INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

ASIA/PACIFIC

REGIONAL INTERFACE CONTROL DOCUMENT (ICD)

FOR

X. 25 PROTOCOL FOR AFTN

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CONTENTS

1 INTRODUCTION

1.1 Purpose

Information contained herein describes the requirements for an X.25 interface between two systems operating as Aeronautical Fixed Telecommunication Network (AFTN) switching centres, each acting as a network subscriber. The connectivity may be via a direct circuit, or via X.25 access to a public packet network. Subscriber information is determined in the latter case by the public network provider.

1.2 Organisation

This Interface Control Document (ICD) defines the physical characteristics, datalink control procedures, packet layer procedures and message transfer requirements necessary to exchange IA-5 AFTN message data between the two subscribers. This document is based on the CCITT 1984 X.25 standard.

1.3 Referenced Documents and Definitions

Documents:

ITU-T X.25 - Data communications - X.25 Packet Level Protocol for Data Terminal equipment.

ITU-T X.3 - PAD parameters.

ICAO Annex 10 - Volumes I and II Fifth Edition Incorporating Amendment 70.

Definitions:

AFTN Aeronautical Fixed Telecommunications Network

DCE Data Communications Equipment

DTE Data Terminal Equipment

ISO International Organisation for Standardisation

ITU International Telecommunications Union

OSI Open Systems Interconnection - A reference model for communications systems developed by ISO to facilitate the internetworking of equipment which may originate from different vendors.

PSN Packet Switch Network

IA-5 International Alphabet No 5

ICAO International Civil Aviation Organisation

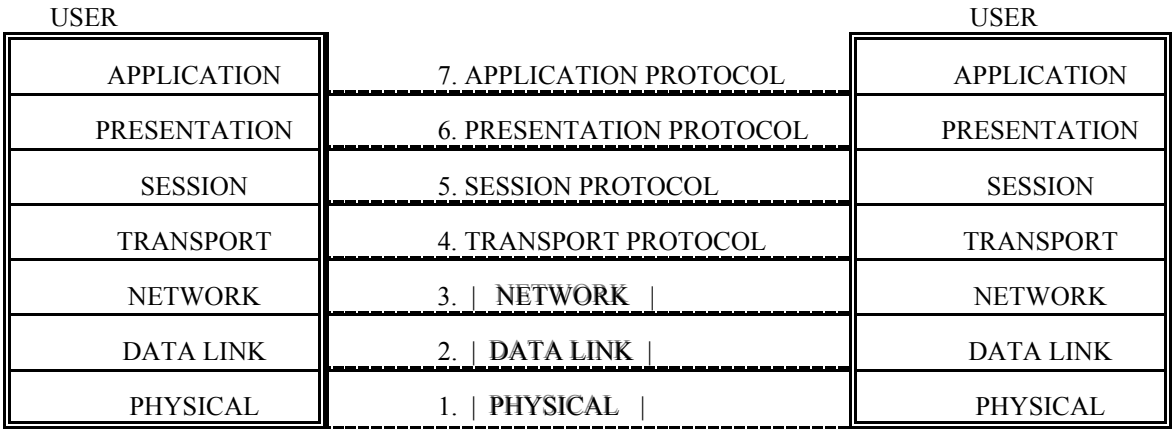
PVC Permanent Virtual Circuit

SVC Switched Virtual Circuit

PAD Packet Assembler Dissassembler. A device used for connecting asynchronous physical devices to an X.25 network.

1.4 Open Systems Interconnection (OSI) Model

OSI 7 LAYER MODEL



END SYSTEM A |<-- X.25 -->| END SYSTEM B

Transport Protocol not applicable.

Session Protocol not applicable.

Presentation Protocol not applicable.

Application Protocol not applicable.

2 PHYSICAL CHARACTERISTICS (Level 1)

2.1 Primary Links

2.1.1 Point-to-Point Physical Links. The physical circuits shall be 2 wire or 4 wire, full duplex, digital or voice grade, non switched, point-to-point, with optional dial backup capability, supporting signalling rates from 2400 bps to 9600 bps. Signalling rates are conditional to expected traffic loads.

2.1.2 Private/Public Packet Network Physical Links. The physical circuits shall be 2-wire or 4-wire, full duplex, digital or voice-grade, non-switched, point-to-point, with optional dial backup capability, supporting signalling rates from 2400 bps to 9600 bps. Signalling rates are conditional to expected traffic loads. Users may also implement switched circuit access in accordance with local public network providers requirements and agreement with remote aeronautical authority(ies), however security aspects of the public network would need to be considered.

2.1.3 Modems. Modems for voice grade circuits shall operate synchronously from 2400 to 9600 bps, or as agreed between the two administrations. (Functional compatibility is a requirement when operating with the AFTN provider.) The "Request-to-Send" option shall be used to provide constant carrier on the transmit channel. Modems for public network access shall be compatible with those provided by the public network provider.

3 DATA LINK-LEVEL CONTROL (Level 2)

3.1 Procedures. Link-level control procedures between the X.25 subscribers, or subscriber and public network provider, shall be as described herein and in accordance with LAPB procedures for DTE/DCE and ICAO Annex 10, Volume I, section 4.11.4.2. The interface shall be configured in an Asynchronous Balanced Mode (ABM).

> ABM The link shall operate as two combined stations connected in a balanced configuration. Each station supports a two-way simultaneous exchange of commands, responses and information, i.e., initiation of transfers is mutually exclusive of any invitation.

3.2 Frame Structure. The unit of transmission shall be the frame. All octets shall be transmitted in the following order:

a. Opening Flag sequence - 01111110
b. 8-bit Address field
c. 8-bit Control field
d. Information field (optional)
e. 16-bit Frame Check sequence
f. Closing Flag sequence - 01111110

3.2.1 Flag Sequences. Flag sequences serve to synchronise a frame and consist of six "one" bits with a single leading and trailing zero bit, e.g., an 8-bit code of "01111110". However, a two-flag sequence can be the formation of two flags condensed into a sequence of "011111101111110". The flag sequence that closes a frame may also be the flag sequence that opens the next frame. In order to achieve code transparency, the flag sequence cannot appear in any other field.

3.2.1.1 Zero-Bit Insertion. To preclude the appearance of a flag in any field other than opening and closing flag fields, a zero-bit insertion procedure is required. This procedure is defined in the LAP B documentation.

3.2.1.2 Synchronous Idle. Continuous Flag sequences shall be sent in either direction on point-to-point circuits when there are no packets to transmit.

3.2.2 Address Field. The address field shall be an 8-bit field, which is a unique assignment of each combined station on the interface. This field contains the address of combined station B/A when a frame is transmitted as a command by combined station A/B. Conversely, this field contains the address of combined station A/B when a frame is transmitted as a response by combined station A/B. Addresses assigned to this interface for private point-to-point circuits are as follows:

BITS	1	2	3	4	5	6	7	8
X.25 User 1 DTE	1	1	0	0	0	0	0	0
X.25 User 2 or PSN DCE	1	0	0	0	0	0	0	0

3.2.2.1 Global and Null Address. The global address consists of eight "1 bits (11111111) and shall be used only in "XID" procedures. The XID option will not be used on this interface. The null address consists of eight "0" bits (00000000) and shall be used only for test purposes. A frame with a null address shall be ignored by the receiving combined station.

3.2.3 Control Field. The control field shall be a single 8-bit sequence containing fields to denote the frame format being transmitted, the Poll/Final indication, the I-frame number being transmitted, and to acknowledge received I-frames. The size of the basic control field restricts the maximum number of unacknowledged I-frames that can be transmitted to seven, unless option 10 is implemented.

3.2.3.1 Control Field Definition. The frame formats exchanged over the interface are grouped into three distinct categories, as defined below. The basic scheme accommodates modulo 8 numbering, where the transition of I-frames are cyclic 0 through 7.

BITS	1	2	3	4	5	6	7	8
Information Frames	0	[N(S)]			P	[N(R)]		
Supervisory Frames	1	0	[SS]		P/F	[N(R)]		
Unnumbered Frames	1	1	[MM]		P/F	[MMM]		

Bit-Field Definitions

Bits 1 & 2: Format Designator

Bit one set to "0" denotes an Information Frame.
Bit one set to "1" denotes the following:

Bit two set to "0" denotes Supervisory Frame.
Bit two set to "1" denotes Unnumbered Frame.

3.2.3.2 Unnumbered Function. MMMMM: The M-bits are used in U-frame commands and responses for setting various modes and conditions. Each 5-bit indicator that is applicable to this interface is defined as follows:

BITS	3	4	5	6	7	8
SABM	1	1	P	1	0	0
UA	0	0	F	1	1	0
DISC	0	0	P	0	1	0
DM	1	1	F	0	0	0
FRMR	1	0	F	0	0	1

SABM: Set Asynchronous Balance Mode

A command from combined station A/B for combined station B/A to establish ABM with 8-bit control fields and to set its N(S) and N(R) values to zero. Combined station A/B may also issue the SABM with P-bit not set to indicate clearance of an RNR (Receive not Ready) state.

UA: Unnumbered Acknowledgment

A response from combined station B/A to indicate acceptance of the SABM or DISC command issued by combined station A/B. If combined station B/A is logically disconnected, it shall respond to the SABM or DISC command with a DM response. A UA response may be issued to indicate clearance of an RNR state.

DISC: Disconnect Action

A command to combined station A/B that combined station B/A is logically disconnected or terminating its side of the interface.

DM: Disconnected Mode

A response from combined station A/B to indicate that it remains in a disconnected mode and cannot take action on a command from combined station B/A.

FRMR: Frame Reject

A response from combined station A/B that rejects a frame transmitted by combined station B/A that has a FCS without error, but correction is not possible by a retransmission. The reasons for the rejection, and the coding of I Field in the response, shall be in accordance with ISO 4335.

3.2.3.3 Supervisory Function. The S format is used by the DTE to perform datalink supervisory control functions, e.g., acknowledging I-frames (RR-frame), requesting retransmission of I-frames (REJ-frame), and requesting a temporary suspension of transmission of I-frames (RNR-frame). The functions of N(r) and P/F are independent; i.e., each supervisory frame shall have an N(r) which may or may not acknowledge additional I-frames received by the DTE, and a P/F bit that may be set to "0" or "1".

3.2.4 Information Field (N1). The information field provides for the transfer of message data in the I-frame. The size of the field for this interface shall be limited to 2104 bits, excluding the number of zero bit insertions.

To calculate N1, add the agreed packet size to the packet header size (octets), e.g., 256 + 3 = 259 octets. Convert from octets to bits (259 X 8 = 2072 bits). Then, add to this the FCS, control byte and addressing fields (2072 + 32 =

2104 bits, ergo N1 = 2104). As a rule of thumb, it is recommended that N1 be greater than the maximum packet size.

3.2.5 Frame-Check Sequence. To facilitate error detection, all frames include a 16–bit frame–check sequence (FCS) preceding the closing flag. The contents of the address field, the control field and, if available, the information field, excluding zero bit insertions, are subject to the FCS calculation.

3.2.5.1 Frame-Check Sequence Error. Any frame received with an FCS error shall be discarded.

3.2.6 Command Rejection Condition. If combined station A/B receives a frame with no FCS error, but otherwise contains invalid conditions as specified in the X.25 standard for Command Reject, it shall report the condition with an FRMR response. Combined station B/A shall then transmit a U-frame with a mode setting command, either SABM or DISC, whereupon combined station A/B shall transmit a U-frame with a UA response.

3.3 Link Protocol Parameters

3.3.1 Timeout. Time-out functions are necessary to ensure recovery action is taken by a combined station to respond to I-frames, S-frames, and U-frames that require acknowledgment. Timers may be adjustable in one-second increments within a range of 2 to 120 seconds, or as determined by the public network provider.

3.3.1.1 Time-out Values. To avoid contention situations, one station shall be designated the primary/combined station and have shorter timer values than the other station. Refer to Appendix A for recommended timeout values.

Notes: 1. Tl should be a computed value based on 3 x Number of Octets per frame x Time/Octet in Milliseconds.

2. T2 should be Number of Octets per frame x Time/Octet in Milliseconds + station processing delay (in milliseconds).

3. The value for T3 is equal to Tl x N2.

3.3.2 Retransmission Attempts. The parameter N2 shall indicate the maximum number of unsuccessful transmission attempts to complete successful transmission. The value of 3 to 7 (refer Appendix A) is recommended for private interfaces, or determined by the PSN provider.

3.3.3 Number of Outstanding I Frames (k). The maximum number of sequentially numbered outstanding I frames shall be seven for private interfaces. The DTE and DCE shall use the same value in all cases. The value for k shall be determined by the PSN provider when using public networks. Interfaces operating over satellite circuits should consider the use of modulo 128 numbering, and select a value for k appropriate for the frame size and signalling speed.

3.4 Acknowledgment. Combined station A/B expects acknowledgment of I-frames it transmits by virtue of the N(R) field in I-frames and S-frames received from combined station B/A. N(R) represents inclusive acknowledgment of all I-frames through N(R)-1. Conversely, combined station B/A shall neither accept nor acknowledge any I-frame received from combined station A/B that does not have N(S) sequence number equal to that expected. Consequently, combined station B/A, upon detecting a sequence error, may initiate exception recovery with a REJ response. This in effect precludes combined station A/B from initiating a "checkpoint" cycle.

3.5 Busy Condition. Combined station A/B shall issue an S-frame with RNR set when temporary buffer conditions

prevent the receipt of additional I-frames. Upon receipt of the RNR command, combined station B/A may complete or abort an I-frame that may be in process at the time but shall withhold transmission of I-frames thereafter until the RNR condition is cleared. If the RNR command has the P-bit set, combined station B/A must respond with a frame with the F-bit set. Combined station B/A shall initiate a timer for the RNR condition. The RNR condition is cleared by combined station A/B sending an S-frame with RR or REJ set, a U-frame with SABM or UA set, or an I-frame with P/F set.

3.6 Recovery. Recovery action by combined station A/B includes initiation of appropriate mode-setting commands to re-establish the ABM mode with combined station B/A, e.g., SABM or DISC. Combined station A/B can also invoke recovery through the FRMR response, which forces combined station B/A to follow with an SABM or DISC command. Higher level recovery may be needed if mode-setting commands do not achieve a balanced configuration. This may require external notification to invoke in-house supervisory action.

4 NETWORK LEVEL CONTROL (Level 3)

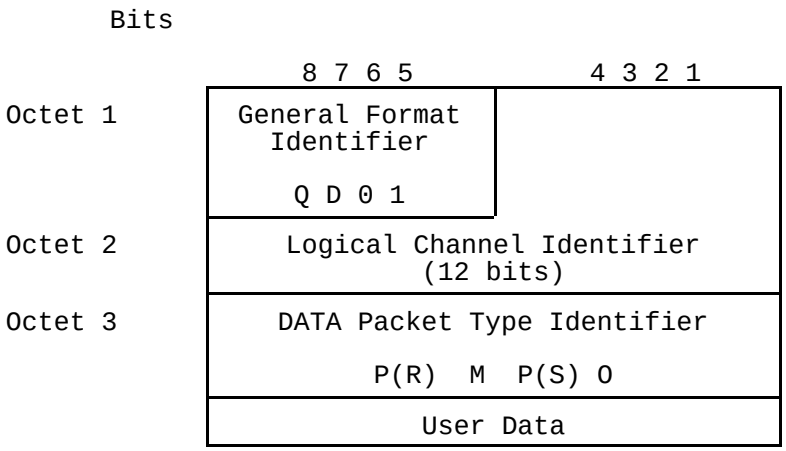
4.1 Procedures. Packet level procedures between the X.25 subscribers are described herein and in accordance with the international standard ISO/IEC 8208, published by the International Organisation for Standardisation, and the International Electrotechnical Commission. The X.25 interface shall be able to connect to an X.25 subscriber circuit (DTE/DTE per ISO 8208), or to an X.25 packet network (DTE/DCE).

4.2 Packet Structure. A single packet to be transferred across the interface is contained within the Data Link Layer Information Field of a frame. A data transfer packet always consists of at least 3 octets of header information plus at least 1 octet of user data. These three octets contain the General Format Identifier Field, the Logical Channel Identifier Field, the Packet Type Identifier Field, the packet sequence number fields and the More Data bit.

4.2.1 General Format Identifier (GFI). The General Format Identifier is a four-bit, binary-coded field which is provided to indicate the general format of the rest of the header. The General Format Identifier is located in bit positions 8, 7, 6 and 5 of octet 1, where bit 5 is the low-order bit.

Bit 8 (Q-bit) of the GFI is not used. Bit 7 (D-bit) may be optionally used by bilateral agreement. Bit 5 of Octet 3 is used as the more data bit (M-bit).

An example of the GFI of a Data Packet follows:



4.2.2 Packet Type Identifier Field. The packet types recognised by all AFTN X.25 interfaces are listed below. The listed packet types can be sent and received.

CALL REQUEST/INCOMING CALL
CALL ACCEPTED/CALL CONNECTED
CLEAR REQUEST/CLEAR INDICATION
CLEAR CONFIRMATION
DATA
INTERRUPT
INTERRUPT CONFIRMATION
RECEIVE READY
RECEIVE NOT READY
REJECT
RESET REQUEST
RESET CONFIRMATION
RESTART REQUEST
RESTART CONFIRMATION

4.2.3 Logical Channels. The number of logical channels, their sequence starting point, and types shall be agreed during implementation planning and contained in table form following this paragraph.
It is recommended that the AFTN X.25 processor shall be configured to handle two way SVCs.

X.25 LOGICAL CHANNEL ASSIGNMENT TABLE

LCN NUMBER	SERVICE	APPLICATION/DESCRIPTION
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
4096		Maximum Number Available

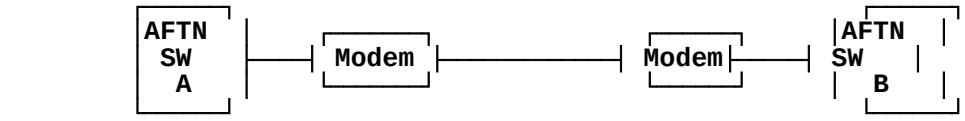
4.2.3.1 PVCs. When a logical channel is defined as a PVC, it shall use the lowest number assignments and be used only on private point-to-point circuits. No call setup shall be required.

4.2.3.2 SVCs. When defined as an SVC, the connection shall be two way, or two one-way, and must be established with a remote X.25 subscriber before any data is exchanged.

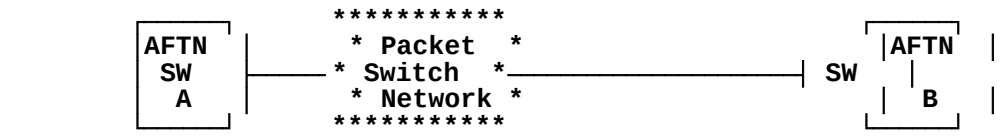
4.2.3.3 DTE to DCE physical and logical requirements:

It is not possible for two X.25 interfaces to communicate if they are both DTE or both DCE. Reference should be made to Appendix A for DTE/DCE parameter requirements.

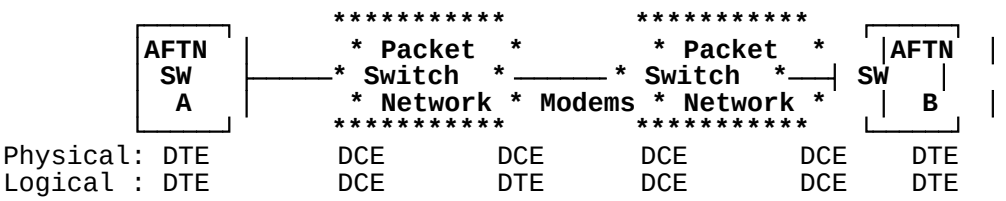
Direct Switch to Switch connection:



Via one Packet Switch Network:



Via Two or More Packet Switch Networks:



The above requires that a physical connection incorporate a NULL modem type connection and that one PSN take on the Logical functionality of a DTE.

From the above scenarios it is essential that the connectivity and logical functionality is agreed in advance between states. The actual functionality will depend on the requirements and capabilities available by either the AFTN Switch's X.25 interface and/or any Packet Switch Network to which it is attached.

4.3 Restart and Reset. The reception of a RESTART REQUEST packet shall cause all SVCs to be cleared and all PVCs to be reset, which results in the loss of all unacknowledged packets. A RESET REQUEST packet shall cause the addressed logical channel to be reset. When a channel is reset, all pending packets for that channel are discarded, and the send and receive sequence numbers shall be set to zero.

4.4 Call Establishment. Each X.25 subscriber shall maintain a database indicating the X.121 address of all X.25 subscribers that are to receive messages from the AFTN centre, and are not connected via a PVC. When a delivery is scheduled to one of these subscribers, the processor shall transmit a Call Request packet to establish a logical connection and proceed with data transfer. A packet may contain a complete message, a part of a message, but never all or part of two or more messages. When the complete message has been transmitted and acknowledged, the call may be cleared by transmitting a Clear Request packet, after a time out period. Provisions should be made in the call management process to deal with call collisions by timeouts or default recovery. Such provisions are outside the scope of this ICD, but should be agreed between administrations when planning for the interface.

4.4.1 Incoming Calls. Incoming calls shall be established when an INCOMING CALL packet is received. At the completion of the last complete message, the processor shall expect to receive a CLEAR INDICATION packet after

an idle time period. If not received, the processor shall not clear the call until it has been idle for approximately 4 minutes. Incoming Call Packets arriving from sources that are not configured and authorised shall be cleared.

4.4.2 Outgoing Calls. Outgoing calls shall be established when a message delivery to an X.25 destination is required. The processor shall establish a connection by transmitting a CALL REQUEST packet containing the X.25 address of the destination as the called address, and its own X.25 address as the calling address. When message delivery is complete, the processor shall terminate the SVC by transmitting a CLEAR REQUEST packet after the idle timeout.

4.4.3 Additional Facilities. This interface does not require the support of any of the X.25 additional facilities. X.25 subscribers wishing to use optional facilities must make bilateral arrangements to do so, and are outside the scope of this ICD. When the PSN is used a particular option may be dependent on the public network for its use.

4.5 Flow Control. The X.25 processor shall maintain flow control over all packets sent and received. It shall generate packet sequence numbers on outbound data, and verify packet sequence numbers on inbound data. When sequence errors are detected, the logical channel shall be reset.

4.6 Diagnostic Code Received in Packets. This interface does not support diagnostic codes received in packets and some AFTN X.25 processors may ignore any codes received. Diagnostic codes if used shall be mutually agreed.

4.7 Recommended Values. Appendix A contains tables of recommended values. The values for public networks are determined by the public network provider.

4.8 DTE Addresses. When connectivity is provided by a private point-to-point circuit the DTE addresses shall be 10-digits and be agreed during the implementation planning. For public network connectivity the DTE addresses shall be 14-digits and will be provided by the local service provider.

4.9 Call Clearing. Calls shall be cleared automatically under the following conditions:

a. An activity timer for the connection has expired.

b. The application process has halted.

c. Loss of the logical channel, when a PSDN is used.

d. Loss of the logical link or physical connection.

4.10 M-bit Management. The M-bit shall be supported to indicate a message transfer that consists of more than one packet. An M-bit value of 0 indicates a complete message is contained in the packet, or it is the last packet of a multi-packet message. The following table illustrates the operation of the M-bit for a given channel.

It follows that it is a fundamental requirement that each AFTN message will always start in a new packet.

Table 4.1 M-bit Operation with heading line.

M-bit = 1	M-bit = 1	M-bit = 0	M-bit = 0	M-bit = 1	M-bit = 0
S O ABC123 H	...	E T X	S E O ABC123 T H X	S O ABC123 H	E .... T X

MSG 1	MSG 2	MSG 3

Table 4.2 M-bit Operation without heading line.

M-bit = 1	M-bit = 1	M-bit = 0	M-bit = 0	M-bit = 1	M-bit = 0
S O FF ... H	...	E T X	S E O FF ... T H X	S O FF ... H	E .... T X
MSG 1			MSG 2	MSG 3	

4.11 Error Handling. Standard X.25 error handling procedures shall be followed while in data transfer mode, with the following exceptions: receipt of a Q-bit set to 1 shall be ignored; receipt of a D-bit set to 1 shall be ignored.

5 AFTN MESSAGE LEVEL

5.1 Code Set and Message Format. Message composition shall be IA-5, as described in ICAO Annex 10, Volume I, paragraph 4.11.1. Message format shall be as specified in Volume II, section 4.4.16. Message text shall be as specified in Volume II, section 4.4.16.3.

Note: The use of the Transmission Identification (TI), or other optional information in the Heading Line, should be the subject of bilateral coordination.

5.2 Service Message Format. Service message format and text shall be in accordance with ICAO Annex 10, Volume II.

6 AFTN PAD CONNECTION

Some States may wish to connect their AFTN centre using an X.25 PAD device. The parameters, procedures and addressing required for such an interface should be in compliance with ITU-T Recommendations X.28 and X.3 and by bilateral agreement. A separate circuit is required for each logical connection to a remote centre. Refer to Appendix B for recommended PAD parameters.

APPENDIX A

AFTN X.25 Recommended Interface Parameters

Frame Level (Link Layer)

Parameter	AFTN X.25 Subscriber A	AFTN X.25 Subscriber B	Comments
Reference Standard (Frame/Link Layer)	ISO 1776	ISO 1776	
Logical Address	DTE	DTE	Following ISO's DXE procedures
Max Outstanding Frames (k)	7	7	
ACK Receipt Timer (T1)	6	6	Based on 9.6Kb and 256 byte packets.
ACK Send Timer (T2)	500 milliseconds	500 milliseconds	T2 < T1
Idle Channel State Timer (T3)	18-21 seconds	18-21 seconds	T3 > T4
Idle Probe Timer (T4)	3 seconds	3 seconds	
Maximum Number Bits in I-Frame (N1)	2104	2104	N1 > Maximum Packet Size
Frame Retry Counter (N2)	3-7	3-7	
Frame Sequence	Modulo 8	Modulo 8	

Packet Level (Network Layer)

Parameter	AFTN X.25 Subscriber A	AFTN X.25 Subscriber B	Comments
Reference Standard (Packet/Network layer)	ISO 8208	ISO 8208	
Packet Sequence	Modulo 8/128	Modulo 8/128	128 for Satellite
Packet Negotiation	No	No	
Packet Data Size	256	256	
Allowed Packet Data Size during Negotiation	None	None	
Allowed Packet Data Size (agreed in advance)	64, 128, 256	64, 128, 256	
Window Size Negotiation	No	No	
Window Size, W (Receive/Send)	7/7	7/7	1 to 7 1 to 127 (sat)
Total LCNs	5	5	
LCN Order	Descending	Ascending	
LCN Base	1	1	

Packet Level (Network Layer) - Continued			
Parameter	AFTN X.25 Subscriber A	AFTN X.25 Subscriber B	Comments
Total PVCs	3	3	
Total two way Virtual Circuits	1	1	
Total Outgoing Virtual Circuits	1	1	
Total Incoming Virtual Circuits	1	1	
Total SVCs	2	2	
Delivery Confirmation Bit (D-bit)	0 or 1	0 or 1	Optional
More Bit (M-bit)	Yes	Yes	
DTE Restart Request Timer (T20)	60 seconds	60 seconds	
DTE Call Request Timer (T21)	180 seconds	180 seconds	
DTE Reset Confirmation Timer (T22)	60 seconds	60 seconds	
DTE Clear Confirmation Timer (T23)	60 seconds	60 seconds	
DTE Window Transmission Timer (T24)	60 seconds	60 seconds	
DTE Packet Acknowledgement Timer (T25)	200 seconds	200 seconds	
DTE Interrupt Timer (T26)	180 seconds	180 seconds	
DTE Reject Timer (T27)	180 seconds	180 seconds	
Restart Request Retransmission Counter (R20)	2	2	
Restart Request Retransmission Count (R22)	2	2	
Clear Request Retransmission Count (R23)	2	2	
Data Packet Retransmission Count (R25)	2	2	
Reject Retransmission Count (R27)	2	2	
Restart Request Timer (T10)		60 seconds	
Call Request Timer (T11)		180 seconds	
Reset Confirmation Timer (T12)		60 seconds	
Clear Confirmation Timer (T13)		60 seconds	
Window Transmission Timer (T14)		60 seconds	
Packet Acknowledgement Timer (T15)		180 seconds	
Interrupt Timer (T16)			
Reject Timer (T17)			

APPENDIX B

AFTN X.25 Recommended PAD Parameters

X.3 Parameter	Parameter Setting	Description
1	No	PAD recall character=<DLE>.
2	No	Local echo during transfer.
3	<ETX> <EOT>	Data forwarding characters.
4	No	Wait before data forwarding (Idle timer).
5	XON/XOFF	DTE device flow control in data transfer.
6	No	Send PAD service and prompt signals.
7	No	Send an X.25 Reset Packet when break signal is received.
8	No	Discard Output
9	No	Padding after carriage return.
10	No	Line folding.
11	As required	Baud rate.
12	Yes	Use PAD flow control.
13	No	Insert line feed after carriage return.
14	No	Padding after line feed.
15	NO	Editing allowed in data transfer state.
16	<DEL>	Character delete.
17	<CAN>	Line delete.
18	<DC2>	Line display.
19	Yes	Print terminal signals can be edited
20	No	Echo all characters.
21	No	N No parity checking, or character substitution.
22	No	Page wait.

Note: PAD Parameters are frequently referred to by decimal numbers. Where decimal numbers are used 0=NO and 1=YES other decimal values represent **options.**