*mini*ATM and Scrip
Communications Protocol
And Message Format Specification



PRELIMINARY

VERSION TSCD2.9

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TABLE OF CONTENTS

TABLE OF CONTENTS 2
VERSION SUMMARY 3
MODEM COMMUNICATION PARAMETERS 7
Control Character Table 8
Transaction Request Message 9
Transaction Response Message 11
Configuration Table Download Request Message 13
Configuration Table Download Response Message 14
Host Totals Download Request Message 15
Host Totals Response Message 17
Reversal Request Message 18
Reversal Response Message 20
Status Monitoring Field 21
Product Code Table for Program / Table Version Numbers 23
Product Code Table for EPROM Version Numbers 23
Transaction Code Table 24
AUTHORIZATION CODES TABLE 26
MISCELLANEOUS FIELD ID DESCRIPTIONS 27
VALID MISCELLANEOUS FID TABLE 31
PROTOCOL SPECIFICATION 33
NORMAL MESSAGE W/EOT 34
NORMAL MESSAGE W/O EOT 35
CORRECTABLE REQUEST AND RESPONSE TRANSMIT ERROR 36
UNCORRECTABLE REQUEST TRANSMIT ERROR 37
UNCORRECTABLE RESPONSE TRANSMIT ERROR 38
TERMINAL ACK NOT RECEIVED BY HOST 39
TERMINAL DOES NOT ACKNOWLEDGE RESPONSE FROM HOST 40
HOST DOES NOT RESPOND TO ACK FROM TERMINAL (DEFAULT MODE) 41
HOST DOES NOT RESPOND TO REQUEST MESSAGE 42
TERMINAL DOES NOT RESPOND TO HOST ENQ 43
HOST DOES NOT ANSWER TERMINAL CALL 44
APPENDIX A 45
ANSI PIN BLOCK FORMAT 45
PIN Block Construction 45
Formatted Clear-Text PIN Block 46
APPENDIX B 47
MAC PROTOCOL ADDENDUM 47
MESSAGE PROTOCOL WITH MAC ENABLED 48
APPENDIX C 49
EXTENDED TRANSACTION CODE TABLE † 49
APPENDIX D 50
TRIPLE-DES ENCRYPTION OF THE PIN BLOCK 50

PRELIMINARY

VERSION SUMMARY

Version	Date	Summary of Changes
TSCD2.9 †	2/4/02	Added "ts" to the Terminal Identifier field for Triton Scrip
	1/30/02	Added FID '[' – ASCII Char 5Bh – Terminal is Triple-DES capable Revised Appendix D
	1/10/02	Changed to '1=reserved' for the Encryption Mode Flag of the Information Header in the Request Messages which support the Information Header (or Comms Header). Added Model 9700 to Product Code tables. Clarified Status Monitoring Field. The first character of the Status Monitoring Field will always be a capital letter (A - Z). Clarified Terminal Totals Fields. The first character, and all characters, of the Terminal Totals Fields will always be numeric (0 – 9). Added Appendix D – Triple-DES Encryption of the PIN Block Added '2=Triple DES encryption of the PIN block' to the Encryption Mode Flag of the Information Header in the Request Messages which support the Information Header (or Comms Header). Added FID '{' – ASCII Char 7Bh – Triple-DES Encrypted PIN-Key 2 (*K2)* Added transactions type "44" - Non-Financial prepaid online transaction (POS type transaction) Added FID-group 'x' for prepaid offline and/or online transactions. Added FID 'xa' – Telco product serial number for online transactions. Added FID 'xb' – activation phone number for prepaid offline or online transactions. Added FID 'xc' – Taxes 1 – (GST/HST/PST taxes for offline transactions) or general taxes for offline transactions. Added FID 'xd' – Taxes 2 - general taxes for online transactions Added FID 'xe' - Host Total amounts for prepaid online transactions. Added FID 'xf' – Contact phone number for prepaid offline or online transactions. Added FID 'xg' – Carrier name for prepaid offline or online transactions. Added FID 'xh' – Expiration date for online transactions. Added FID 'xi' – Secret number of prepaid offline or online transactions.
TSCD2.7k†	6/15/01	Changed Miscellaneous FID 'o' to fixed length - 12 Numeric total characters.
TSCD2.7j†	5/23/01	Updated Appendix C – Extended Transaction Code Table to include eight new transaction types. The types now include eight for Bank Transaction Types, and eight for Brokerage Transaction Types.
TSCD2.7i	5/14/01	Added transactions type "99" - Extended Transaction Code. Added Miscellaneous FID 'l' (ASCII Char 6Ch) for Extended Transaction Codes. Added Appendix C – Extended Transaction Code Table Changed text of checking, savings, and credit card account's to include 'primary' and 'secondary'.
	03/30/01	Added transaction type, "43" - Quasicash CREDIT ADVANCE Added Miscellaneous FID 'o' – ASCII Char – 6Fh for Quasicash CREDIT total amounts. Added note about the Quasicash authorization number in the Transaction Response Message. The authorization code will be alphanumeric for Quasicash transactions and space filled to the left if less than 8 characters.

PRELIMINARY

TSCD2.7h	11/20/00	Added Miscellaneous Field ID 'n' to indicate reason for a reversal.
TSCD2.7	9/11/00	Absence of 'k' field implies unknown Issuer Fee/Credit.
	8/30/00	Clarified 'k' field. Absence implies zero Issuer Fee/Credit. 'k' allowed in reversal, as well as, the transaction reply.
	8/28/00	Added Miscellaneous Field ID 'k' for issuer fee/credit.
	8/18/00	Modified Amount 2 fields in Transaction Request and Transaction Response to allow negative amounts.
	2/8/00	Clarified 'g' and 'i' FIDs to indicate that the fields are not mandatory if track 3 is supported by the card reader. If the fields are used in the message AND the track 3 data is faulty, the field only contains the FID code. Added N and P program designators in Product Code Table for Program / Table Version Numbers. Added N in Product Code Table for EPROM Version Numbers.
	1/21/00	Added Miscellaneous Field ID 'g' for Track 3 data. Added FID 'g' to Valid Miscellaneous FID Table in Request and Reversal messages. This FID is only used with terminals configured with track 2-3 readers. Added Miscellaneous Field ID 'i' for PAN from track 3. Added FID 'i' to Valid Miscellaneous FID Table in Request and Reversal messages. This FID is only used with terminals configured with track 2-3 readers.
	5/10/99	Corrected typo of sentinel (misspelled as sentinal). Removed duplicate entry in Miscellaneous FID Table for 't'. Added support for multiple Miscellaneous Fields in all packet types. Added Miscellaneous Field ID '&' to support return of Account Number in Transaction Response. Added ability to use 'e' Miscellaneous Field ID to support return of 12 digit settlement amount in Host Totals Response. Added Miscellaneous Field ID '#' to support sending 12 digit sequence number to host in Transaction Request and Reversal Request. Added new Transaction Request Code '01' for PIN Change. Added Miscellaneous Field ID '@' to support sending PIN Change PIN Block. Added Authorization Code '222' for PIN Change failed. Added Valid Miscellaneous FID Table Added new Authorization Codes to allow for more complete coverage of possible error conditions.
TSCD2.6	2/16/99	Modified MAC Protocol Addendum to reflect all messages that include a MAC. Added Message Protocol with MAC enabled diagram to the end of this document.
	12/22/98	Added Appendix B (Triton MAC protocol). Deleted FID 'a', authentication field, replaced by MAC fields Added FID '/', '^', and 'm' to support MAC protocol. Added FID 'w' for Maximum withdraw amount Added FID 'h' for Heartbeat interval Added FID 'c' for automatic day close time setting Added FID 't' for time synchronization with host Added FID 'd' for download of programmable messages Added support for more than two FID fields in Configuration Table Download Response Message Changed FID '~' in Configuration Table Download Response Message from optional to required Added optional field group to Host Totals Download Request top report terminal totals to host

PRELIMINARY

		Added new value of 'X – Not installed' in subfields Alarm, Chest door open; Alarm, Top door open; Journal printer, paper status; Journal printer, ribbon status of Status Monitoring field Added , '<Spaces> - Not supported' to Electronics system subfield in Status Monitoring field Removed 'Transaction' from Miscellaneous Field ID Descriptions table. New format of this table indicates which response messages can contain the individual FIDs. Changed wording at end of this table to indicate that FIDs may appear in any miscellaneous field, where appropriate.
TSCD2.5	3/19/98	Added Field ID code for authentication field in response message (FID 'a'). Incorporated dial-up protocol specification into this document. Added table of contents and page numbers to document. Added Appendix A (ANSI X.9.8 excerpts)
TSCD2.4	11/21/97	The status monitoring field is terminated by a field separator, but prior to this release, it was not clear that this FS was part of the status monitoring field itself. This version specifically states that the trailing FS is part of the optional field and is NOT sent if the field is not enabled. Document reformatted and now produced using Microsoft Word 97. Added model 9600 to all references of product. Model 9500 and 9600 and completely software compatible. Added product description tables to explain coding of firmware version numbers in status field. Added transaction 61, 62, 65, 71, 72, 75, 81, 82, 85, 91, 92, and 95. All of these transactions use a miscellaneous field for the amount of the withdrawal, transfer or balance inquiry. These codes were added to allow amounts to be used that are greater that 8 characters in length. The Miscellaneous fields in the Transaction Response message were listed as F for fixed length but described as Variable Alphanumeric for the length/type description. They have been clarified to be variable length to be consistent. Changed FID 'b' field description from ledger balance to available balance. Added Field ID code type 'e' to represent extended length amounts. When used, it overrides the amount 1 field in the request or the response message. This FID may appear in requests and responses. The reference to implied decimal points in amount fields has been changed to indicate that all amount fields are formatted in the smallest unit of currency possible for the installed country. For the US, this is pennies. This is not a change in the way the field is represented, only a change in how it is described. The implication of decimal places can be assumed based on the local requirements. Changed Miscellaneous field 1 and 2 in transaction request message from fixed length to variable length. Added capability for more than two miscellaneous field to be returned in transaction response message
TSCD2.3B	9/5/97	Added field separator between amount 3 and status field in reversal request message. This is not a spec. Change, but correction of an omission.
TSCD2.3A	6/27/97	Changed description of 'p' printing field to include error receipts, as well as responses.
TSCD2.3	5/18/97	Added Field ID code for receipt text (FID 'p') transaction response message and host totals response message. Changed specified length of Miscellaneous fields from fixed at 20 to variable to accommodate FID p. Added support at 2400 baud.
TSCD2.2	2/11/97 3/18/97	Added status monitoring at the end of all messages. This data is switchable at the terminal to enable or disable it being sent. If enabled, it is sent at the end of every message sent to the host. Added Field ID code for additional balances (FID 'b') Added Field ID code for surcharge amount (FID !). This FID was already included in the Configuration download Response message. It is now supported in any response Misc. field.

PRELIMINARY

TSCD2.1	1/24/97	Made Communications Identifier, Terminal Identifier, Software Version No. and Information Header fields optional in all request messages to the host. Noted that corresponding information header fields in the response messages are optional and only sent when the request messages contain the optional fields. Specified the first character of the Information header to be the DES Indicator flag. The last seven characters are still undefined.
TSCD2.0	6/10/96	Formal release of Version 2 Specification. This specification is an upgrade from the first generation. It adds several features, which include but are not limited to: Deleted version number and date from each table in document. Added support for communications key download in transaction response messages. Added transaction codes 41, 42, and 45 Added Communications Identifier, Terminal Identifier, Software Version No. and Information Header fields in each request message to host. Added version summary page.

PRELIMINARY

MODEM COMMUNICATION PARAMETERS

The modem communications parameters are:

- 300, 1200, or 2400 bps
- 7 data bits
- even parity
- 1 stop bit
- Asynchronous

The modem complies with Bell 212A/103 and CCITT V.22 standards.

The LRC (Longitudinal Redundancy Check) is always the last character of the message. This character is the Exclusive OR of all characters in the message, starting with the first character after the STX, through and including the ETX.

PRELIMINARY

†**Preliminary**.

Control Character Table	
STX	02h
ETX	03h
EOT	04h
ENQ	05h
ACK	06h
NAK	15h
FS	1Ch

PRELIMINARY

Transaction Request Message

Field Name	Length/Type	Fixed/ Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Communications Identifier	8 ASCII Char.	F		X*	A text string used to identify the 'owner' of the message to a communications service provider. Default string is "XXXXXX^^". ^ characters are spaces and are required. 'X' characters represent identification string for processor.
Terminal Identifier	2 ASCII Char.	F		X*	Lower case 't' and lower case 'd' or 's', indicating to host the type of terminal
Software Version No.	2 ASCII Char.	F		X*	Two digit Base 36 number representing the version of software installed on the terminal. Starts at '00'
Encryption Mode Flag	1 ASCII Char.	F		X*	0 = Single DES encryption of PIN block. 1 = Reserved. 2 = Triple DES encryption of PIN block.
Information Header	7 ASCII Char.	F		X*	Seven byte field, unused as of this release. Must be space filled.
FS	1 ASCII Char.	F		X*	Field separator
Terminal ID	15 Alphanumeric	F	X		Terminal ID. Assigned by processor. Left justified, space filled to the right.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		Code indicating type of transaction being done. See Transaction Codes table.
FS	1 ASCII Char.	F	X		Field separator
Sequence Number	4 Numeric	F	X****		Consecutive number from 1-9999 set by terminal. Rolls over at 9999. Tags a transaction as a unique event. Each subsequent transaction is guaranteed to have different sequence number.
FS	1 ASCII Char.	F	X		Field separator
Track 2	37 Numeric	V	X		Complete track 2 data, excluding the Start Sentinel, End Sentinel, and LRC
FS	1 ASCII Char.	F	X		Field separator
Amount 1	8 Numeric	F	X		Withdraw or transfer amount. Zero filled to the left. Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F	X		Field separator
Amount 2	8 Numeric	F	X		Surcharge amount as set by terminal. Zero filled to the left. Represents the amount in the smallest possible unit of currency. An ASCII minus sign (e.g. "-0000100") in the first position represents a credit.
FS	1 ASCII Char.	F	X		Field separator
PIN Block	16 Alphanumeric	F	X		ANSI standard encrypted PIN block. (See Appendix A)
FS	1 ASCII Char.	F	X		Field separator
Miscellaneous 1	Variable Alphanumeric	V		X	Can contain user defined information.
FS	1 ASCII Char.	F	X		Field separator

PRELIMINARY

Transaction Request Message					
Miscellaneous 2	Variable Alphanumeric	V		X	Can contain user defined information.
FS	1 ASCII Char.	F	X		Field separator
Status Monitoring Field	XX ASCII Chars.	F		X**	Contains status information about terminal. Refer to table for full field format later in this document.
FS	1 ASCII Char.	F		X**	Field separator
Miscellaneous X	Variable Alphanumeric	V		X***	Can contain user defined information.
FS	1 ASCII Char.	F		X***	Field separator
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

* These fields are optional only as a group. The terminal contains a management function to enable or disable the sending of this group of fields. This group was added in version 2.0, and was made optional in version 2.1 to allow compatibility with older host drivers. If the field group is not enabled on the terminal, these fields will not be sent. If they are not sent, the corresponding fields in the response messages should not be returned.

** This field (Status Monitoring Field) is optional and can be enabled or disabled at the terminal level. If enabled, it is sent on *ALL* messages up to the host. No response is expected to the sending of this information. The first character of the Status Monitoring Field will always be a capital letter (A - Z).

*** As of version 2.7, more than two miscellaneous fields are allowed for. Each field must include a valid FID code and data and be terminated by a field separator. See Valid Misc. FID table.

**** As of version 2.7, If 12 digit sequence number is being sent as a miscellaneous field, this field should be padded with 4 spaces.

PRELIMINARY

Transaction Response Message

Field Name	Length/Type	Fixed/ Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Information Header	12 ASCII Char.	F		X*	Not used as of this release, must be space filled
FS	1 ASCII Char.	F		X*	Field separator
Multi-Block Indicator	1 Numeric	F	X		0 = single block response 1= another block will follow this block. Last block must always be 0.
FS	1 ASCII Char.	F	X		Field separator
Terminal ID	15 Alphanumeric	F	X		Copied from request message.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		Copied from request message.
FS	1 ASCII Char.	F	X		Field separator
Sequence Number	4 Numeric	F	X		Copied from request message.
FS	1 ASCII Char.	F	X		Field separator
Response Code	3 Numeric	F	X		Result of request. Approved = 000. Non-0000 = declined. See Authorization Codes for list of decline codes.
FS	1 ASCII Char.	F	X		Field separator
Authorization Num.	8 Numeric	F	X		Authorization number generated by the processor for the transaction. Right justified, zero filled to the left if not 8 characters. (note: This field is alphanumeric for Quasicash type transaction responses, Zero(030h) or space(020h) filled to the left if less than 8 characters.)
FS	1 ASCII Char.	F	X		Field separator
Transaction Date	6 Numeric	F	X		Date of transaction in MMDDYY format. Set by processor.
FS	1 ASCII Char.	F	X		Field separator
Transaction Time	6 Numeric	F	X		Time of the transaction in HHMMSS format. Set by processor.
FS	1 ASCII Char.	F	X		Field separator
Business Date	6 Numeric	F	X		Business date of the transaction in MMDDYY format. Set by processor.
FS	1 ASCII Char.	F	X		Field separator
Amount 1	8 Numeric	F	X		Balance amount. Zero filled to the left, right justified. If space filled, no balance available (for W/D transactions) Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F	X		Field separator
Amount 2	8 Numeric	F	X		Amount of actual surcharge Zero filled to the left, right justified. Represents the amount in the smallest possible unit of currency. An ASCII minus sign (e.g. “-0000100”) in the first position represents a credit.

PRELIMINARY

Transaction Response Message					
FS	1 ASCII Char.	F	X		Field separator
Miscellaneous 1	Variable Alphanumeric	V		X	Miscellaneous data. Refer to Miscellaneous Field ID codes for possible uses for this field.
FS	1 ASCII Char.	F	X		Field separator
Miscellaneous 2	Variable Alphanumeric	V		X	Miscellaneous data. Refer to Miscellaneous Field ID codes for possible uses for this field.
FS	1 ASCII Char.	F	X		Field separator.
Miscellaneous X**	Variable Alphanumeric	V		X**	Miscellaneous data. Refer to Miscellaneous Field ID codes for possible uses for this field.
FS**	1 ASCII Char.	F		X**	Field separator.
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

* These fields are optional only as a group. They should only be included in responses to requests that contain the corresponding optional fields. Refer to the request message table for further information.

If the FID ‘p’ is returned in either MISC. 1 or MISC. 2, the data will be printed on all approved and declined transactions.

** As of version 2.4, more than two miscellaneous fields are allowed for. Each field must include a valid FID code and data and be terminated by a field separator. See Valid Misc. FID table.

PRELIMINARY

Configuration Table Download Request Message

Field Name	Length/Type	Fixed/ Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Communications Identifier	8 ASCII Char.	F		X*	A text string used to identify the 'owner' of the message to a communications service provider. Default string is "XXXXXX^^". ^ characters are spaces and are required. 'X' characters represent identification string for processor.
Terminal Identifier	2 ASCII Char.	F		X*	Lower case 't' and lower case 'd' or 's', indicating to host the type of terminal.
Software Version No.	2 ASCII Char.	F		X*	Two digit Base 36 number representing the version of software installed on the terminal. Starts at '00'
Encryption Mode Flag	1 ASCII Char.	F		X*	0 = Single DES encryption of PIN block. 1 = Reserved. 2 = Triple DES encryption of PIN block.
Information Header	7 ASCII Char.	F		X*	Seven byte field, unused as of this release. Must be space filled.
FS	1 ASCII Char.	F		X*	Field separator
Terminal ID	15 Alphanumeric	F	X		Terminal ID. Assigned by processor. Left justified, space filled to the right.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		Code indicating type of transaction being done. Transaction code = 60 for Configuration Table Download.
FS	1 ASCII Char.	F	X		Field separator
Status Monitoring Field	XX ASCII Chars.	F		X**	Contains status information about terminal. Refer to table for full field format later in this document.
FS	1 ASCII Char.	F		X**	Field separator
Miscellaneous X	Variable Alphanumeric	V		X***	Can contain user defined information.
FS	1 ASCII Char.	F		X***	Field separator
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

* These fields are optional only as a group. The terminal contains a management function to enable or disable the sending of this group of fields. This group was added in version 2.0, and was made optional in version 2.1 to allow compatibility with older host drivers. If the field group is not enabled on the terminal, these fields will not be sent. If they are not sent, the corresponding fields in the response messages should not be returned.

** This field (Status Monitoring Field) is optional and can be enabled or disabled at the terminal level. If enabled, it is sent on *ALL* messages up to the host. No response is expected to the sending of this information. The first character of the Status Monitoring Field will always be a capital letter (A - Z).

*** As of version 2.7, multiple Miscellaneous fields are allowed for. Each field must include a valid FID code and data and be terminated by a field separator. See Valid Misc. FID table.

PRELIMINARY

Configuration Table Download Response Message

Field Name	Length/Type	Fixed/ Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Information Header	12 ASCII Char.	F		X*	Not used as of this release, must be space filled
FS	1 ASCII Char.	F		X*	Field separator
Terminal ID	15 Alphanumeric	F	X		Terminal ID. Assigned by processor. Left justified, space filled to the right.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		Code indicating type of transaction being done. Transaction code = 60 for Configuration Table Download.
FS	1 ASCII Char.	F	X		Field separator
Field ID Code	'~'	F	X		The '~' character indicates the field is the Pin Working Key 1.
Encrypted PIN Key	16 Alphanumeric	F	X		PIN Working Key 1. This key is encrypted by the PIN Master Key before being transmitted to the terminal.
FS	1 ASCII Char.	F	X		Field separator
Field ID Code	'!'	F		X	The '!' character indicates the field is the maximum allowed surcharge amount.
Surcharge amount	8 Numeric	F		X	The surcharge amount that the terminal will display to the customer and charge for the transaction(Note: actual surcharge may be less than this amount). Right justified, zero filled to the left. Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F	X		Field separator
Miscellaneous X**	Variable Alphanumeric	V		X	Miscellaneous data. Refer to Miscellaneous Field ID codes for possible uses for this field.
FS	1 ASCII Char.	F		X	Field separator, needed only if Miscellaneous field X is present.
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

NOTE:

* These fields are optional only as a group. They should only be included in responses to requests that contain the corresponding optional fields. Refer to the request message table for father information.

** As of version 2.4, more than two miscellaneous fields are allowed for. Each field must include a valid FID code and data and be terminated by a field separator. See Valid Misc. FID table.

Fields will be added to the end of this message as needed. Each field will have a Field ID Code associated with it. Fields do not have to be in any order, and are not required in each message. The terminal will use the ID code to process all fields sent.

PRELIMINARY

Host Totals Download Request Message

Field Name	Length/Type	Fixed/ Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Communications Identifier	8 ASCII Char.	F		X*	A text string used to identify the 'owner' of the message to a communications service provider. Default string is "XXXXXX^^". ^ characters are spaces and are required. 'X' characters represent identification string for processor.
Terminal Identifier	2 ASCII Char.	F		X*	Lower case 't' and lower case 'd' or 's', indicating to host the type of terminal
Software Version No.	2 ASCII Char.	F		X*	Two digit Base 36 number representing the version of software installed on the terminal. Starts at '00'
Encryption Mode Flag	1 ASCII Char.	F		X*	0 = Single DES encryption of PIN block. 1 = Reserved. 2 = Triple DES encryption of PIN block.
Information Header	7 ASCII Char.	F		X*	Seven byte field, unused as of this release. Must be space filled.
FS	1 ASCII Char.	F		X*	Field separator
Terminal ID	15 Alphanumeric	F	X		Terminal ID. Assigned by processor. Left justified, space filled to the right.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		Code indicating type of transaction being done. See Transaction Codes table. For Host totals, code is either 50 or 51.
FS	1 ASCII Char.	F	X		Field separator
Status Monitoring Field	XX ASCII Chars.	F		X**	Contains status information about terminal. Refer to table for full field format later in this document.
FS	1 ASCII Char.	F		X**	Field separator
No. of Withdrawals (Terminal)	4 Numeric	F		X***	Total number of withdrawals since the last request for totals. Zero filled to the left.
No. of Inquiries (Terminal)	4 Numeric	F		X***	Total number of inquiries since the last request for totals. Zero filled to the left.
No. of Transfers (Terminal)	4 Numeric	F		X***	Total number of transfers since the last request for totals. Zero filled to the left.
Settlement (Terminal)	12 Numeric	F		X***	Total amount of all withdrawals. Zero filled to left, right justified. Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F		X***	Field separator

PRELIMINARY

Host Totals Download Request Message					
Miscellaneous X	Variable Alphanumeric	V		X****	Can contain user defined information.
FS	1 ASCII Char.	F		X****	Field separator
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

* These fields are optional only as a group. The terminal contains a management function to enable or disable the sending of this group of fields. This group was added in version 2.0, and was made optional in version 2.1 to allow compatibility with older host drivers. If the field group is not enabled on the terminal, these fields will not be sent. If they are not sent, the corresponding fields in the response messages should not be returned.

** This field (Status Monitoring Field) is optional and can be enabled or disabled at the terminal level. If enabled, it is sent on *ALL* messages up to the host. No response is expected to the sending of this information. The first character of the Status Monitoring Field will always be a capital letter (A - Z).

*** This field group (Terminal Totals Fields) is optional and can be enabled or disabled at the terminal level by a management function. If enabled, the Terminal Totals Field is sent with the Host Totals Download Request Message up to the host. The first character, and all characters, of the Terminal Totals Fields will always be numeric (0 – 9).

**** As of version 2.7, multiple Miscellaneous Fields are allowed for. Each field must include a valid FID code and data and be terminated by a field separator. See Valid Misc. FID table.

PRELIMINARY

Host Totals Response Message

Field Name	Length/Type	Fixed/ Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Information Header	12 ASCII Char.	F		X*	Not used as of this release, must be space filled
FS	1 ASCII Char.	F		X*	Field separator
Terminal ID	15 Alphanumeric	F	X		Terminal ID. Assigned by processor. Left justified, space filled to the right.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		Code indicating type of transaction being done. See Transaction Codes table.
FS	1 ASCII Char.	F	X		Field separator
Business Date	6 Numeric	F	X		Business Date of transactions in MMDDYY format.
FS	1 ASCII Char.	F	X		Field separator
No. of Withdrawals	4 Numeric	F	X		Total number of withdrawals since the last request for totals. Zero filled to the left.
No. of Inquiries	4 Numeric	F	X		Total number of inquiries since the last request for totals. Zero filled to the left.
No. of Transfers	4 Numeric	F	X		Total number of transfers since the last request for totals. Zero filled to the left.
Settlement	8 Numeric	F	X		Total amount of all withdrawals. Zero filled to left, right justified. Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F	X		Field separator
Miscellaneous Field**	Variable alphanumeric	V		X**	Miscellaneous data. Refer to Miscellaneous Field ID codes for possible uses for this field.
FS	1 ASCII Char.	F		X**	Field separator
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

PRELIMINARY

* These fields are optional only as a group. They should only be included in responses to requests that contain the corresponding optional fields. Refer to the request message table for further information.

** As of version 2.3, only FID ‘p’ is supported.
Support for FID ‘^’ was added in version 2.6
Support for FID ‘e’ was added in version 2.7 See Valid Misc. FID table.
Note: ‘e’ field, if used in this message, contains 12 digit Settlement amount.

Reversal Request Message

Field Name	Length/Type	Fixed/ Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Communications Identifier	8 ASCII Char.	F		X*	A text string used to identify the 'owner' of the message to a communications service provider. Default string is "XXXXXX^^". ^ characters are spaces and are required. 'X' characters represent identification string for processor.
Terminal Identifier	2 ASCII Char.	F		X*	Lower case 't' and lower case 'd' or 's', indicating to host the type of terminal
Software Version No.	2 ASCII Char.	F		X*	Two digit Base 36 number representing the version of software installed on the terminal. Starts at '00'
Encryption Mode Flag	1 ASCII Char.	F		X*	0 = Single DES encryption of PIN block. 1 = Reserved. 2 = Triple DES encryption of PIN block.
Information Header	7 ASCII Char.	F		X*	Seven byte field, unused as of this release. Must be space filled.
FS	1 ASCII Char.	F		X*	Field separator
Terminal ID	15 Alphanumeric	F	X		Terminal ID. Assigned by processor. Left justified, space filled to the right.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		"29" for reversal
FS	1 ASCII Char.	F	X		Field separator
Sequence Number	4 Numeric	F	X		Sequence number of the transaction to be reversed.
FS	1 ASCII Char.	F	X		Field separator
Track 2	37 Numeric	V	X		Complete track 2 data, excluding the Start Sentinel, End Sentinel, and LRC
FS	1 ASCII Char.	F	X		Field separator
Amount 1	8 Numeric	F	X		Requested Withdraw amount. Zero filled to the left. Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F	X		Field separator
Amount 2	8 Numeric	F	X		Surcharge amount as set by terminal. Zero filled to the left. Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F	X		Field separator
Amount 3	8 Numeric	F	X		Actual Dispensed amount. Zero filled to the left. Represents the amount in the smallest possible unit of currency.
FS	1 ASCII Char.	F	X		Field separator
Status Monitoring Field	XX ASCII Chars.	F	X	X**	Contains status information about terminal. Refer to table for full field format later in this document.
FS	1 ASCII Char.	F		X**	Field separator
Miscellaneous X**	Variable Alphanumeric	V		X***	Miscellaneous data. Refer to Miscellaneous Field ID codes for possible uses for this field.

PRELIMINARY

Reversal Request Message					
FS**	1 ASCII Char.	F		X***	Field separator.
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

* These fields are optional only as a group. The terminal contains a management function to enable or disable the sending of this group of fields. This group was added in version 2.0, and was made optional in version 2.1 to allow compatibility with older host drivers. If the field group is not enabled on the terminal, these fields will not be sent. If they are not sent, the corresponding fields in the response messages should not be returned.

** This field (Status Monitoring Field) is optional and can be enabled or disabled at the terminal level. If enabled, it is sent on *ALL* messages up to the host. No response is expected to the sending of this information. The first character of the Status Monitoring Field will always be a capital letter (A - Z).

*** As of version 2.7, multiple Miscellaneous Fields are allowed for. Each field must include a valid FID code and data and be terminated by a field separator. See Valid Misc. FID table.

PRELIMINARY

Reversal Response Message

Field Name	Length/Type	Fixed / Var.	Reqd	Opt.	Description
STX	1 ASCII Char.	F	X		Start of text character
Information Header	12 ASCII Char.	F		X*	Not used as of this release, must be space filled
FS	1 ASCII Char.	F		X*	Field separator
Terminal ID	15 Alphanumeric	F	X		Copied from request message.
FS	1 ASCII Char.	F	X		Field separator
Transaction Code	2 Alphanumeric	F	X		"29" from request message.
FS	1 ASCII Char.	F	X		Field separator
Sequence Number	4 Numeric	F	X		Copied from request message.
FS	1 ASCII Char.	F	X		Field separator
Response Code	3 Numeric	F	X		Result of request. Approved = 000. 111 = declined.
FS	1 ASCII Char.	F	X		Field separator
Miscellaneous X**	Variable Alphanumeric	V		X**	Miscellaneous data. Refer to Miscellaneous Field ID codes for possible uses for this field.
FS	1 ASCII Char.	F		X**	Field separator, needed only if Miscellaneous field X is present.
ETX	1 ASCII Char	F	X		End of text Character
LRC	1 Hexadecimal Char	F	X		Longitudinal Redundancy Check. Exclusive OR (XOR) of all characters starting with the first character after the STX, through and including the ETX.

PRELIMINARY

* These fields are optional only as a group. They should only be included in responses to requests that contain the corresponding optional fields. Refer to the request message table for father information.

** As of version 2.7, multiple Miscellaneous Fields are allowed for. Each field must include a valid FID code and data and be terminated by a field separator. See Valid Misc. FID table.

Status Monitoring Field		
Sub-Field Name	**Length/Type**	**Description**
Program Version Number	10 ASCII Chars.	Program version number in format XX-YYYY.ZZ, where XX indicates product, YYYY indicates processor version, and ZZ indicates revision level. Refer to table for product identification.
Table Version Number	10 ASCII Chars.	Table version number in format XX-YYYY.ZZ, where XX indicates product, YYYY indicates processor version, and ZZ indicates revision level. Refer to table for product identification.
Firmware Version Number	10 ASCII Chars.	EPROM version number in format WWXX.YYZAA, where WW is the family product code, XX is the major version number, YY is the minor version number, Z indicates presence of Electronic Journal (security module), and AA is revision of security module firmware
Alarm, Chest door open	1 ASCII Char.	0 – False, 1 – True, <Space> - Not supported, X – Not installed
Alarm, Top door open	1 ASCII Char.	0 – False, 1 – True, <Space> - Not supported, X – Not installed
Alarm, Supervisor active	1 ASCII Char.	0 – False, 1 – True, <Space> - Not supported
Receipt printer, paper status	1 ASCII Char.	0 – OK, 1 – Low, 2 - Out, <Space> - Not supported
Receipt printer, ribbon status	1 ASCII Char.	0 – OK, 1 – Low, 2 - Out, <Space> - Not supported, T – thermal
Journal printer, paper status	1 ASCII Char.	0 – OK, 1 – Low, 2 - Out, <Space> - Not supported, X – Not installed
Journal printer, ribbon status	1 ASCII Char.	0 - OK, 1 – Low, 2 - Out, <Space> - Not supported, T – thermal, X – Not installed
Note status, dispenser	1 ASCII Char.	0 - OK, 1 – Low, 2 - Out, <Space> - Not supported (This is the cumulative summary of all cassettes in the dispenser. Empty individual cassettes are not reflected here).
Receipt printer	1 ASCII Char.	0 - OK, 1 – Needs attention, 2 - Out of service, <Space> - not supported, X - Not installed
Journal Printer	1 ASCII Char.	0 - OK, 1 – Needs attention, 2 - Out of service, <Space> - not supported, X - Not installed
Dispenser	1 ASCII Char.	0 - OK, 1 – Needs attention, 2 - Out of service, <Space> - not supported, X - Not installed
Communications System	1 ASCII Char.	0 - OK, 1 – Needs attention, 2 - Out of service
Card reader	1 ASCII Char.	0 - OK, 1 – Needs attention, 2 - Out of service
Cards retained	3 ASCII Char.	000-999, <Spaces> - Not supported
Electronics system	2 ASCII Chars.	XX represents status of electronics subsystem (Refer to table for listing of codes), <Spaces> - Not supported.
Current Error Code for Terminal	3 ASCII Chars.	XXX represents the value of the error code that existed in the terminal at the time the message was sent. ‘000' indicates no problems.
Communications failures	3 ASCII Chars.	Number of communications problems experienced since last reset of this value. Comms. Failure would be BUSY, NO CONNECT, etc.
Cassette A Denomination	3 ASCII Chars.	000 - 99K. Values that are all numeric represent actual value of notes. Values suffixed with ‘K’ indicate thousands. (01K = 1 thousand unit note, 50K = 50 thousand unit note).
Cassette A notes loaded	4 ASCII Chars.	0000 – 9999. Numbers of notes in the cassette when it was installed. (Note: this values is manually entered).
Cassette A notes dispensed	4 ASCII Chars.	0000 – 9999
Cassette A reject events	3 ASCII Chars.	000 – 999

PRELIMINARY

Status Monitoring Field		
Cassette B Denomination	3 ASCII Chars.	000 - 99K. Values that are all numeric represent actual value of notes. Values suffixed with 'K' indicate thousands. (01K = 1 thousand unit note, 50K = 50 thousand unit note).
Cassette B notes loaded	4 ASCII Chars.	0000 – 9999. Numbers of notes in the cassette when it was installed. (Note: this values is manually entered).
Cassette B notes dispensed	4 ASCII Chars.	0000 – 9999
Cassette B reject events	3 ASCII Chars.	000 – 999
Cassette C Denomination	3 ASCII Chars.	000 - 99K. Values that are all numeric represent actual value of notes. Values suffixed with 'K' indicate thousands. (01K = 1 thousand unit note, 50K = 50 thousand unit note).
Cassette C notes loaded	4 ASCII Chars.	0000 – 9999. Numbers of notes in the cassette when it was installed. (Note: this values is manually entered).
Cassette C notes dispensed	4 ASCII Chars.	0000 – 9999
Cassette C reject events	3 ASCII Chars.	000 – 999
Cassette D Denomination	3 ASCII Chars.	000 - 99K. Values that are all numeric represent actual value of notes. Values suffixed with 'K' indicate thousands. (01K = 1 thousand unit note, 50K = 50 thousand unit note).
Cassette D notes loaded	4 ASCII Chars.	0000 – 9999. Numbers of notes in the cassette when it was installed. (Note: this values is manually entered).
Cassette D notes dispensed	4 ASCII Chars.	0000 – 9999
Cassette D reject events	3 ASCII Chars.	000 – 999
Total notes purged	3 ASCII Chars.	000 - 999. Total notes exiting the dispenser in response to a purge command. Cassette origin is unknown for these notes.

PRELIMINARY

This field is composed of individual subfields and is sent as a whole group, if enabled. Individual fields cannot be sent separately.

The first character of the Status Monitoring Field will always be a capital letter A(ASCII Char 41h) through Z(ASCII Char 5Ah).

Product Code Table for Program / Table Version Numbers

CODE	DESCRIPTION
C'X'	Model 9500 family of single cassette dispensers. 'X' may be any letter.
D'X'	Model 9515 family of multiple cassette dispensers. 'X' may be any letter.
N'X'	Model 2000 Mako family. 'X' may be any letter.
P'X'	Model 9200 SuperScrip family. 'X' may be any letter.
S'X'	Model 9600 family of single cassette dispensers. 'X' may be any letter.
U'X'	Model 9640 family of single cassette dispensers. 'X' may be any letter.
T'X'	Model 9615 family of multiple cassette dispensers. 'X' may be any letter.
Z'X'	Model 9700 family of multiple cassette dispensers. 'X' may be any letter.

Product Code Table for EPROM Version Numbers

CODE	DESCRIPTION
C'X'	Model 9500 family of single or multiple cassette dispensers. 'X' may be any letter.
N'X'	Model 2000 Mako and Model 9200 SuperScrip. 'X' may be any letter.
S'X'	Model 9600 family of single or multiple cassette dispensers. 'X' may be any letter.
Z'X'	Model 9700 family of single or multiple cassette dispensers. 'X' may be any letter.

PRELIMINARY

Transaction Code Table

CODE	DESCRIPTION
01	Change PIN. Must send PIN Change PIN Block (Misc. field) along with this code.
11	Cash Withdrawal from primary checking account
12	Cash Withdrawal from primary savings account
15	Cash Withdrawal from primary credit card account
21	Transfer from primary checking account to savings account
22	Transfer from primary savings account to checking account
25	Transfer from primary credit card account to primary checking account
29	Reverse Previous Withdrawal
31	Primary checking account balance inquiry
32	Primary Savings account balance inquiry
35	Primary Credit card balance inquiry
41	Non-Cash Withdrawal from primary checking account (POS type transaction)
42	Non-Cash Withdrawal from primary savings account (POS type transaction)
43†	Quasicash pinless purchase from primary credit account (POS type transaction)
44†	Non-Financial prepaid online transaction (POS type transaction)
45	Non-Cash Withdrawal from primary credit card account (POS type transaction)
50	Get host totals (do not change business day or reset totals)
51	Change business date and reset totals
60	Download configuration table
61	Cash Withdrawal from primary checking account using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.
62	Cash Withdrawal from primary savings account using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.
65	Cash Withdrawal from primary credit card account using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.
71	Transfer from primary checking account to savings account using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.
72	Transfer from primary savings account to checking account using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.
75	Transfer from primary credit card account to checking account using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.

PRELIMINARY

Transaction Code Table	
81	Primary checking account balance inquiry using Miscellaneous Field ID ‘e’ for balance. Amount 1 field in response is set to spaces.
82	Primary savings account balance inquiry using Miscellaneous Field ID ‘e’ for balance. Amount 1 field in response is set to spaces.
85	Primary credit card balance inquiry using Miscellaneous Field ID ‘e’ for balance. Amount 1 field in response is set to spaces.
91	Non-Cash Withdrawal from primary checking account (POS type transaction) using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.
92	Non-Cash Withdrawal from primary savings account (POS type transaction) using Miscellaneous Field ID ‘e’ in request message for amount. Amount field 1 is set to spaces.
95	Non-Cash Withdrawal from primary credit card account (POS type transaction) using Miscellaneous Field ID in request message ‘e’ for amount. Amount field 1 is set to spaces.
99†	Use Extended Transaction Code String – Miscellaneous FID ‘l’ (ASCII 6Ch).

†**Preliminary**.

PRELIMINARY

Authorization Codes Table	
CODE	DESCRIPTION
000	Transaction approved
001	Expired card
002	Unauthorized usage
003	PIN error
004	Invalid PIN
005	Bank unavailable
006	Card not supported
007	Insufficient funds
008	Ineligible transaction
009	Ineligible account
010	Number of daily withdrawals exceeded
011	Cannot process transaction
012	Amount too large
013	Account closed
014	PIN tries exceeded
015	Database problem
016	Withdrawal limit already reached
017	Invalid amount
018	External decline
019	System error
020	Contact card issuer
021	Routing lookup problem
022	Message edit error
023	Transaction not supported
111	Reversal Declined
222	PIN Change Declined

† Preliminary

PRELIMINARY

Miscellaneous Field ID Descriptions

Field ID Code	DESCRIPTION
'!' (exclamation point)	Surcharge amount to be displayed to customer during Surcharge Notification screen. 8 numeric ASCII characters, right justified and zero filled to the left. Represents the amount in the smallest possible unit of currency.
'/' (solidus)	MAC enable or disable field. 1 ASCII Character. An ASCII '0' disables MAC (disabled by default) and an ASCII '1' enables MAC.
'^' (caret)	MAC (Message Authentication Code) Result. 9 ASCII characters calculated with the MAC key by encrypting the message starting from the STX and ending with the ETX, the LRC is ignored. The MAC is separated into two equal halves by an ASCII space. MAC result example: 'A562 34CD'. NOTE: Sending a MAC with 9 ASCII spaces will cause the terminal to fail the current message and perform a Configuration Table Download on the next call.
'b'	Supplemental balance field, 8 numeric ASCII characters long zero filled to left. Eleven space characters are used to pad the field to 20 positions. Example: [b00123456_ _ _ _ _ _ _ _ _ _ _] where '00123456' is 123456 units of available balance. Represents the amount in the smallest possible unit of currency.
'c'	Day close time is the time of day specified in hours and minutes when the scheduled day close will occur. The format is HHMM. The valid range is 0000(midnight) to 2359.
'd'	Store Message Download is used to download the programmable messages to the terminal. The first character after the FID is a character that defines which type of message is to be downloaded. The four message types currently supported are **s**tore, **m**arketing, **w**elcome and **e**xit. The first letter of each message type is used to identify it after the FID. The second character after the FID is the number of lines contained in the message. The text format is any ASCII character of 20 hex or greater, as well as carriage return (0d hex) for the 'w' and 'e' messages. A maximum of 166 characters, including FID and line count, is allowed. The following table lists the message types with associated line length and with maximums.

Message Type	Message Identifier	Max. no. of Lines	Max. no. of characters per line
Store	s	4	40
Marketing	m	4	40
Welcome	w	3	30
Exit	e	3	30

'e'	Extended length amount field. When present in a Transaction Request Message, this field OVERRIDES the amount field 1 in the response message. Amount 1 will be space filled to indicate this. It can be used for balance inquiries. The format consists of the FID code 'e', followed by 12 ASCII digits, zero filled to the left. Example: [e000123456789] where '000123456789' represents 123,456,789 units of currency. (NOTE: the units always represent the smallest possible representation of the currency involved. For United States, this would be the number of pennies). When present in a Host Totals Response Message, this field represents the 12 digit Settlement Amount.
'&'	28 Digit Account Number (i.e. Checking, Savings, etc.) Left justified, padded with spaces.
'#'	12 Digit (alphanumeric) Sequence Number.
'@'	PIN Change PIN Block. 16 alphanumeric. ANSI standard encrypted PIN block. (See Appendix A)
'g'	Track 3 information, excluding the Start Sentinel, End Sentinel, and LRC. If this field is used, and if track 3 data is not present or is unreadable, this field will contain just the FID code 'g'.
'h'	Heartbeat interval (minutes) is the length of time the terminal will sit idle (no transactions initiated) before it sends a Configuration Download Request. The format is 3 ASCII numeric characters, right justified and zero filled to the left. The valid range is 1 to 999.

PRELIMINARY

Miscellaneous Field ID Descriptions	
'i' ASCII Char – 69h.	Primary Account Number from track 3 on the magnetic stripe. If this field is used, and if track 3 data is not present or is unreadable, this field will contain just the FID code 'i'.
'k'	Issuer Fee/Credit to be displayed to customer during Surcharge Notification screen. Nine numeric ASCII characters, right justified and zero filled to the left. Represents the amount in the smallest possible unit of currency. An ASCII minus sign (e.g. "-00000100") in the first position represents a credit. The absence of this field implies an unknown Issuer Fee/Credit.
'l' † ASCII Char – 6Ch.	Extended Transaction Code String. – Six ASCII numbers. – T_1 T_2 T_3 T_4 T_5 T_6 2 Numeric (T_1 T_2) - Transaction Type Code 2 Numeric (T_3 T_4) - "From" Account Type Code (Code '00' not allowed) 2 Numeric (T_5 T_6) - "To" Account Type Code See Appendix C – Extended Transaction Code Table for a list of Transaction and Account Type Codes.
'm'	MAC (Message Authentication Code) key. 16 ASCII characters encrypted under Master key. Will be used starting with the *next* transaction.
'n'	Reason for reversal. Two ASCII numbers representing the following reasons for a reversal: '01' - Incorrect Dispense: The amount dispensed does not match amount requested. This may be due to either a mechanical failure or the lack of available bill(s) to make the requested amount. '02' – Protocol Error: A request message was sent from the terminal for which no valid response message was received from the host. '03' – Lost EOT: A valid response message was received by the terminal, but the EOT was not received. This assumes the terminal was configured to expect the EOT. If the terminal is configured to ignore EOT, there will be no reversal generated. '04' – Mac Error: The calculated MAC result does not match the MAC result returned in the response message. '05' - Customer Cancellation: Customer decided not to continue after reviewing the transaction fee.
'o' † ASCII Char - 6Fh.	Total number of CREDIT ADVANCE transactions and the total amount of all CREDIT ADVANCE transactions. (12 Numeric total) 4 Numeric – Total number of CREDIT ADVANCE transactions since the last request for totals. Zero filled to the left. 8 Numeric – Total amount of all CREDIT ADVANCE transactions. Zero filled to left, right justified. Represents the amount in the smallest possible unit of currency.
'p'	ASCII formatted printing text field. This field, if present, will be printed at the end of a successful transaction receipt, error receipt or host totals receipt. It must include as the second character (after the 'p') the number of lines to be printed (from '1' to '4'). Preformatted text follows this line count. All ASCII characters above 20 HEX (the space character) are allowed. The only control character allowed is the carriage return, 0d HEX. The printer is capable of printing up to forty characters per line. Each separate line of text must be terminated by a carriage return. No centering is done by the terminal; all text is printed as sent. Maximum length of this field is 166 characters, including the 'p'. Can also appear in host totals response message

PRELIMINARY

Miscellaneous Field ID Descriptions

't'	Current network time sent from the host processor to update the terminal's time. The format is 6 numeric ASCII characters in the form HHMMSS. The time will be in 24 hour military format.	
'w'	Maximum withdrawal amount is the largest dollar amount allowed for a withdrawal transaction. The format is 3 ASCII numeric characters right justified and zero filled to the left. The valid range is $1 to $999. This does not override any maximum set by the network.	
'x' †	Prepaid online and/or prepaid offline fields. The first character after the FID 'x' is another character that defines which data element is to be transmitted. The table below describes each data element. A Field Separator must follow each field.	
	'a'	Telco-product Serial Number for prepaid offline transactions 16 ASCII characters maximum
	'b'	Activation phone number for prepaid offline or online transactions 20 ASCII characters maximum
	'c'	Taxes 1 – (GST/HST/PST – General Sales Tax / Harmonized Sales Tax / Provencial Sales Tax for offline transactions) or general taxes for offline transactions. 8 numeric Zero filled to the left. Represents the amount in the smallest possible unit of currency.
	'd'	Taxes 2 – General taxes for online transactions. 8 numeric Zero filled to the left. Represents the amount in the smallest possible unit of currency.
	'e'	Total number of prepaid online transactions and the total amount of all prepaid online transactions. (12 Numeric total) 4 Numeric – Total number of Wireless Phone Refill transactions since the last request for totals. Zero filled to the left. 8 Numeric – Total amount of all Wireless Phone Refill transactions. Zero filled to left, right justified. Represents the amount in the smallest possible unit of currency.
	'f'	Contact phone number for prepaid offline or online transactions. 20 ASCII characters maximum
	'g'	Carrier Name for prepaid offline or online transactions. 20 ASCII characters maximum
	'h'	6 Digit (numeric) Expiration date(MMDDYY) for online transactions.
	'i'	Secret Number for prepaid offline or online transactions 20 ASCII characters maximum
'~' (tilde) ASCII Char 7Eh	DES Communications key (PIN Working Key). 16 ASCII characters long, encrypted under Master key. Will be used starting with the *next* transaction. Same format as this field in configuration table download. Triple-DES Encrypted PIN Key 1 (*K1)* if the terminal is Triple-DES capable (See APPENDIX D). Each character represents a 4-bit hexadecimal numeral (0-9, A-F).	

PRELIMINARY

Miscellaneous Field ID Descriptions	
'{' † (left bracket) ASCII Char 7Bh	Triple-DES Encrypted PIN Key 2 (*K2)* (See APPENDIX D) when used in a Response Message. 16 ASCII characters. Each character represents a 4-bit hexadecimal numeral (0-9, A-F). The absence of this FID in a Response Message(Transaction or Configuration Table Download) will set K2 equal to K1 (*K2=K1)* and the '[' FID equal to zero(0) for all request messages if the terminal is Triple-DES capable, which is identical to Single-DES encryption of the PIN block. The presence of this FID in a Response Message(Transaction or Configuration Table Download) will set the '[' FID equal to two (2) for all request messages if the terminal is Triple-DES capable. Will be used starting with the *next* transaction.
'[' † (left brace) ASCII Char 5Bh	Terminal is Triple-DES capable / Encryption Mode Flag (EMF) (See APPENDIX D) 1 ASCII character. 0(default) = Terminal is Triple-DES capable (reset to zero (0) by absence of the '{' FID in a Transaction or Configuration Table Download message from the host) 2 = Terminal is Triple-DES capable (set to two (2) by the presence of the '{' FID in a Transaction or Configuration Table Download message from the host) Terminals that are not Triple-DES capable will not send this FID, therefore its absence indicates the terminal is Single-DES only. The value of this FID (0 or 2) is also the value of the Encryption Mode Flag in the communication header of request messages.

PRELIMINARY

This table describes the Field ID codes that can appear in the miscellaneous fields in the response message. In all cases, the Field ID (FID) Code character *must* be the first character in the field, with the appropriate data following directly after the FID.

Any field described here may be placed in either field Miscellaneous 1, Miscellaneous 2, or Miscellaneous X, where appropriate.

†**Preliminary**.

Valid Miscellaneous FID Table

Message Type	Allowed FIDs	
	Request	Response
Transaction	'^' – MAC Result 'e' – Extended Length Field '#' – 12 Digit Sequence Number '@' – PIN Change PIN Block 'g' – Track 3 information 'i' – Track 3 PAN 'I'† - (ASCII Char 6Ch) – Extended Transaction code string 'xb' † – Activation phone number for prepaid offline or online transactions. '[' † – Terminal is Triple-DES capable	'!' – Surcharge amount '/' – MAC enable/disable '^' – MAC result 'b'– Supplemental balance 'c' – Day close time 'd' – Store message 'e' – Extended length field (12-digit Balance Amount) '#' – 12 Digit sequence number 'k' –' Issuer Fee/Credit 'm' – MAC key 'p' – Print literal text 't' – Current network time 'w' – Max withdrawal amount '~' – DES Comms key or Triple-DES Encrypted PIN-Key 1 '{' † – Triple-DES Encrypted PIN-Key 2 '&' – Account Number. 'h' – Heartbeat Interval. 'I' † - (ASCII Char 6Ch) – Extended Transaction code string 'xa' †-Telco product Serial Number for online transactions 'xb' †- Activation phone number for prepaid offline transactions 'xc' †- Taxes 1 - GST/HST/PST for prepaid offline transactions. 'xd' †- Taxes 2 – general taxes for online transactions. 'xf' †- Contact phone number for prepaid offline or online transactions. 'xg' †- Carrier Name for prepaid offline or online transactions. 'xh' †- Expiration date(MMDDYY) for prepaid online transactions.

PRELIMINARY

Valid Miscellaneous FID Table		
Message Type	Allowed FIDs	
	Request	Response
Transaction (cont.)		'xi' † - Secret Number for prepaid online or off line transactions.
Configuration Download	'[' † – Terminal is Triple-DES capable	'!' – Surcharge amount '/' – MAC enable/disable 'm' – MAC key '~' – DES Comms key or Triple-DES Encrypted PIN-Key 1 '{' † – Triple-DES Encrypted PIN-Key 2
Host Totals Download	'^' – MAC Result o'† – Total number of CREDIT ADVANCE transactions and the total amount of all CREDIT ADVANCE transactions. '[' † – Terminal is Triple-DES capable 'xe' † – Host Total amounts for prepaid online transactions.	'^' – MAC Result 'p' – Print literal text 'e' – Extended length field (12-digit Settlement Amount) o' † – Total number of CREDIT ADVANCE transactions and the total amount of all CREDIT ADVANCE transactions. 'xe'† – Host Total amounts for prepaid online transactions.
Reversal	'^' – MAC Result '#' – 12 Digit Sequence Number 'g' – Track 3 information 'k' – Issuer Fee/Credit 'n' – Reason for Reversal '[' † – Terminal is Triple-DES capable	'^' – MAC Result '#' – 12 Digit Sequence Number

† **Preliminary**.

PRELIMINARY

PROTOCOL SPECIFICATION

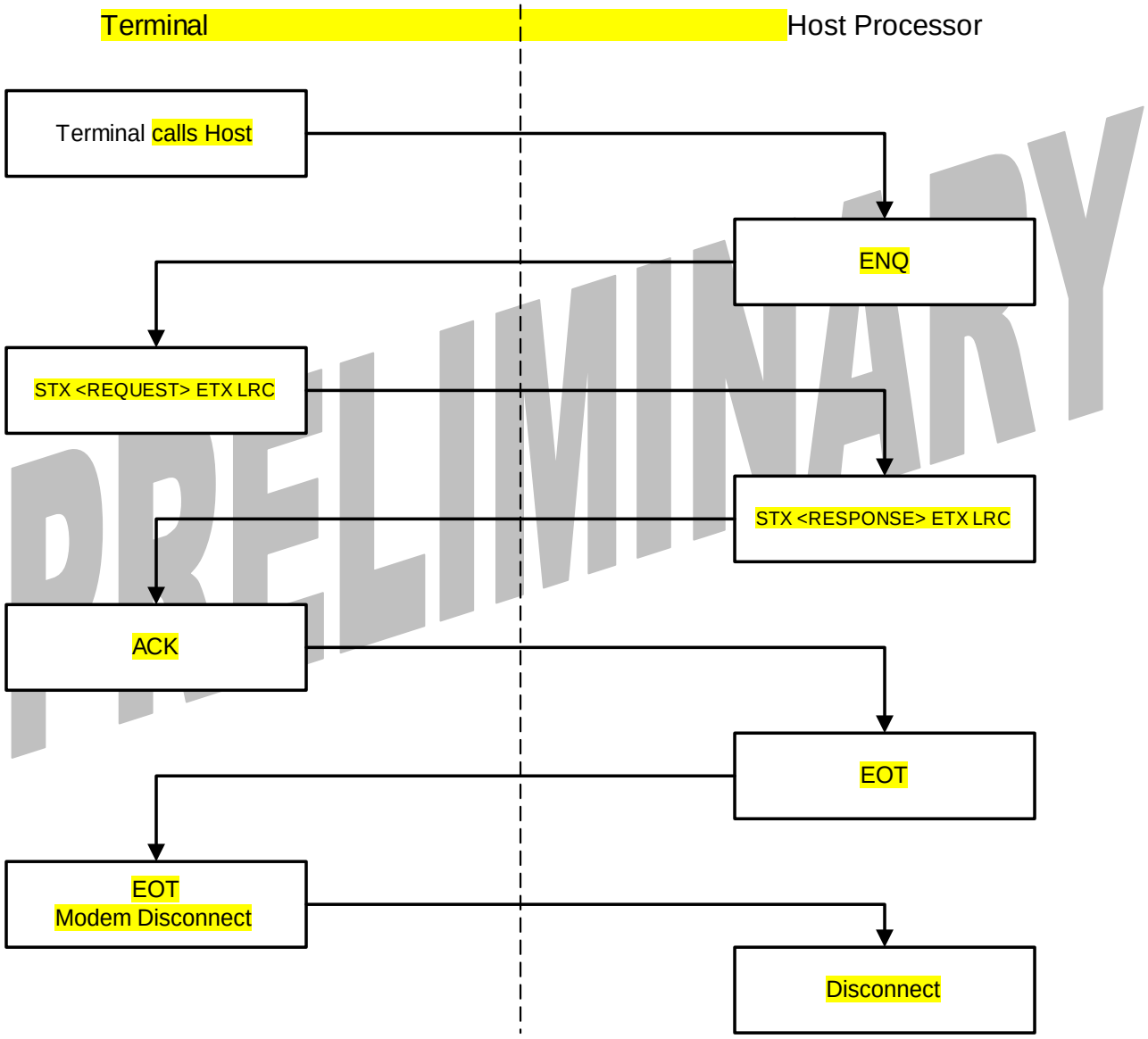
The *mini*ATM communications protocol closely follows the VISA II POS Authorization protocol. The following diagrams illustrate the protocol level for messages sent between the terminal and the processor.

Diagrams are provided for the two modes of normal operation (terminal expects EOT, and terminal does not require EOT), as well as conditions that result in cancelled transactions.

PRELIMINARY

Normal Message w/EOT

This diagram illustrates the line protocol for a normal dispense cycle. Dispense occurs after Host EOT is received (default).

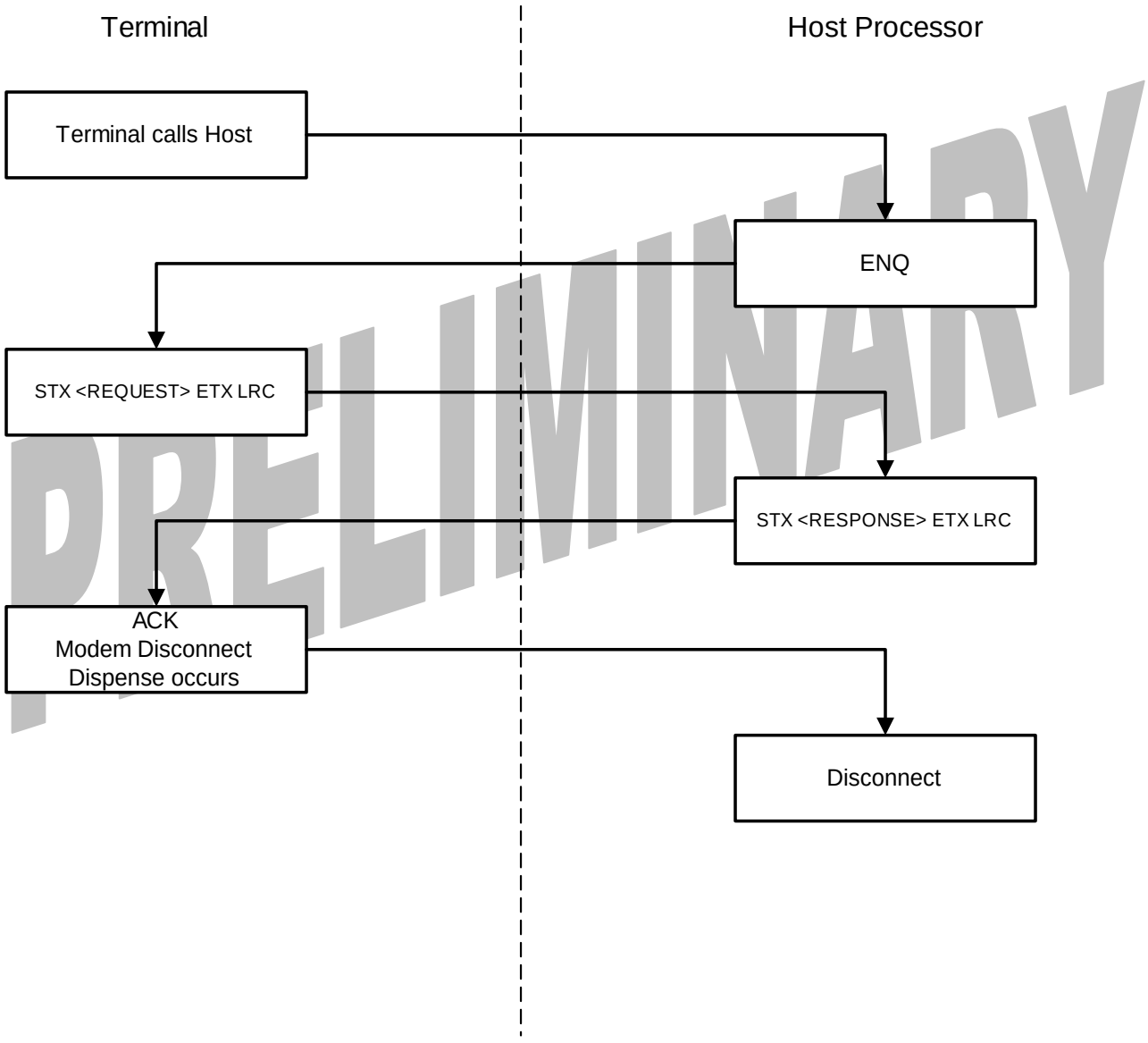


PRELIMINARY

In this mode, the terminal will not dispense unless it receives the EOT from the host.

Normal Message w/o EOT

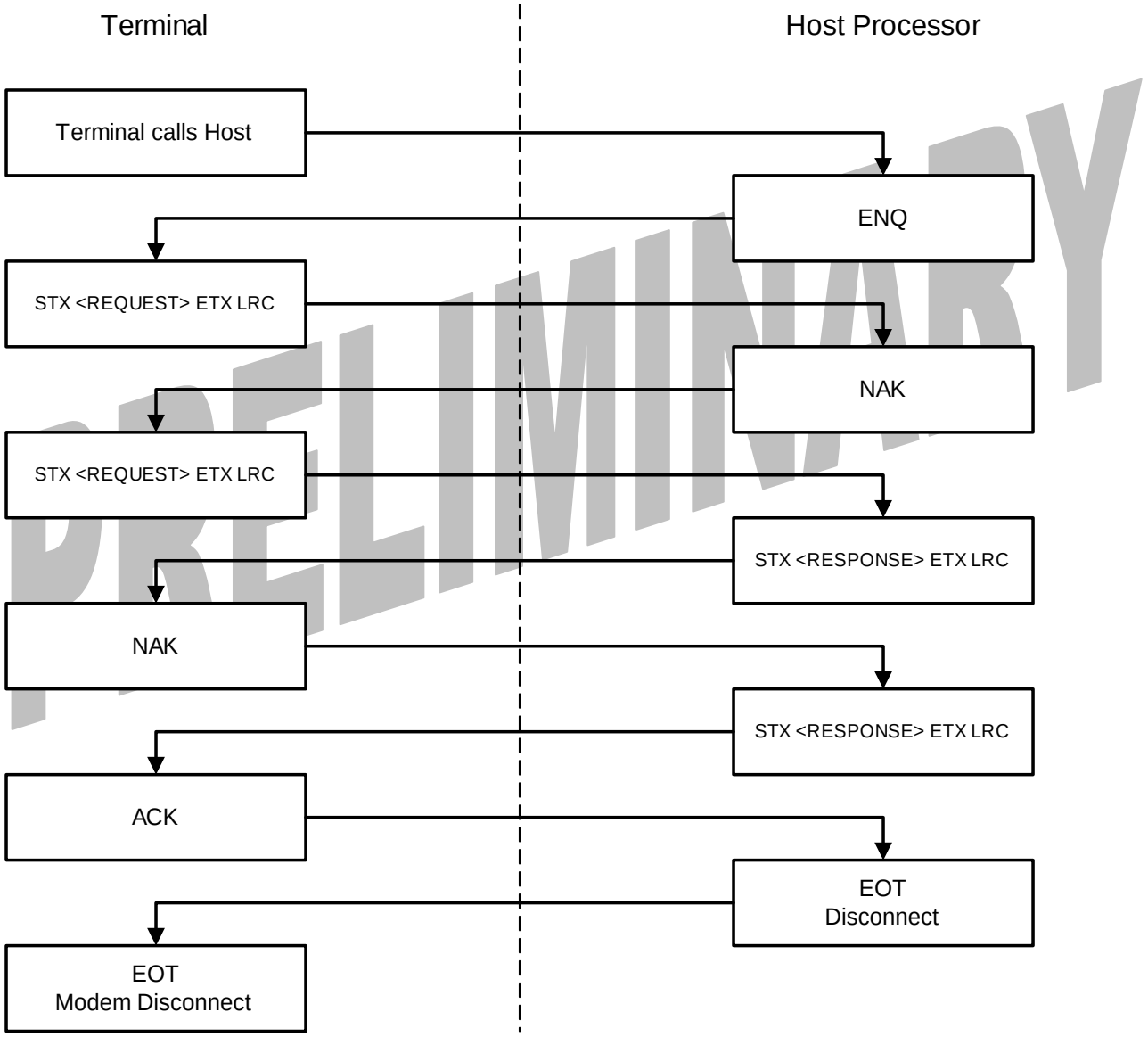
This diagram illustrates the line protocol for a normal dispense cycle when the terminal is not expecting an EOT. Dispense occurs after the terminal sends the ACK to the HOST. If the host sends an EOT it will be ignored.



PRELIMINARY

Correctable Request and Response Transmit Error

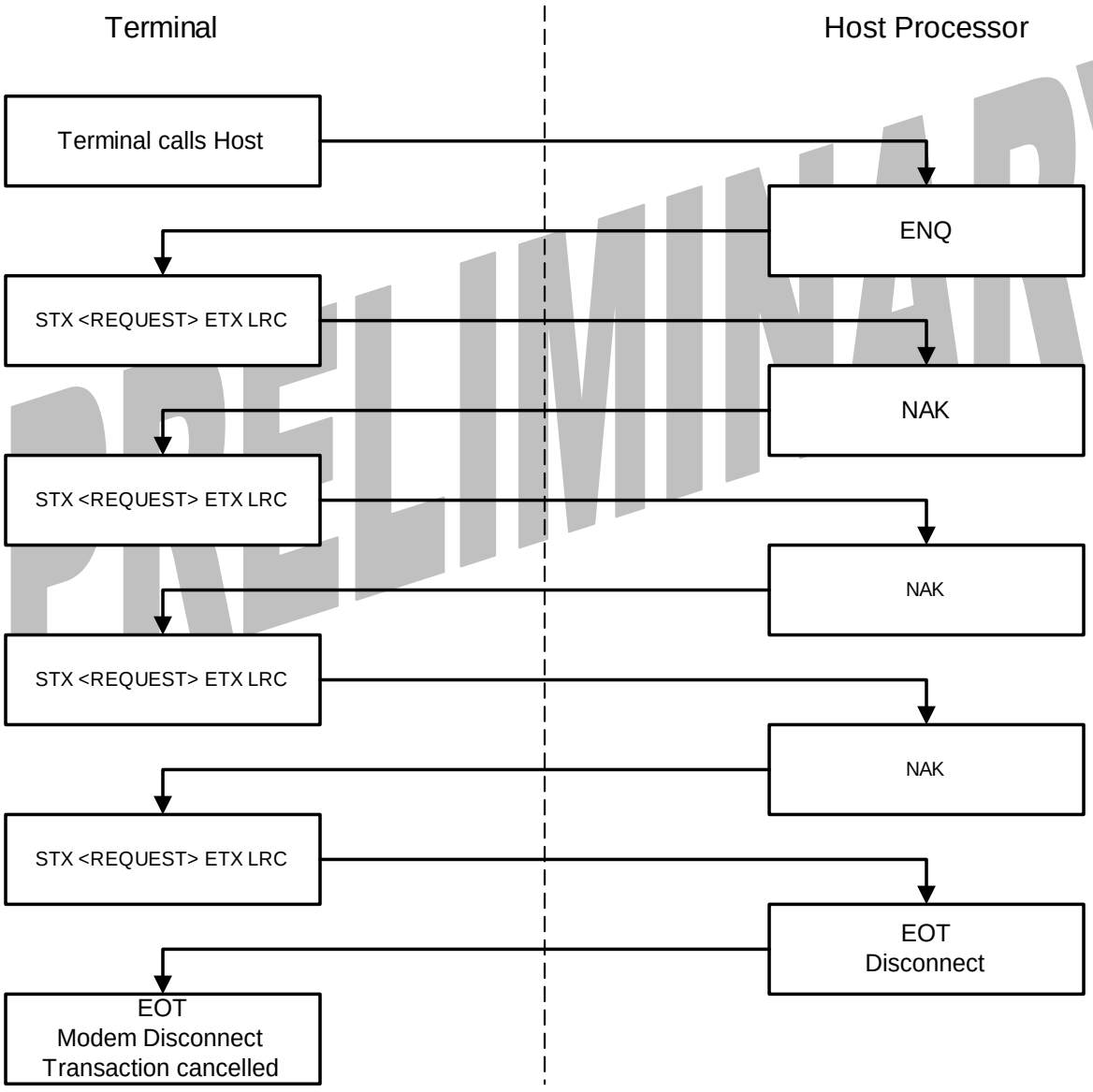
This diagram illustrates the line protocol for a correctable transmit error in the request and response messages. The NAK character is sent to indicate an error in the LRC. The terminal will not dispense if this happens.



PRELIMINARY

Uncorrectable Request Transmit Error

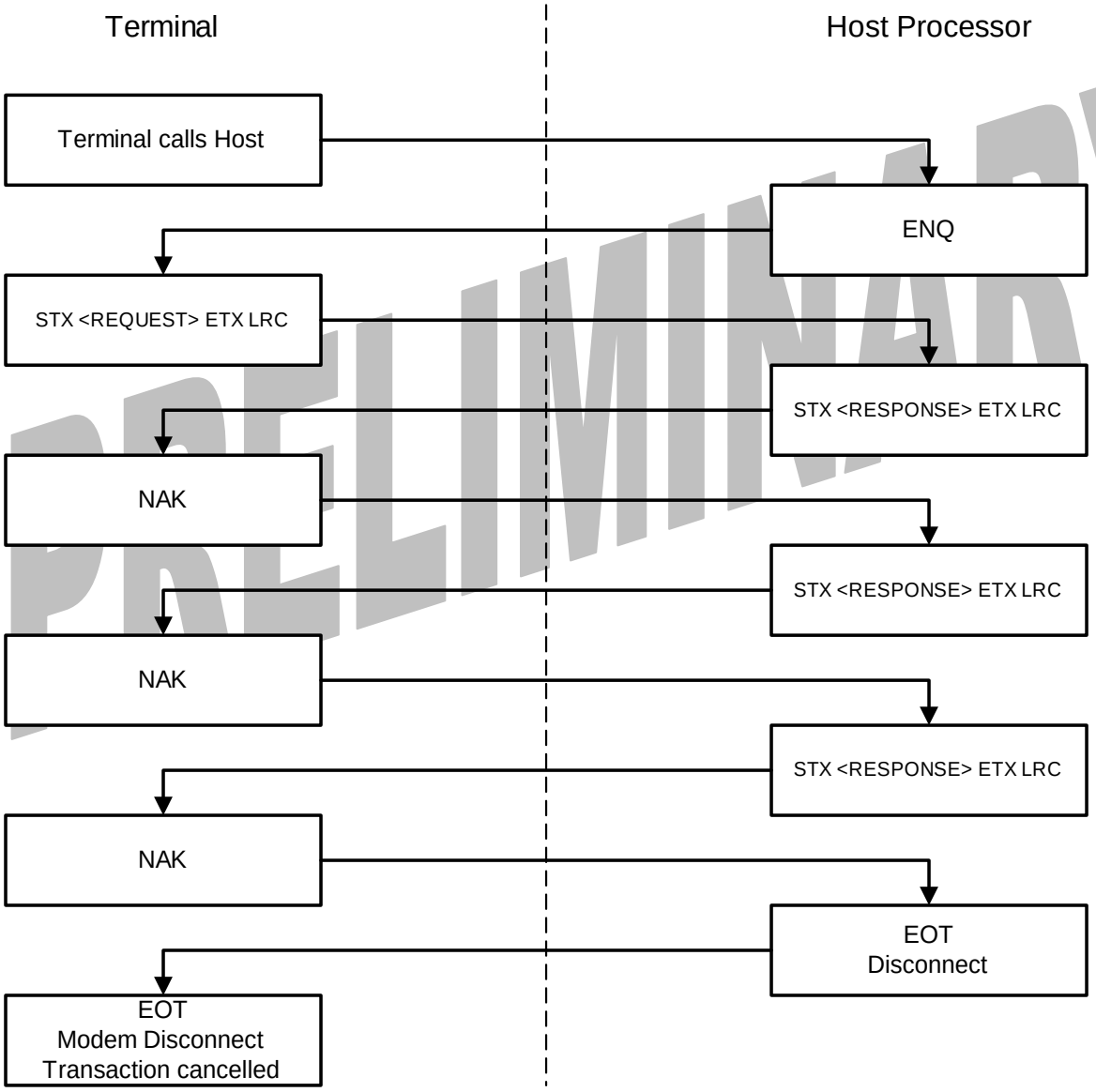
This diagram illustrates the line protocol for an uncorrectable transmit error in the request message. The NAK character is sent from the host to indicate an error in the LRC. The terminal will not dispense if this happens.



PRELIMINARY

Uncorrectable Response Transmit Error

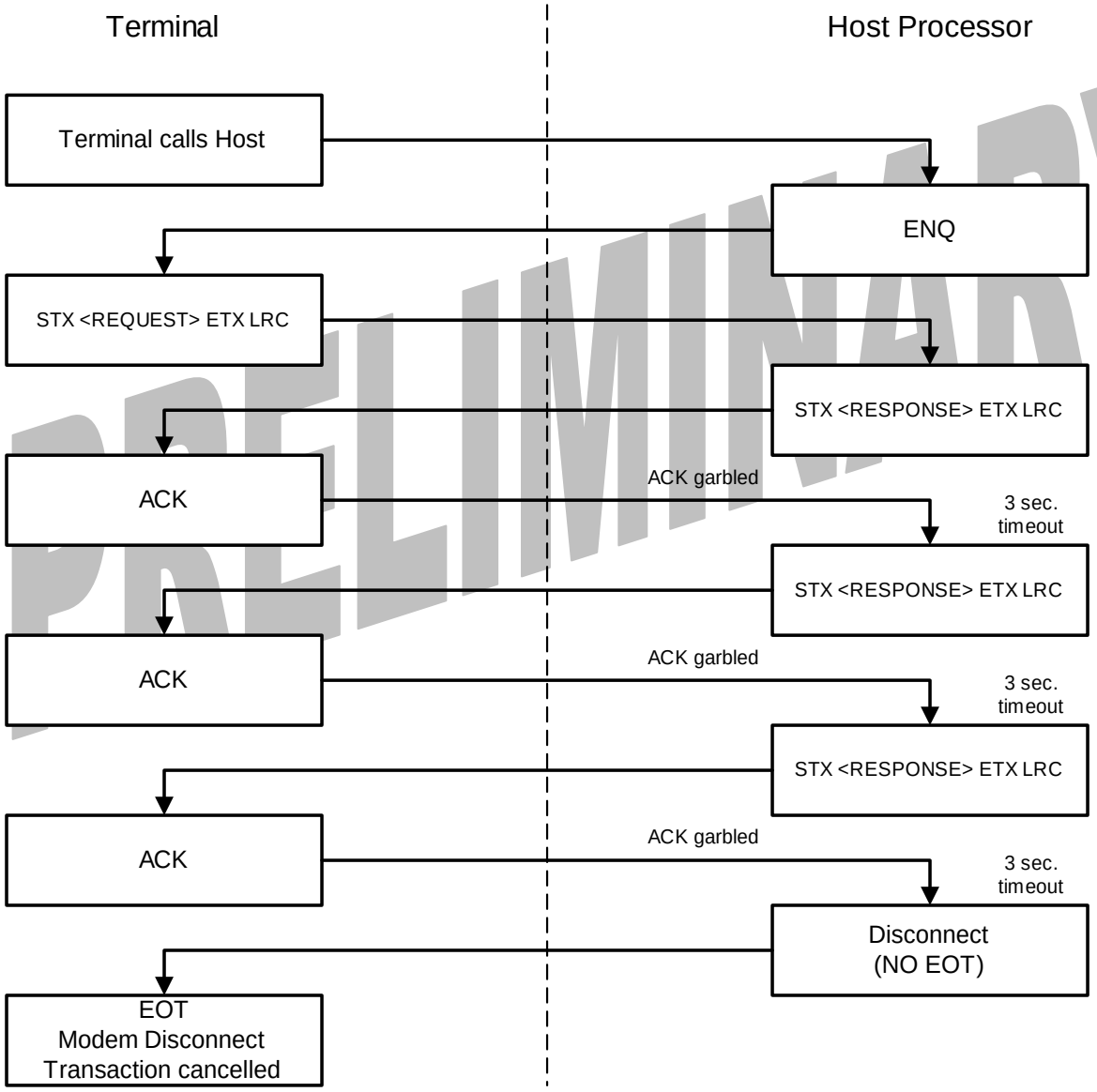
This diagram illustrates the line protocol for an uncorrectable transmit error in the response message. The NAK character is sent from the terminal to indicate an error in the LRC. The terminal will not dispense if this happens.



PRELIMINARY

Terminal ACK Not Received By Host

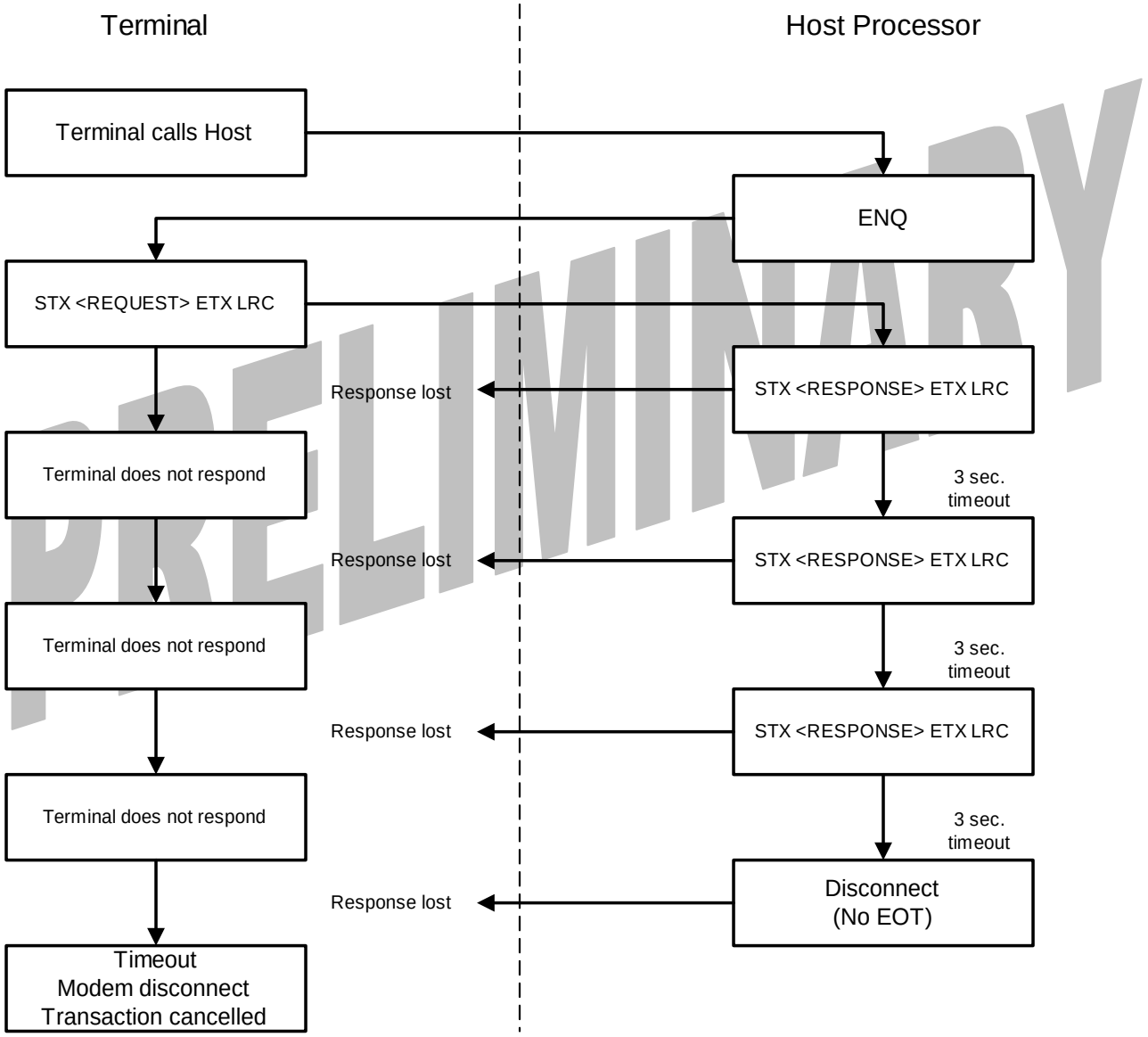
This diagram illustrates the line protocol when the host does not receive the ACK properly. In this scenario, the terminal will not dispense because no EOT was received (assuming the terminal is configured to expect EOT). The host should reverse the transaction.



PRELIMINARY

Terminal Does Not Acknowledge Response From Host

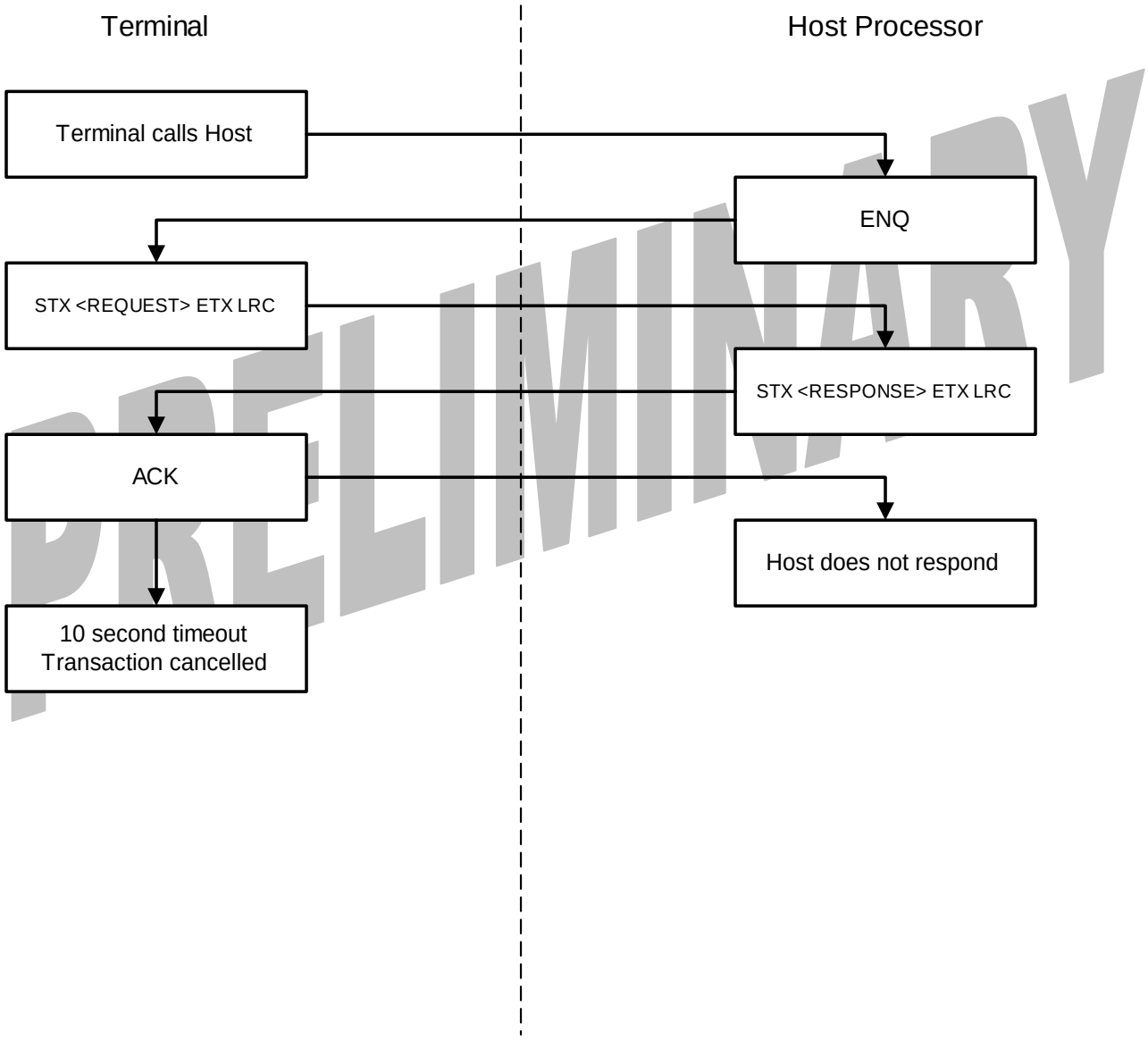
This diagram illustrates the line protocol when the terminal does not receive the response properly from the host. In this scenario, the terminal will not dispense the requested amount (if it was approved). The host should reverse the transaction.



PRELIMINARY

Host Does Not Respond to ACK from Terminal (Default Mode)

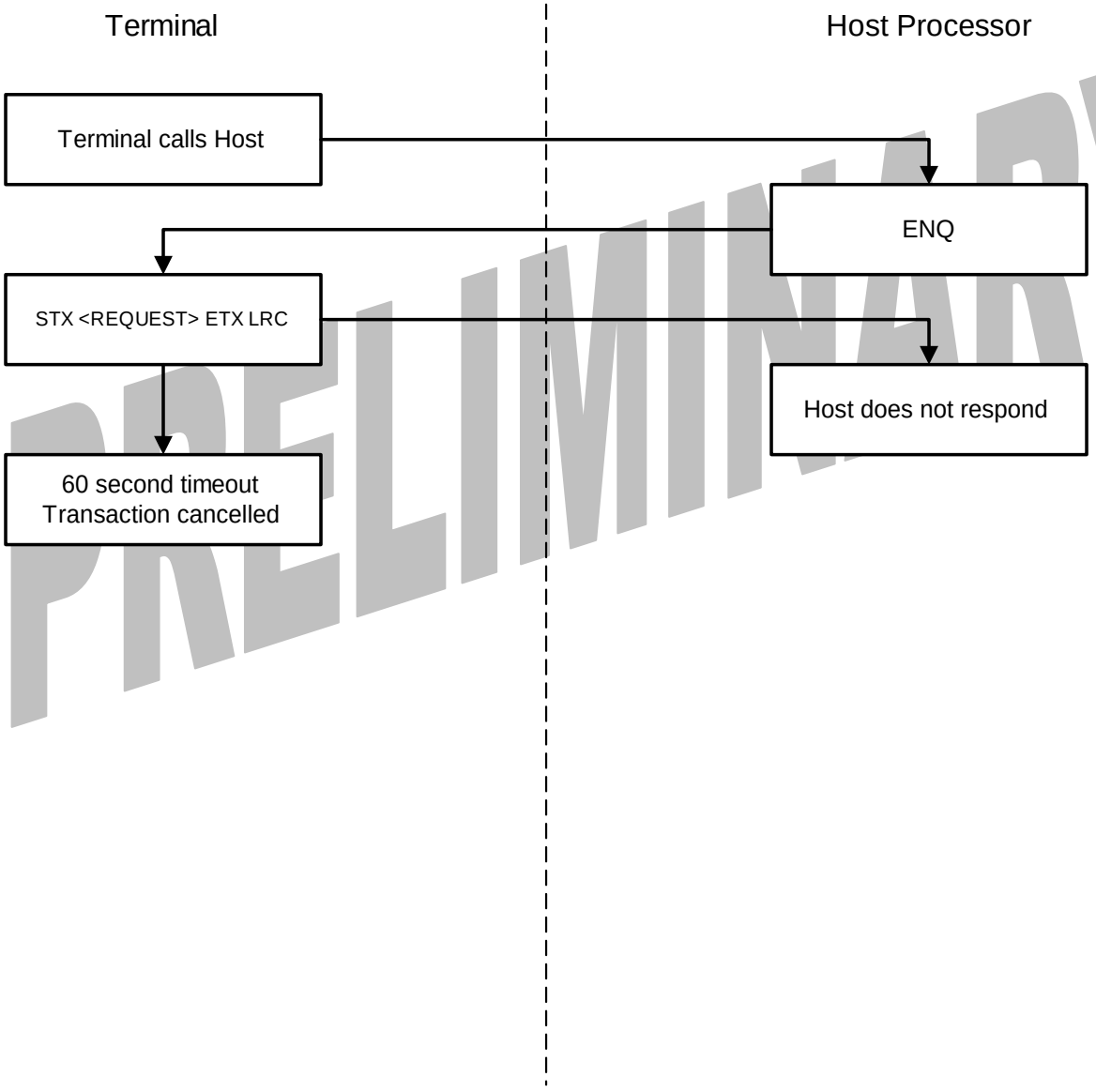
This diagram illustrates the line protocol when the host does not respond with an EOT to the ACK from the terminal when operating in default mode (terminal requires Host EOT to dispense). The terminal will not dispense in this scenario.



PRELIMINARY

Host Does Not Respond to Request Message

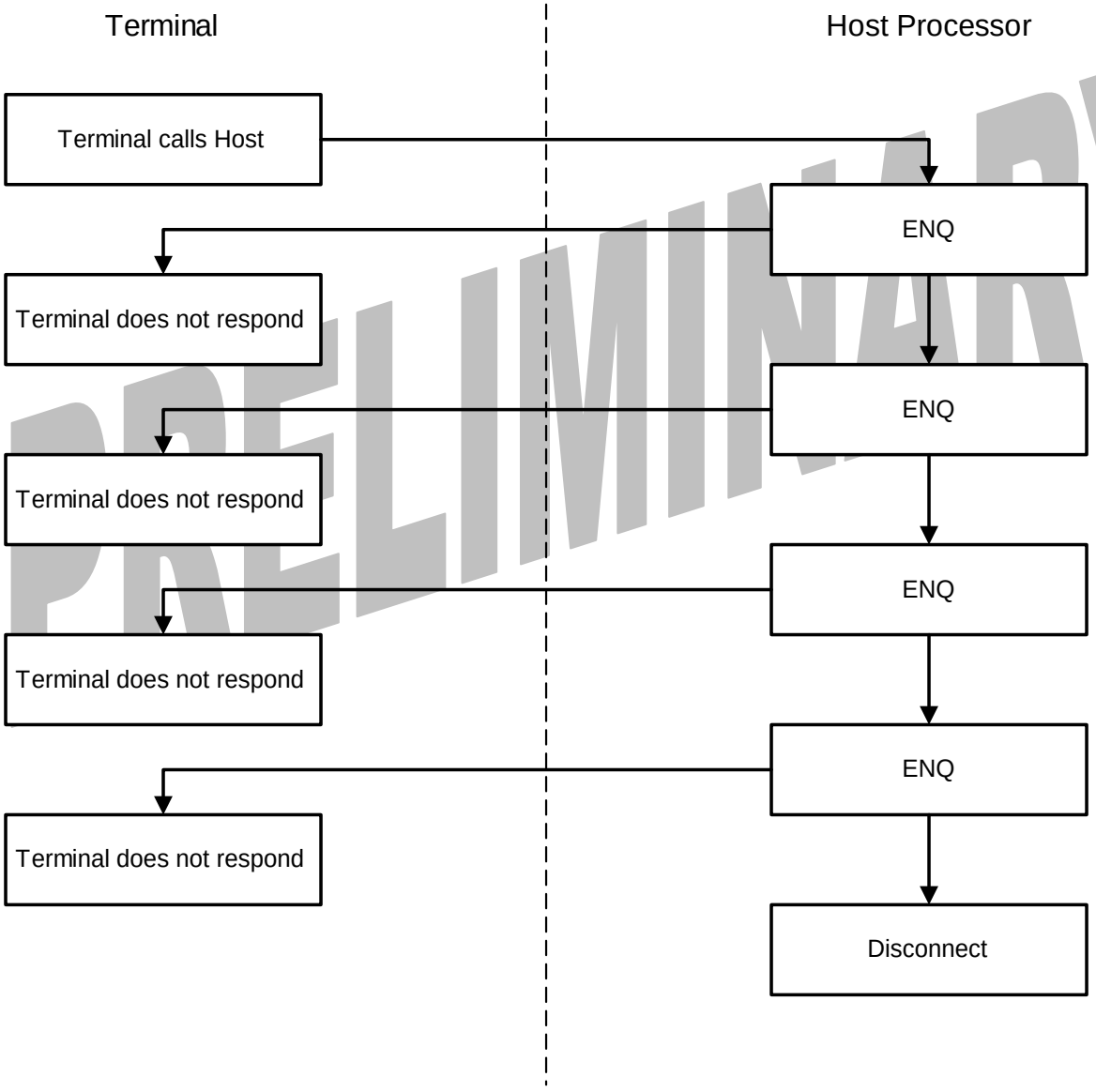
This diagram illustrates the line protocol when the host does not respond to the request message at all. The terminal will not dispense if this happens.



PRELIMINARY

Terminal Does Not Respond to Host ENQ

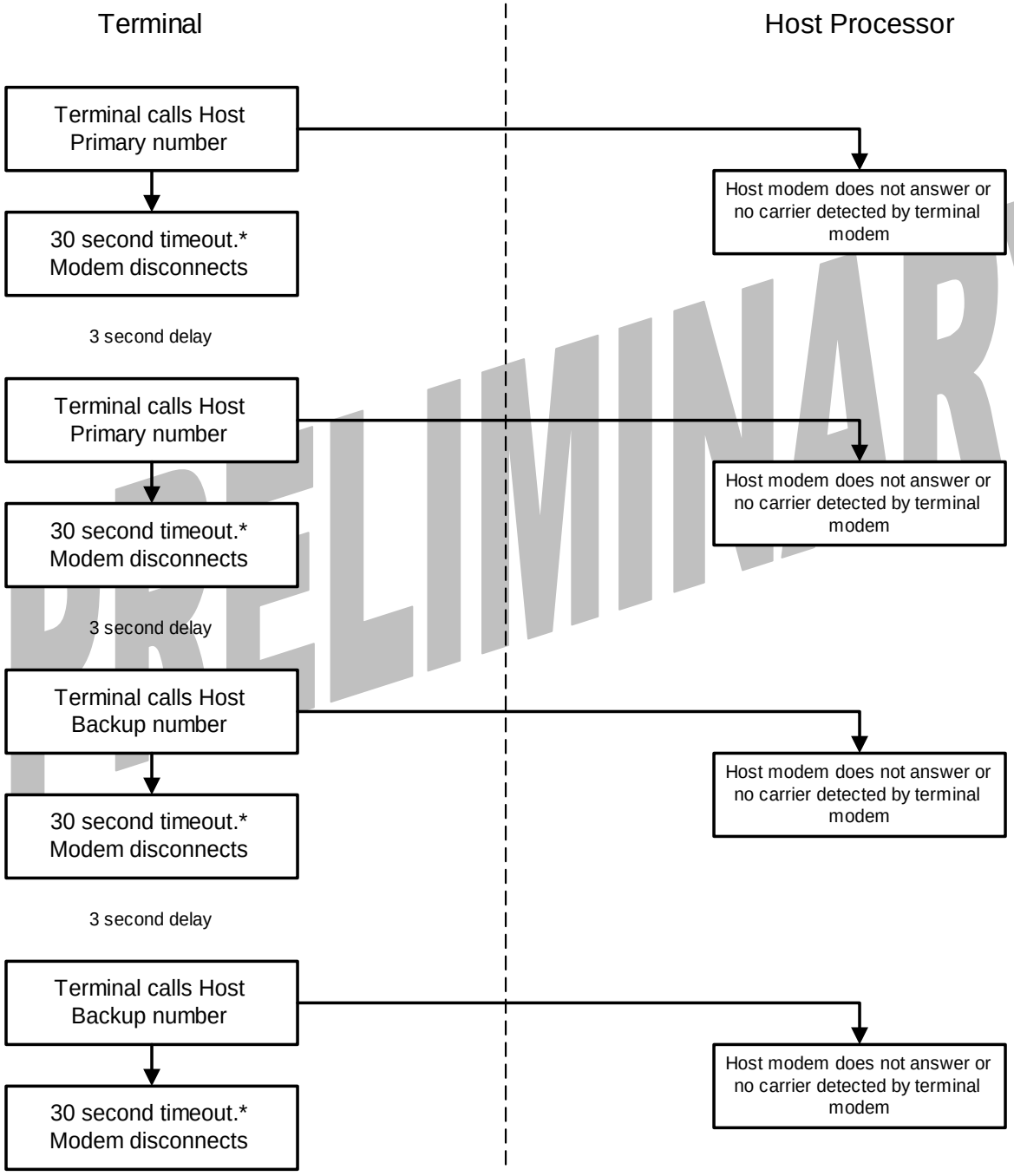
This diagram illustrates the line protocol when the terminal does not respond to the ENQ character. The host should send at least 4 ENQ characters, one second apart, although this is not required.



PRELIMINARY

Host Does Not Answer Terminal Call

This diagram illustrates the line protocol when the host does not answer the call. The terminal will try the primary number twice, then the backup number (if programmed) twice. If no answer is received, the transaction will be cancelled.



PRELIMINARY

* Modem response can shorten timeout

APPENDIX A

ANSI PIN Block Format

This appendix includes two sections from the American National Standards Institute (ANSI) document titled *American National Standard For Personal Identification Number (PIN) Management and Security X.9.8.* This document describes, among other things, the techniques used to secure transmissions of customer PINs over insecure communications pathways. It is presented as a reference only.

PRELIMINARY

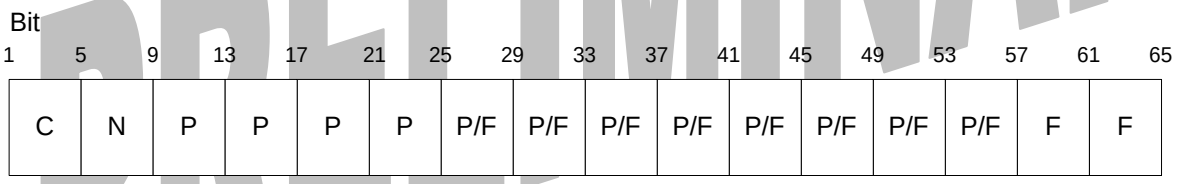
3.7.2.2.2 Clear-Text PIN Block Format

The PIN is assumed to consist of 4-12 decimal digits and *shall* be entered by a customer, in sequence as specified by Section 3.5.1.2, with the first digit entered referred to as digit 1 and the last referred to as digit N.

The clear-text PIN format specified *must* be used in interchange and may be used in the terminal to acquirer segment of the network. Bit positions are specified based on numbering the bits in the DEA input block as in Section 3.7.2.2.1.

The clear-text PIN and the customer's account number are constructed as follows:

PIN Block Construction



C - Control field. Currently, the only defined value is 0000 (binary) which designates the block as containing 4 to 12 four-bit decimal PIN digits representing user-entered characters according to Section 3.5.1.1. Future use of different values of this field could accommodate different character sets.

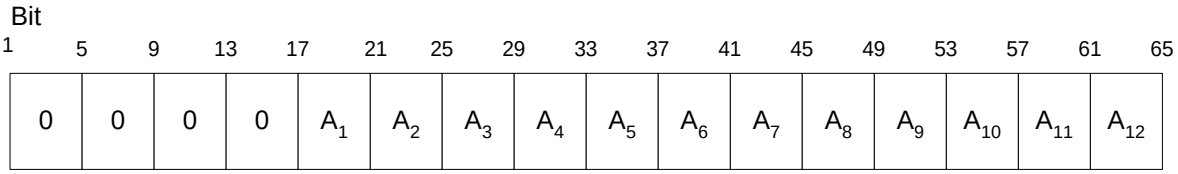
N - PIN length entered field. Four-bit binary number with permissible values of 0100 (=4) to 1100 (=12)

P - PIN digit. Four-bit field having possible values from 0000 to 1001 as defined by Section 3.5.1.1.

F- Fill digit. Four-bit field having fixed value 1111.

P/F - PIN digit or fill digit, as determined by PIN length entered field (N).

Account Number Block Construction



A - The 12-right-most digits of the primary account number (PAN), excluding the check digit. A_1 is the most significant digit and A_{12} is the digit immediately preceding the PAN's check digit.

0 - A decimal pad digit-zero. The first 4-bit fields of the account number block are always padded with this value.

Formatted Clear-Text PIN Block

Next, the PIN and account number blocks are Exclusive OR'd before assembled in the DEA input register.

When the customer's account number is not available, other cryptographic techniques should be used to protect the PIN. Appendix F (ANSI X.9.8) illustrates one such method.

Any network or interchange node having access to the clear-text PIN block (i.e., during a decryption/re-encryption or during a PIN verification) should reject transactions having any of the following:

a. Control field value of other than 0000
b. A PIN length entered field of value less that 4 or greater that 12
c. Any PIN digit from P_1 through P_N of value greater than 9

This serves as a reasonable check on PIN encryption/decryption processing, but does not serve as any indication of validity of the customer-entered PIN.

PRELIMINARY

3.7.2.2.3 Cipher-Text PIN Format

The formatted clear-text PIN block, defined above, then *shall* be encrypted using the DEA on Electronic Code-Book (ECB) mode as shown in Section 3.7.2.2.1. The 64-bit output cipher block is called the reversibly encrypted PIN (or encrypted PIN).

The encrypted PIN *shall* be transmitted between financial institutions as a 64-bit entity in bit oriented communications, as eight 8-bit bytes in 8-bit transparent character oriented communications, as sixteen characters representing hexadecimal digits (0, 1, …, 9, A, B, …, F), or by any other data representation agreed upon by sender and receiver. (Triton Note: The Triton Standard uses 16 hexadecimal digits represented as ASCII characters).

The order of transmission *shall* be for left to right, with respect to the diagram in Section 3.7.2.2.1. For example, in 8-bit transparent communications the first byte transmitted will contain bits 1 though 8 of the DEA output block; the eight byte transmitted will contain bits 57 through 64 of the DEA output block.

APPENDIX B

MAC Protocol Addendum

The MAC fields implemented in this specification follow the ANSI Standard X9.9 format.

This section describes the actual implementation of the fields in the message.

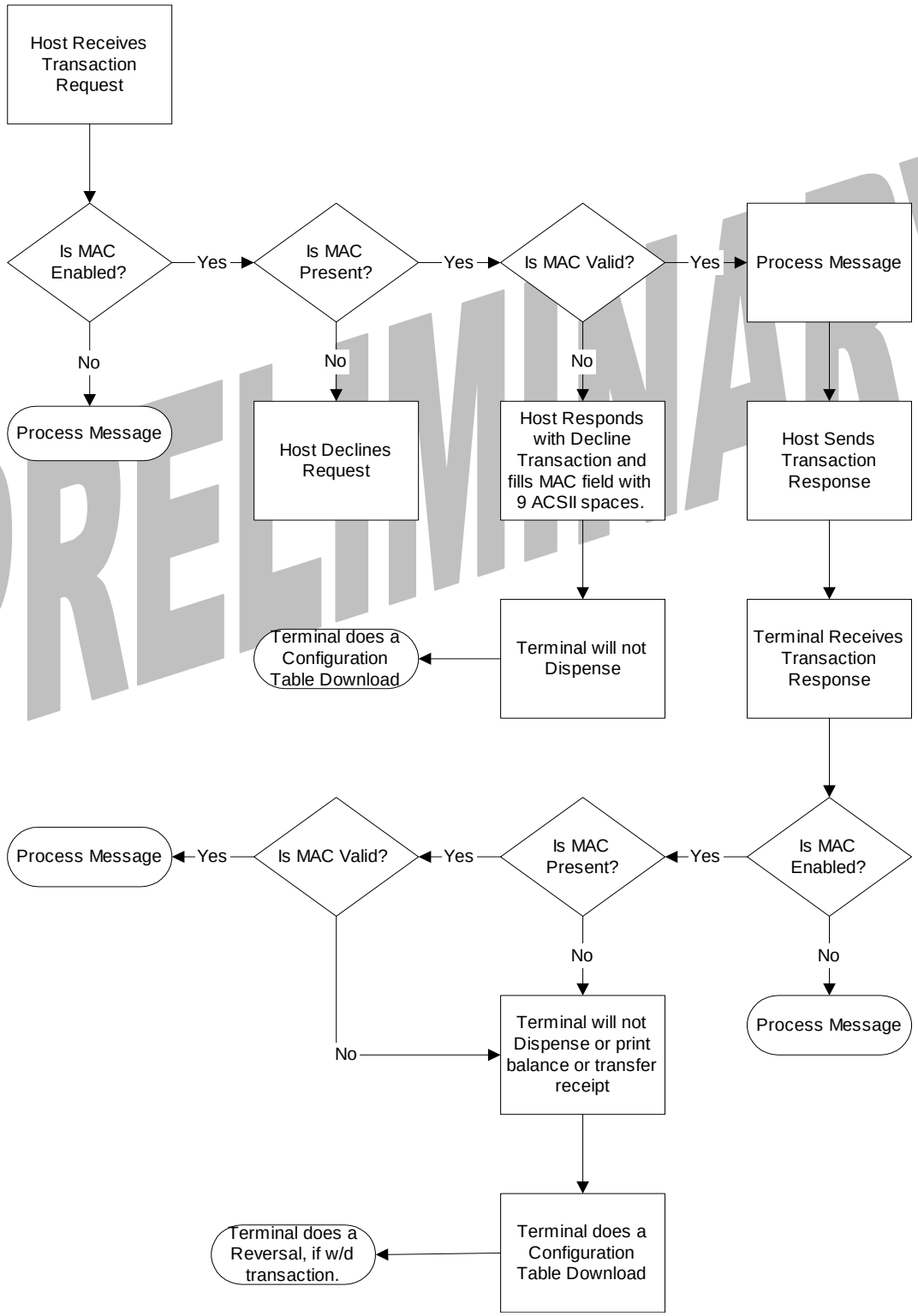
1. Insert a Field ID '^' into one of the miscellaneous fields in the formatted message. Fill this field with 9 ASCII zero characters.
2. Create an 8-byte buffer in RAM called 'INPUT' and fill this block with hex zeroes.
3. Create an 8-byte buffer in RAM called 'OUTPUT' and fill this block with hex zeroes.
4. Begin at the STX character of the formatted message.
5. Take the next 8 ASCII characters from the formatted message (include STX first time through) and transfer them to the INPUT buffer. Use all characters up to and including the ETX. If less than 8 characters are available, pad the remaining position(s) with Binary zeroes.
6. Exclusive-OR the OUTPUT buffer with the INPUT buffer and store in the INPUT buffer.
7. Encrypt the INPUT buffer using DES with the MAC key and store in the OUTPUT buffer.
8. Repeat steps 5 through 7 until the end of the message is reached (ETX).
9. Discard the right-most 32 bits of the OUTPUT buffer. Convert the remaining 32 bits into ASCII characters, 4 bits at a time to produce 8 ASCII characters.
10. Insert an ASCII space character (20h) after the fourth character.
11. The format of the string should be as follows: 'XXXX<sp>XXXX', where X is a hexadecimal ASCII character (0-F).
12. Insert this 9 character string in place of the 9 ASCII zeroes in the Field ID '^' created in step 1.
13. Calculate the LRC of the message with the MAC field in place.

MAC Field Use

When enabled, the terminal will send the MAC field with all message requests except Configuration Table Download request, and will expect them in all message responses except Configuration Table Download response. If the terminal receives an invalid MAC field in a response message, it will immediately perform a Configuration Table Download on a separate call to update the MAC and/or COMMS key. If the failed MAC was contained in a Transaction Response Message and a withdraw or purchase was performed, a reversal will follow the Configuration Table Download, and if a withdraw was performed, no cash will be dispensed in this case.

PRELIMINARY

Message Protocol with MAC Enabled



PRELIMINARY

APPENDIX C

Extended Transaction Code Table †			
CODE	Transaction Type	CODE	Account Type
01	Withdrawal	00	No Account
02	Transfer	11	Primary Checking Bank Account
03	Balance Inquiry	12	Primary Savings Bank Account
		15	Primary Credit Card Bank Account
		16	Primary Money Market Bank Account
		21	Secondary Checking Bank Account
		22	Secondary Savings Bank Account
		25	Secondary Credit Card Bank Account
		26	Secondary Money Market Bank Account
		31	Primary Checking Brokerage Account
		32	Primary Savings Brokerage Account
		35	Primary Credit Card Brokerage Account
		36	Primary Money Market Brokerage Account
		41	Secondary Checking Brokerage Account
		42	Secondary Savings Brokerage Account
		45	Secondary Credit Card Brokerage Account
		46	Secondary Money Market Brokerage Account

PRELIMINARY

To use an extended transaction code string, first place a '99' into the 2-digit transaction code field of the transaction request message. Then construct the extended transaction code string by combining the FID 'l' (ASCII Char - 6Ch) with a transaction type code, a 'from' account type code and a 'to' account type code, consecutively, in the order shown below.

Extended Transaction Code String. – FID 'l' plus Six ASCII numbers. – 'l' + T_1 T_2 T_3 T_4 T_5 T_6

T_1 T_2 - Transaction Type Code

T_3 T_4 - 'From' Account Type Code (Code '00' not allowed)

T_5 T_6 - 'To' Account Type Code

The reply transaction codes must match those in the request.

Example:

1.) Transfer from Secondary Money Market Bank Account to Primary Savings Brokerage Account – 'l022632'

† **Preliminary**

APPENDIX D

Triple-DES Encryption of the PIN Block

Triple-DES (3DES) encryption/decryption (as specified in ANSI X9.52) is a sequence of DES encryption/decryption operations as shown in diagram 1 and diagram 2 below. 3DES is highly secure and uses two independent 64-bit block keys, *K1* and *K2*. Single-DES is less secure and is achieved when *K1* and *K2* are equal (*K1 = K2). K1* and *K2* are obtained by sending both the Encrypted PIN-Key 1 (‘~’) and Encrypted PIN-Key 2 (‘{‘) FIDS in a response message. The Encrypted PIN-Key’s are decrypted using the Master Key, resulting in *K1* and *K2*. The Clear-Text PIN Block Format and Cipher-Text PIN Format are the same for both Single DES and Triple DES. See APPENDIX A for a description of the PIN Block Format.

The presence of only the Encrypted PIN-Key 1 (‘~’) in a response message will cause 3DES capable terminals to store *K2* with the value of *K1*, and set the Encryption Mode Flag (EMF) and the ‘[‘ FID to zero (0). The presence of both the Encrypted PIN-Key 1 (‘~’) and Encrypted PIN-Key 2 (‘{’) will store *K1* and *K2* with separate values and set the EMF and the ‘[‘ FID to two (2), **even for equal Key values**. When the Key values are equal (*K1 = K2)* in a 3DES capable terminal, Single-DES encryption/decryption is achieved by performing the 3DES encryption/decryption scheme. Table 1 summarizes the ‘[‘ FID and EMF.

PRELIMINARY



Diagram 1 - 3DES Encryption

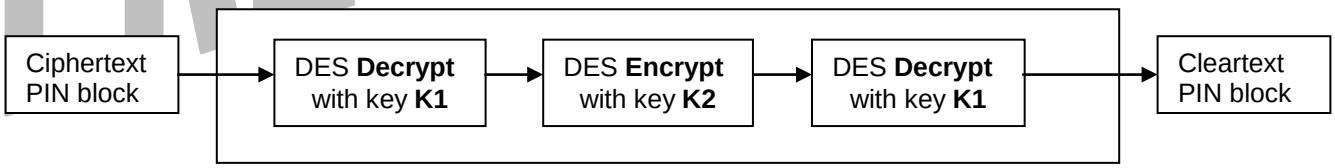


Diagram 2 - 3DES Decryption

	Terminal is 3DES capable		Terminal is not 3DES capable
KEYS received in response message from host	‘~’ ONLY	‘~’ & ‘{'	‘~’ ONLY
Encryption Mode Flag in Communications header	0	2	0
‘[‘ FID in request message	‘[0’	‘[2’	NOT SENT

Table 1 – 3DES Capable FID ‘[‘