		Not required.
Point of Service Condition Code	025	M	
Point of Service PIN Capture Code	026		Not required.
Authorisation Identification Response Length	027		Not required.
Amount, Transaction Fee	028		Not required.
Acquiring Institution Identification Code	032	M	
Forwarding Institution Identification Code	033		Not required.
Primary Account Number, Extended	034		Not required.
Track-2 Data	035	C	Mandatory if track data is available (ICC processed or card successfully swiped).
Retrieval Reference Number	037	M	
Response Code	039		Not required.
Card Acceptor Terminal Identification	041	M	
Card Acceptor Name / Location	043	M	
Currency Code, Transaction	049	M	
Currency Code, Settlement	050		Not required.
Personal Identification Number (PIN) Data	052	M	
ICC Data	055	C	Mandatory if ICC processed.
Point of Service Data	061		
Receiving Institution Country Code	068		Not required.

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Receiving Institution Identification Code	100		Not required.
Account Identification 1	102		Not required.
Account Identification 2	103		Not required.

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4.2.3 [R3] - PIN Change

4.2.3.1 Overview

This message is sent by the NBX to CAPO. The message requests a PIN Change transaction.

The [R3] PIN Change message maps to the following ISO message:

- 0100 – Authorisation Request.

4.2.3.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Primary Account Number	002	M	
Processing Code	003	M	900000 for PIN Change
Amount, Transaction	004		Not required.
Transmission Date and Time	007	M	
Systems Trace Audit Number	011	M	
Time, Local Transaction	012	M	
Date, Local Transaction	013	M	
Date, Expiration	014		Not required.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Point of Service Entry Mode	022	M	
Card Sequence Number	023		Not required.
Point of Service Condition Code	025	M	
Point of Service PIN capture code	026		Not required.
Approval Code Length	027		Not required.
Amount, Transaction Fee	028		Not required.
Acquiring Institution Identification Code	032	M	
Forwarding Institution Identification Code	033		Not required.
Primary Account Number, Extended	034		Not required.
Track-2 Data	035	C	Mandatory if track 2 data is available (ICC processed or card successfully swiped).
Retrieval Reference Number	037	M	
Card Acceptor Terminal Identification	041	M	
Card Acceptor Name / Location	043	M	
Currency Code, Transaction	049	O	Omitted by NBX.
Personal Identification Number (PIN) Data	052	M	The “old” PIN.
ICC Data	055	C	Mandatory if ICC processed
Point of Service Data	061		
Receiving Institution Country Code	068		Not required.
Receiving Institution Identification Code	100		Not required.
New PIN (Reserved for Private Use)	123	M	The “new” PIN.

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4.2.4 [A1] - Balance Enquiry Response

4.2.4.1 Overview

This message is sent by CAPO to the NBX. The message contains a Balance Enquiry request response.

The [A1] Balance Enquiry Response message maps to the following ISO message:

- 0110 – Authorisation Request Response.

4.2.4.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Primary Account Number	002	M	Echoed from the request message.
Processing Code	003	M	Echoed from the request message.
Amount, Transaction	004		Not required.
Transmission Date and Time	007	M	
Systems Trace Audit Number	011	M	Echoed from the request message.
Time, Local Transaction	012	M	Echoed from the request message.
Date, Local Transaction	013	M	Echoed from the request message.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Network International Identifier	024		Not required.
Point of Service Condition Code	025	M	Echoed from the request message.
Amount, Transaction Processing Fee	030	M	
Acquiring Institution Identification Code	032	M	Echoed from the request message.
Forwarding Institution Identification Code	033		Not required.
Primary Account Number, Extended	034		Not required.
Retrieval Reference Number	037	M	Echoed from the request message.
Authorisation Identification Response	038	M	
Response Code	039	M	
Card Acceptor Terminal Identification	041	M	Echoed from the request message.
Additional Response Data	044	C	Mandatory if Response Code=30 (field in error)
Currency Code, Transaction	049	M	
Additional Amounts	054	C	The Available and Ledger balances if request was successful.
Receiving Institution Country Code	068		Not required.
Receiving institution identification code	100		Not required.

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4.2.5 [A1] - Financial Transaction Response

4.2.5.1 Overview

This message is sent by CAPO to the NBX. The message contains a Financial Transaction request response.

The [A1] Financial Transaction Request Response message maps to the following ISO message:

- 0210 - Financial Transaction Request Response.

4.2.5.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Primary Account Number	002	M	Echoed from the request message.
Processing Code	003	M	Echoed from the request message.
Amount, Transaction	004	M	Echoed from the request message, except for an approved "Withdraw Limit" transaction, where this will be set to the amount authorised by CAPO
Amount, Settlement	005		Not required.
Transmission Date and Time	007	M	
Conversion Rate, Settlement	009		Not required.
Systems Trace Audit Number	011	M	Echoed from the request message.
Time, Local Transaction	012	M	Echoed from the request message.
Date, Local Transaction	013	M	Echoed from the request message.
Date, Settlement	015	M	Echoed from the request message.
Date, Conversion	016		Not required.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Card Sequence Number	023		Not required.
Network International Identifier	024		Not required.
Point of Service Condition Code	025	M	Echoed from the request message.
Amount, Transaction Processing Fee	030	M	
Acquiring Institution Identification Code	032	M	Echoed from the request message.
Forwarding Institution Identification Code	033		Not required.
Primary Account Number, Extended	034		Not required.
Retrieval Reference Number	037	M	Echoed from the request message.
Authorisation Identification Response	038	M	
Response Code	039	M	
Card Acceptor Terminal Identification	041	M	Echoed from the request message.
Additional Response Data	044	C	Mandatory if Response Code=30 (field in error)
Currency Code, Transaction	049	M	Echoed from the request message.
Currency Code, Settlement	050		Not required.
Additional Amounts	054	C	The Available and Ledger balance information if the request was authorised, or declined because of insufficient funds.
Receiving Institution Identification Code	100		Not required.
Account Identification 1	102		Not required.
Account Identification 2	103		Not required.

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4.2.6 [A1] - PIN Change Response

4.2.6.1 Overview

This message is sent by CAPO to the NBX. The message contains a PIN Change request response.

The [A1] PIN Change Response message maps to the following ISO message:

- 0110 – Authorisation Request Response.

4.2.6.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Primary Account Number	002	M	Echoed from the request message.
Processing Code	003	M	Echoed from the request message.
Amount, Transaction	004		Not required.
Transmission Date and Time	007	M	
Systems Trace Audit Number	011	M	Echoed from the request message.
Time, Local Transaction	012	M	Echoed from the request message.
Date, Local Transaction	013	M	Echoed from the request message.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Network International Identifier	024		Not required.
Point of Service Condition Code	025	M	Echoed from the request message.
Amount, Transaction Processing Fee	030	M	
Acquiring Institution Identification Code	032	M	Echoed from the request message.
Forwarding Institution Identification Code	033		Not required.
Primary Account Number, Extended	034		Not required.
Retrieval Reference Number	037	M	Echoed from the request message.
Authorisation Identification Response	038	M	
Response Code	039	M	
Card Acceptor Terminal Identification	041	M	Echoed from the request message.
Additional Response Data	044	C	Mandatory if Response Code=30 (field in error)
Currency Code, Transaction	049	C	Echoed from the request message if present.
Receiving Institution Country Code	068		Not required.

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4.2.7 [E1] - Reversal Request

4.2.7.1 Overview

This message is sent by the NBX to CAPO when a financial transaction that has been processed by the issuer needs to be reversed.

The [E1] message maps to the following ISO messages:

- 0420 - Reversal Request
- 0421 - Reversal Repeat.

Reversal [E1] messages are generated by the NBX. These are only sent to the FI to reverse a previously authorised Accept transaction (i.e. [A1]) according to the following conditions:

- The Authorisation [A1] is late (i.e. is received after the Agent timeout period has been exceeded)
- The transaction outcome at the counter is different to the Authorisation response received at the counter ([A3]) (e.g. clerk declines to proceed due to suspected fraud)
- The transaction outcome at the counter is indeterminate (e.g. counter has timed out waiting for response, or ICC failed to complete any script processing)

Reversals [E1] can only be generated when the [A1] message to be reversed can be matched against a [R3] request.

The NBX prevents duplicate 0420 messages being sent to the FI.

Reversal Requests may be sent up to a period, which shall be configurable and shall be set initially to 5 days, after the original transaction to which it refers.

Note that partial reversals are not supported over this interface. PIN Change reversals are also not supported.

4.2.7.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Primary Account Number	002	M	
Processing Code	003	M	Copied from the [A1]
Amount, Transaction	004	M	
Amount, Settlement	005		Not required.
Transmission Date and Time	007	M	
Conversion Rate, Settlement	009		Not required.
Systems Trace Audit Number	011	M	
Time, Local Transaction	012	M	
Date, Local Transaction	013	M	
Date, Expiration	014		Not required.
Date, Settlement	015	M	Copied from the [R3]
Date, Conversion	016		Not required.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Point of Service Entry Mode	022	M	
Card Sequence Number	023		Not required.
Point Of Service Condition Code	025	M	
Point Of Service PIN Capture Code	026		Not required.

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Amount Transaction Fee	028		Not required.
Amount, Transaction Processing Fee	030	M	
Acquiring Institution Identification Code	032	M	
Forwarding Institution Identification Code	033		Not required.
Primary Account Number, Extended	034		Not required.
Track-2 Data	035	C	Mandatory if track data is available (ICC processed or card successfully swiped).
Retrieval Reference Number	037	M	
Authorisation Identification Response	038	M	
Card Acceptor Terminal Identification	041	M	
Card Acceptor Name/Location	043	M	
Currency Code, Transaction	049	M	
Currency Code, Settlement	050		Not required.
Personal Identification Number (PIN) Data	052		Not required.
ICC Data	055		May be present but is not required.
Advice/Reversal Reason Code (Reserved Private)	060	M	
Point of Service Data	061		
Receiving Institution Country Code	068		Not required.
Original Data Elements	090	M	
Replacement Amounts	095		Not required.
Receiving Institution Identification Code	100		Not required.
Account Identification 1	102		Not required.
Account Identification 2	103		Not required.

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4.2.8 [E2] - Reversal Request Response

4.2.8.1 Overview

This message is sent by CAPO to the NBX in response to a reversal request from the NBX.

Reversal [E1] messages are “must deliver” messages. If an [E2] Reversal Response from the FI is not received within a configurable period, a [E1] Reversal Repeat is sent subject to not exceeding a configurable number of retries / elapsed time.

The [E2] message maps to the ISO message 0430 – Reversal Request Response.

4.2.8.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Processing Code	003	M	Echoed from the 042x message.
Amount, Transaction	004	M	
Transmission Date and Time	007	M	
Conversion Rate, Settlement	009		Not required.
Systems Trace Audit Number	011	M	Echoed from the 042x message.
Time, Local Transaction	012	M	Echoed from the 042x message.
Date, Local Transaction	013	M	Echoed from the 042x message.
Date, Settlement	015	M	Echoed from the 042x message.
Date, Conversion	016		Not required.
Acquiring Institution Country Code	019		Not required.
Primary Account Number Extended, Country Code	020		Not required.
Forwarding Institution Country Code	021		Not required.
Card Sequence Number	023		Not required
Network International Identifier	024		Not required.
Point of Service Condition Code	025	M	Echoed from the 042x message.
Amount, Transaction Fee	028		Not required.
Acquiring Institution Identification Code	032	M	Echoed from the 042x message.
Forwarding Institution Identification Code	033		Not required
Primary Account Number, Extended	034		Not required.
Retrieval Reference Number	037	M	Echoed from the 042x message.
Response Code	039	M	Will be set to either 00 – Approved, or 30 – Field in error.
Card Acceptor Terminal Identification	041	M	Echoed from the 042x message.
Additional Response Data	044	C	Mandatory if Response Code=30 (field in error)
Currency Code, Transaction	049	M	Echoed from the 042x message.
Currency Code, Settlement	050		Not required.
Receiving Institution Country Code	068		Not required.
Original Data Elements	090	M	Echoed from the 042x message.
Replacement Amounts	095		Not required
Receiving Institution Identification Code	100		Not required
Account Identification 1	102		Not required
Account Identification 2	103		Not required.

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4.2.9 Administration Advice (0620)

4.2.9.1 Overview

Administration Advice messages are sent from NBX to CAPO when a received message cannot be deblocked or when a message fails syntax checking, in order to initiate manual investigation of a problem by either CAPO or the NBX. CAPO will not generate Administration Advice messages, but NBX will correctly handle their receipt.

The Administration Advice message maps to ISO message 0620.

4.2.9.2 Message Definition

Message Element	Bitmap Reference	Required	Notes / Conditions
Transmission Date and Time	007	M	
Systems Trace Audit Number	011	M	
Network Management Information Code	070	M	Set to be 900
Info Text	124	M	

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4.2.10 Network Management Messages (0800 / 0810)

The following Network Management Messages will be exchanged between CAPO and the NBX:

- 0800 - Network Management Request Message
- 0810 - Network Management Response Message

They are used for the following purposes (followed by associated Network Management Information Code):

- Log on, initiated by NBX (071)
- Log off, initiated by NBX (072)
- Handshake, initiated by NBX (361)
- Key Change - Acquirer zone from NBX (161)

The conditions under which these messages, except for Handshakes, are sent for each of the specified purposes are described in section 6.4. The use of Handshakes is described in the NBX – POCA Technical Interface Specification, [Ref. 5].

4.2.10.1 Network Management Request (0800)

Message Element	Bitmap Reference	Required	Notes / Conditions
Transmission Date and Time	007	M	
Systems Trace Audit Number	011	M	Set for this transaction
Network Management Information Code	070	M	Values will depend on message purpose, as described above
Message Security Code	096	C	Required for key change, logon and logoff
Network Management Information	125	C	Required for key change. Positions 01-32=32 byte working key (encrypted under the Acquirer Zone Master Key using Atalla variant 1), 33-38=check value, 39-60 Spaces (optional)

4.2.10.2 Network Management Request Response (0810)

Message Element	Bitmap Reference	Required	Notes / Conditions
Transmission Date and Time	007	M	
Systems Trace Audit Number	011	M	Copied from the 0800
Response Code	039	M	
Network Management Information Code	070	M	This is copied from the 0800 received message.

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4.2.11 REC – NBX Reconciliation File Format

The REC reconciliation file, and the conditions under which it is sent to CAPO from the NBX are addressed in the NBX – FI Reconciliation and Settlement File Format AIS, [Ref. 4]. The file transfer mechanism and conditions of transfer are described in the NBX – POCA Technical Interface Specification, [Ref. 5].

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5 Transfer Structure

5.1 Transfer Grouping

The following figure shows the end-to-end message sequences, using the RACE (Request / Authorise / Confirm / Exception) model, for all application messages between the NBX and CAPO.

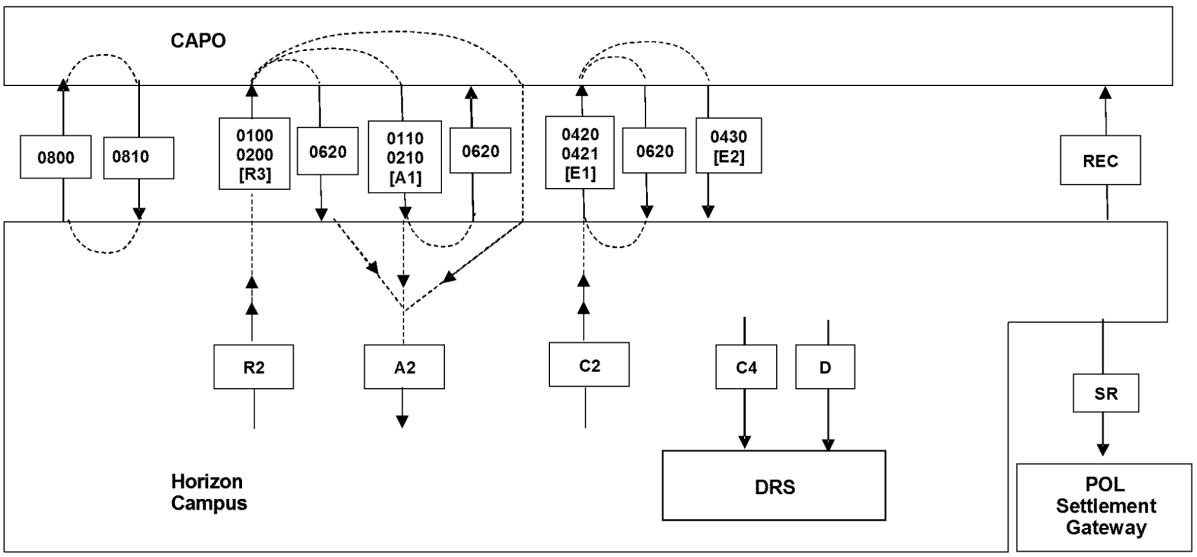

Figure 1 - CAPO Message Flows in the Network Banking Environment

A 0620 message may be issued by the NBX in response to all messages from CAPO (for simplicity, only one such flow is shown on the diagram). Note also that CAPO will not send 0620 messages to NBX; however, the diagram shows that NBX will correctly process any that it receives.

Reversals (0420 messages) are not sent from NBX to CAPO unless and until an approved response (0210 message) has been received from CAPO.

In the event that NBX does not receive a reversal response within the allotted time interval then the NBX may send EBT repeat reversals (0421 messages). CAPO will ensure that a reversal is not applied to an account more than once.

The interface should be resilient to the transfer of duplicate messages; in practice, however, this should only happen after failure and recovery of either end of the interface.

CAPO will not validate transmission date and time in messages against the date and time that messages are received.

The interface details are also described in the NBX – POCA Technical Interface Specification, [Ref. 5].

5.2 Transfer Structure

The messages defined in this AIS will be exchanged in accordance with ISO 8583 (1987), [Ref. 1], which describes the use of Message Type Identifier, Bit Map and Data Elements in the message structure. Note that

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the messages exchanged over this interface do not use the third bit map or any of its supported data elements. Note also that the Bit Maps are transferred in binary.

Messages for one transaction may be interleaved with messages for any other transaction. Requests (0100 and 0200 messages) may continue to be sent during a key change, using the existing key until the Key Change response has been received.

5.3 Record Structure

The record structure for the REC file passed over this interface is described in the NBX – FI Reconciliation and Settlement File Format AIS, [Ref. 4]. The details are not repeated here.

5.4 Sequences

Figure 1 above (see Section 5.1) shows the end-to-end message sequences of all the messages supported by this AIS, from the PO Outlet to CAPO. Further detail relating specifically to the NBX-CAPO connection can be found in the NBX - POCA Technical Interface Specification (Ref. [5]). The interface must be resilient to the disconnection or loss of any part of the total network-banking environment for short or extended periods.

5.5 Data Volumes

Data Rates and Volumes over this interface are addressed within NBX Volume Model Comparisons, [Ref. 2].

5.6 Data Authentication

Message Authentication Codes (MACs) are not sent between CAPO and the NBX.

5.7 Data Dictionary

The Data Elements used on this interface are defined and described within ISO 8583 (1987), [Ref. 1].

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6 Security of Transmitted Data

The security standards for the NBX – CAPO interface are described in the NBX – POCA Technical Interface Specification, [Ref. 5].

6.1 Protected Data

PIN blocks that pass across the interface from NBX to CAPO are encrypted under an Acquirer Working Key (AWK). This key is used in the NBX - CAPO shared security zone. PIN Blocks encryption is translated from the other security zone keys to protection under this shared key using a hardware encryption module. The PIN blocks are never rendered in clear outside the hardware module.

Acquirer Working Keys (AWKs) are exchanged electronically encrypted under an Acquirer Zone Master Key (AZMK) shared between NBX and CAPO. To facilitate import of the AWK into the CAPO systems, the AWK is encrypted using Atalla variant 1 as defined in [ATCRM]. The AZMK is generated and owned by CAPO. The AWK is owned and generated by the NBX.

6.2 Encryption and Decryption Methods

PIN Block and Acquirer Working Key transmission is protected by Triple DES double length keys, 112bit plus key check data.

All data transmitted on communication lines between the NBX and CAPO as described in the NBX – POCA Technical Interface Specification, [Ref. 5].

6.3 Session Establishment

Session Establishment will be initiated by the NBX. Initial Logon message exchanges are followed by transmission of a new AWK by the NBX to CAPO, with a key check value protected by encryption under the shared current AZMK.

CAPO verifies the key and acknowledges it to NBX. All PIN Block data is protected by this AWK until the session ends or the AWK is renewed.

The only messages categorised as “must deliver” are Reversal Request (0420/0421).

6.4 Key Management

Key ownership is described in section 10 of the document Horizon – EDS Operational Level Agreement, [Ref. 6]. See also section 6.7 of the document NBX - POCA TIS, [Ref. 5]. NBX - CAPO Zone Management Keys are managed in NBX.

CAPO:

- Generates three new AZMK components
- AZMK components will be generated in a secure manner
- Key components will contain
  - A key identifier (visible)
  - A key generation date (visible)

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  - A component number (visible)
  - 32 hex characters in two groups of sixteen characters – Triple DES key component, VISA method
- Four hex character Key Check Value, VISA method, printed securely and on separate sheet for the Key Manager.

NBX:

- Manages secure logon of key holders & the key manager
- Accepts entry of key components & verifies component check digits
- Generates the AZMK from the key components & verifies the key check digits

Keys component documents must be stored and transported separately and securely.

The CAPO – NBX AZMK is renewed every six months by the process described above. The AZMK, having been produced as described above, is securely transported to the NBX. The NBX and CAPO operations will agree a time for key promotion. Promotion by both parties will be preceded by telephone coordination. After promotion of the new AZMK the NBX operator will initiate an AWK exchange under the new AZMK using the AWK Key Change sequence. This will provide online key verification of the AZMK. If this online key verification procedure is successful the promoted AZMK will be confirmed as the current AZMK. If the AWK exchange is unsuccessful manual procedures initiated by NBX and CAPO operators will revert to the old AZMK.

CAPO requires more than one Processor Interface (PI) to support the transaction throughput for the NBX. For this configuration each PI will be configured to support two TCP/IP socket connections. A logical session will be initiated by a logon, and data for that session will flow over both socket connections belonging to that PI (see the NBX - POCA Technical Interface Specification, [Ref. 5] for further details). Each PI generates a NBX – CAPO Acquirer Working Key (AWK) which it sends to CAPO for validation. This AWK, if validated by CAPO, is used by both socket connections between CAPO and the NBX PI that generated it. Logical sessions for a different PI will use the AWK generated by that PI. All NBX PIs will protect their AWK in transit to CAPO by encryption using the same AZMK, during its six months of currency. The AWKs are changed under the following conditions (note that it is not necessary to change the AWKs as soon as the AZMK is changed).

- Every 24 hours where the session remains active (an AWK may be changed at a set (configurable) clock time and will remain valid until it is changed)
- At session initiation by NBX
- On receipt by CAPO of a 6th invalid PIN block on a session
- When an NBX operator requests a key change.

Work Load Distribution between the PIs will be performed by the NBX at the application level. To ensure that the correct AWK is used, PIN block translation must occur after PI selection.

The Acquirer Zone Master Key is verified electronically after it has been transferred manually in component form. The Acquirer Working Keys are exchanged and verified electronically. The network management (0800/0810) messages used to perform these functions are described in detail in the following sections:

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6.4.1 Acquirer Working Key Distribution

NBX owns and generates AWKs. New AWKs are distributed and verified electronically.

6.4.1.1 NBX Initiated Log On

1. Successful Log On

NBX		CAPO
Logon	——— 0800 (071) ——→	
	←——— 0810 (071) ———	OK (Response Code 00 – Completed successfully)
Key Change (AWK)	——— 0800 (161) ——→	
	←——— 0810 (161) ———	OK (Response Code 00 – Completed successfully)

2. Bad AWK

NBX		CAPO
Logon	——— 0800 (071) ——→	
	←——— 0810 (071) ———	OK (Response Code 00 – Completed successfully)
Key Change (AWK)	——— 0800 (161) ——→ New Key	
	←——— 0810 (161) ———	Denied (Response Code 76 – Key synchronisation error)

The NBX will resend the same AWK a configurable number of times (currently set to 6). On the 6th 76 code, the NBX will generate and send a new AWK, and the retry count will be reset. In the event of multiple key synchronization errors, NBX operations should verify that the key management system and application configuration parameters are correctly set for the current AZMK tag. If no fault is found, NBX/CAPO operations should be contacted to investigate the problem (e.g. establish whether the ZMK has just been changed, whether either system has been restarted, when the last successful message transfer was etc.).

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3. No response to AWK

NBX		CAPO
Logon	——— 0800 (071) ——→	
	←——— 0810 (071) ———	OK (Response Code 00 – Completed successfully)
Key Change (AWK)	——— 0800 (161) ——→	
	No response	

NBX will resend the message a configurable number of times (currently set to 5). If there is still no response, NBX operations should initiate investigation of the problem. e.g. If consultation indicated a communication failure, Network Management should be alerted.

6.4.1.2 Key Change due to PIN validation errors detected by CAPO

1. More than 5 PIN errors in a session.

NBX		CAPO
Business message	——— 0100/0200 ——→	
	←——— 0100/0200 ———	Error (Response Code 76 – Key synchronisation error) (6th occurrence)
Key Change (AWK)	——— 0800 (161) ——→	
	←——— 0810 (161) ———	OK (Response Code 00 – Completed successfully)

NBX will expedite the Key Change to minimise the number of messages rejected due to PIN errors (code 76). In the event of an unsuccessful Key Change, the PI should be stopped to allow NBX/CAPO operations to investigate the problem.

6.4.1.3 Key Change NBX Operator request or 24hr use limit

1. Successful key change.

NBX		CAPO
Key Change (AWK)	——— 0800 (161) ——→	
	←——— 0810 (161) ———	OK (Response Code 00 – Completed successfully)

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2. Bad AWK

NBX		CAPO
Key Change (AWK)	——— 0800 (161) ——→	
	←——— 0810 (161) ———	Denied (Response Code 76 – Key synchronisation error)

The NBX will resend the same AWK a configurable number of times (currently set to 6). On the 6th 76 code, the NBX will generate and send a new AWK, and the retry count will be reset. In the event of multiple key synchronization errors, NBX operations should verify that the key management system and application configuration parameters are correctly set for the current ZMK tag. If no fault is found, NBX/CAPO operations should be contacted to investigate the problem (e.g. establish whether the ZMK just been changed, whether either system has been restarted, when the last successful message transfer was etc.).

3. No response to AWK Request

NBX		CAPO
Key Change (AWK)	——— 0800 (161) ——→	
	No response	

NBX will resend the message a configurable number of times (currently set to 5). If there is still no response, NBX operations should initiate investigation of the problem. e.g. If consultation indicated a communication failure, Network Management should be alerted.

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7 Operational Procedures

7.1 Processing Cycles

This interface relates to online and batch message exchange to support real time financial transactions, and to the daily transmission to CAPO of the REC file.

Stale messages are logged and discarded before transmission or on receipt, as appropriate and no further processing takes place.

The timeout associated with each message type is addressed in NBX Business Parameters, [Ref. 7].

“Must deliver” messages are retransmitted at parameter intervals until delivery is successful, as described in NBX Business Parameters, [Ref. 7].

Transfer Initiation

All transfers defined in this AIS are automatic.

7.2 Security Procedures

Manual Procedures are required to support the above key management protocol, as described in Section 6 above.

7.3 Fallback Procedures

Fallback procedures are described in the NBX – POCA Technical Interface Specification, [Ref. 5]. Each system is responsible for its own recovery after failure. Restoration of the interface and the disposal of stale messages (other than “must deliver” messages) is expected to be automatic. 0100, 0200, 0110 and 0210 ([R] and [A]), 0620, 0800 and 0810 messages awaiting transmission at the time of failure can safely be discarded, as the integrity of the transaction is protected by timeouts. However, 0420 and 0421 ([E]) messages are to be treated as “must deliver” and therefore must be transmitted on recovery.

7.4 Control

The interface must be resilient to duplicate messages, which may occur after recovery of any element in the system, but are not otherwise expected to occur.

Lost or discarded messages are handled by timeout processing at every stage of the message sequence, to ensure that incomplete transactions are declined if unauthorised or reversed if authorised.

The NBX will log events affecting this interface (e.g. response indicating receipt by CAPO of an invalid PIN block) to an Event Log. These events will be managed by Tivoli for escalation to the relevant Help Desk, as appropriate to the code associated with the event.

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8 Appendix A

8.1 Response Codes

The response codes are defined in the document Horizon – Card Account Mapping, [Ref. 3].

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8.2 Reversal Reason Codes

The reasons that may be provided with Reversal Request [E1] messages sent by the NBX to CAPO are defined in Horizon – Card Account Mapping [3].

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9 APPENDIX B

NBX-EBT Interface – ICC Data Field

Field 055 - ICC Data

Format

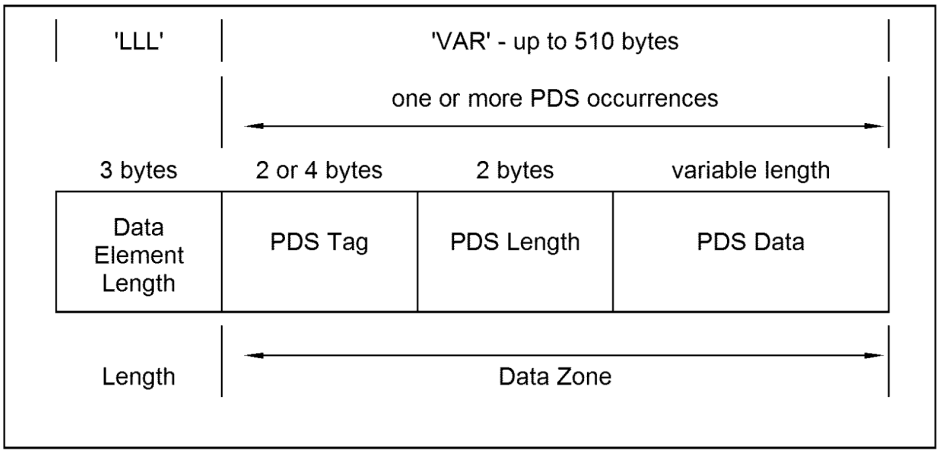
h .. 510
LLLVAR

Description

ICC Data (Field 055) is used to transport chip-specific data over the network. It will be present in all authorisation requests, if POS Entry Mode (Field 022) indicates that the transaction was chip-initiated (value '05').

Structure

Field 055 has its own generic structure and may contain one or more Private Data Sub-elements (PDSs), as shown in the figure below.



Data Element Length specifies the total number of bytes in the Data Zone immediately following it.

Data Zone contains the ASCII representation of each hexadecimal digit (i.e. nibble) of the chip data to be transferred; this comprises one or more PDS occurrences.

Each PDS corresponds to an EMV data element/object and comprises the following sub-fields.

PDS Tag	2 or 4 byte 'tag' value (ASCII hexadecimal), identifying the EMV data object contained in the PDS. The second two bytes are present only if the first byte is odd ('1', '3',.....'B', 'D', 'F') and the second byte is 'F'.
PDS Length	2 bytes, specifying the length (in bytes) of the PDS Data immediately following it, expressed as an ASCII representation of a decimal number (e.g. '12' means the integer 12) in the range 1 to 99.

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PDS Data — Variable between 1 and 99 bytes, containing the actual data from the corresponding EMV data object (as identified by the PDS Tag).

The PDS structure is referred to as Tag-Length-Value (TLV), as defined in the EMV standards.

Note that PDS's may appear in any order in Data Zone. The order shown in the table below corresponds to that in which the relevant fields are input to the ARQC verification algorithm.

PDS's for Card Account

The PDS's required for Card Account transactions (passed in the NBX-EBT On-line Interface) are listed in the following table. Note that the lengths shown in the table assume that all PDS Data is ASCII representation of either hexadecimal digits, or decimal digits.

PDS	Tag	Length (Bytes)	Comments
Application Cryptogram	9F26	16	Contains an ARQC (ASCII hexadecimal)
Cryptogram Information Data	9F27	2	ASCII hexadecimal
Transaction Amount	9F02	12	Format n12 (ASCII numeric), set as follows: • Requested Amount for Withdrawal with Balance • Product Limit for Withdraw Limit • '000000000000' for Balance Enquiry and PIN Change
Terminal Country Code	9F1A	4	Format n4 (ASCII numeric, set to '0826')
Terminal Verification Results (TVR)	95	10	ASCII hexadecimal
Transaction Currency Code	5F2A	4	Format n4 (ASCII numeric. 1st character always '0')
Transaction Date	9A	6	Format n6 (ASCII numeric YYMMDD)
Transaction Type	9C	2	Format n2 (ASCII numeric)
Unpredictable Number	9F37	8	(ASCII hexadecimal)
Application Interchange Profile (AIP)	82	4	(ASCII hexadecimal)
Application Transaction Counter (ATC)	9F36	4	(ASCII hexadecimal)
Issuer Application Data (IAD)	9F10	12	This PDS comprises the following: • Derivation Key Index (2 bytes) (ASCII numeric) • Cryptogram Version Number (2 bytes) (ASCII hexadecimal) • Card Verification Results (CVR) (8 bytes) (ASCII hexadecimal)
Maximum Total PDS Data length		84	

The total length of Field 055 is 151 bytes, calculated as follows:

Field 055 Data Element Length	3
PDS Tags	40
PDS Lengths	24
PDS Data	84
Total	**151**

END OF DOCUMENT