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Publicly Available Specification

TETRAPOL Specifications
Part 19: Stand Alone Dispatch Position Interface;
SubPart 1: Stand Alone Dispatch Position Interface



Reference

Keywords

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Foreword

This document is the Publicly Available Specification (PAS) of the TETRAPOL land mobile radio system, which shall provide digital narrow band voice, messaging, and data services. Its main objective is to provide specifications dedicated to the more demanding PMR segment: the public safety. These specifications are also applicable to most PMR networks.

This PAS is a multipart document which consists of:

Part 1	General Network Design
Part 2	Radio Air interface
Part 3	Air Interface Protocol
Part 4	Gateway to X.400 MTA
Part 5	Dispatch Centre interface
Part 6	Line Connected Terminal interface
Part 7	Codec
Part 8	Radio conformance tests
Part 9	Air interface protocol conformance tests
Part 10	Inter System Interface
Part 11	Gateway to PABX, ISDN, PDN
Part 12	Network Management Centre interface
Part 13	User Data Terminal to System Terminal interface
Part 14	System Simulator
Part 15	Gateway to External Data Terminal
Part 16	Security
TTR 1	Guide TETRAPOL features
Part 18	Base station to Radioswitch interface
Part 19	Stand Alone Dispatch Position interface

1. Scope

This document defines the protocol and messages at the Stand Alone Dispatch Position (SADP) at reference point R17 (as defined in PAS 0001-1 [1]). R17 can be split in separate reference points as detailed hereafter.

2. Normative references

This PAS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this PAS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] PAS 0001-1: "Tetrapol Specifications; General Network Design".
- [2] PAS 0001-3: "Tetrapol Specifications; Air Interface Protocol".
- [3] PAS 0001-6: "Tetrapol Specifications; Line Connected Terminal Interface".
- [4] PAS 001-13-6: "Tetrapol Specifications; UDT-ST Open Interface
« for type 2 »UDT".
- [5] TTR 0001-1-2: "TETRAPOL Technical Report; Guide to TETRAPOL features; Reference and Terminology".
- [6] PAS 0001-19-2: "Tetrapol Specifications; System Terminal Control Protocol".

3. Abbreviations

For the purposes of this PAS, the following abbreviations apply:

A/I	Air Interface
AP	Audio Part
BN	Base Network
BS	Base Station
CCH	Control CHannel
CRP	Connexion Reference Point
DB	DataBase
DC	Dispatch Centre
DCN	Delivery Confirmation Notification
DCS	Dispatch Centre Server
DFN	Delivery Failure Notification
DM	Direct Mode
DM/NM	Direct Mode / Network Monitoring
DP	Dispatch Position
EDT	External Data Terminal
FBM	FallBack Mode
HRSW	Home RadioSWitch
ISI	Inter System Interface
KMC	Key Management Centre
LABS	Line Access Base Station
LCT	Line Connected Terminal
LLC	Logical Link Control
MAC	Medium Access Control
MM	Mobility Management
MO	Managed Object.
MOCH	Multisite Open Channel

MPAP	Mobile PC Asynchronous Protocol
MRI	Mobile Random Identity
MS	Mobile Station
MSG APPLI	Messaging APPLIcation
MSY	Managed SYstem
NMC	Network Management Centre
NS	Not Significant value
OG	Operational Group
OMC	Operations and Maintenance Centre
OMWS	Operations and Maintenance Work Station
PABX	Private Automatic Branch eXchange
PAS	Publicly Available Specification
(P)DN	(Public) Data Network
PDU	Protocol Data Unit
PMR	Private Mobile Radiocommunication
PSTN	Public Switched Telecommunications Network
PTT	Push-To-Talk
Ri	Reference point index i
RP	RePeater
RSW	Radio Switch
RT	Radio Terminal
SADP	Stand Alone Dispatch Position.
SDL	Specification and Description Language
SDP	Submit Delivery Protocol
SFN	Submit Failure Notification
SIM	Subscriber Identity Module
ST	System Terminal
STCP	System Terminal Control Protocol
SwMI	Switching and Management Infrastructure
TCE	Terminal Control Equipment
TCH	Traffic CHannel
TCP/IP	Transmission Control Protocol/Internet Protocol
TDX	Telephone and Data eXchange
TMSG-Id	Temporary MeSsaGe Identifier
TP	TransPort layer
TRSP_U	TRanSPort connection User
TTI	Temporary Terminal Identifier
UA	User Agent
UDT	User Data Terminal
VRSW	Visited Radio SWitch
X.400 MTA	X.400 Message Transfer Agent

4. SADP reference points

The SADP is composed of the following blocks:

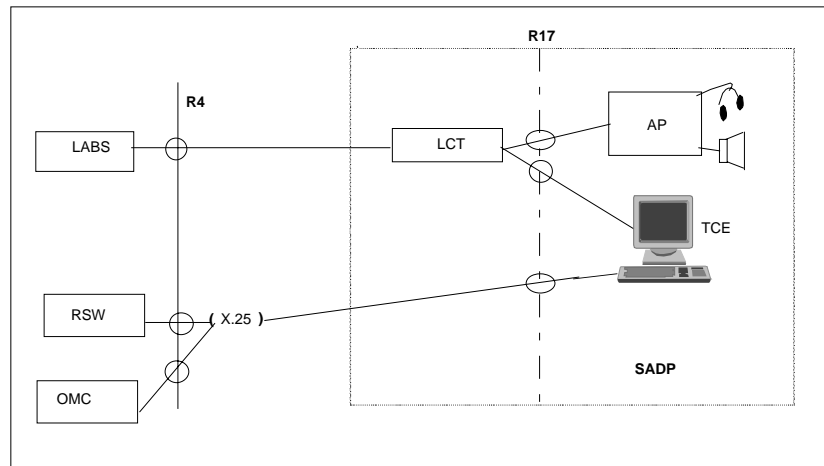


Figure 1: SADP reference points

The reference point R17 can be split into several reference points.

The Reference point R4 which is the interface and protocol for the Line Connected Terminal LCT is described in PAS 0001-6 [3], it is similar to the protocol of the air interface reference point R3 as described in PAS 0001-3 [2].

The LCT is connected to an Audio Part AP and a Terminal Control Equipment (TCE). The corresponding Reference Points is R17 to the LCT and for the audio part.

The audio part is not described in this PAS whereas the LCT-TCE protocol is described in this part.

The Terminal Control Equipment (TCE) is connected to the RSW and OMC through X.25 is described in this Clause.

5. Protocol

This protocol is between the Management Terminal which is the TCE and the Managed System (MSY) which is the RSW or the OMC.

This interface may be used with all operating systems wishing to perform operations on switches.

This protocol is comprised of three layers:

- transport layer;
- association layer
- managed object layer.

The structure of the messages associated with each layer shall be the successive data fields contained in a single message physically crossing the MSY-TCE link.

The layer architecture is illustrated below:

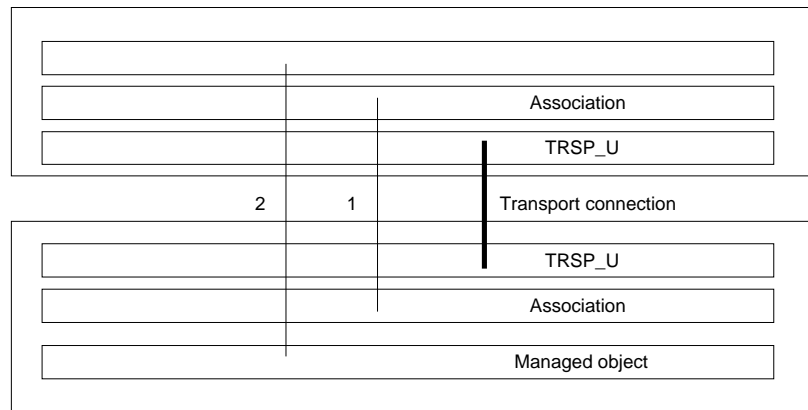


Figure 2: Layer architecture

5.1. Association layer

The information exchange protocol shall be based on the association definition.

The protocol description outlined in the present Clause only applies to the envelope processed by the Managed System function and the MSY access function in the TCE.

5.1.1. Association definition

An association is defined by the interconnection of two applications wishing to dialogue using a protocol common to the two applications (observation, object management, ...).

A couple of applications may have several associations.

All association messages are conveyed in a PDU on the associated transport connection.

A transport connection supports one or more associations.

When a transport connection is released, the associations supported by the connection are closed.

The associated transport connection is not necessarily released when an association is closed.

The layer configuration elements shall be:

- MSY number;
- Number of transport connections;
- Number of associations;
- List of associations per transport connection.

5.1.2. Protocol description

The generic format of a message conveyed on an association is:

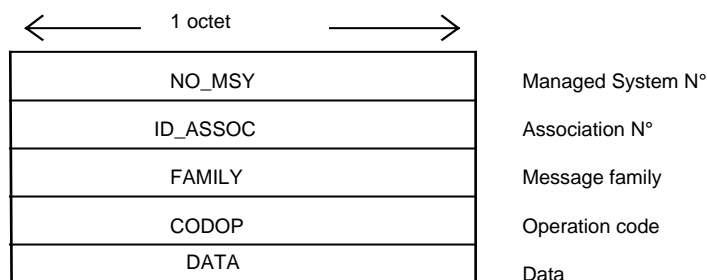


Figure 3: Format of a message

The MSY number identifies the MSY dialoguing with the TCE. It shall be initialised in the MSY to TCE direction. This field is not significant in the TCE to MSY direction, and is not interpreted by MSY.

The association number is a relatively defined number in relation to a transport connection.

The protocol manages three functions at this level:

- Connection management protocol;
- Association management protocol;
- Event report protocol.

5.1.3. Connection management

The Transport User (TRSP_U) function shall manage Transport connections. It shall enable Transport signalling which is divided into:

- Set-up phase;
- Dialogue phase;
- Release phase.

The message structure complies with ISO TRANSPORT layer standards.

The data flow diagram is shown in clause 5.2.1.

5.1.3.1. Set-up phase

A transport connection shall be set-up on receipt of a set-up transport connection request. Only TCE may initiate a transport connection.

The TRSP_U function receives connection indications, which are confirmed.

5.1.3.2. Dialogue phase

Data messages (PDU) are conveyed over the connection in this phase. These messages are not acknowledged.

5.1.3.3. Release phase

The Transport connection is released in this phase. The procedure may be initiated by either end. When a Transport connection is released, an abort message is sent to each association supported by the transport connection.

5.1.4. Association protocol

The association dialogue protocol shall be divided into four phases:

- association set-up phase;

- dialogue phase;
- monitoring phase;
- association release phase.

The data flow diagram is shown in clause 5.2.2.

5.1.4.1. Set-up

The association is opened on receipt of an "ETAB" request on a set-up transport connection. Only TCE may initiate association opening.

A set-up request is systematically acknowledged with a positive or negative "ETAB_ACK" message.

5.1.4.2. Dialogue

Data are exchanged in the dialogue phase. The message exchange depends on the association used, and is characteristic of the protocol used.

5.1.4.3. Monitoring

After an association set-up, MSY monitors the association, depending on association parameters.

Monitoring mode (or not) is an association-dependent characteristic.

If the monitoring protocol fails, MSY breaks off the connection supporting the association.

Depending on parameters setting, monitoring may be bi-directional, TCE to MSY and/or MSY to TCE.

5.1.4.4. Release

The association may be released in two ways:

- Normal release
- Abort

Normal release:

An "LIB" message is sent, and is acknowledged with a "LIB_ACK" message.

Abort:

The abort procedure is used when a fault occurs. An unacknowledged "ABORT" message is sent, as a result of a transport connection release.

5.1.5. Event report protocol

Report events shall be sent by MSY to TCE. It is an acknowledged data transfer protocol. It includes two types of message:

Data transfer message, "REPORT"

Data transfer acknowledgement message, "REPORT_ACK"

There may be one or more event report sending queues per association.

The dialogue principle, seen by MSY, is:

- the "REPORT" message is sent to TCE and saved by MSY. MSY waits for an acknowledgement from TCE;

- on receipt of the acknowledgement, the "REPORT" message is processed in the appropriate file operating mode. It is destroyed in read mode or kept in consult mode. The operating mode is a file-dependent characteristic;
- an algorithm, specific to each association, is executed to scan the event report queue and to determine the next REPORT message sending sequence. The algorithm determines whether the next message will be sent from the same or a different message queue, or whether to go on to another association.

The data flow diagram is shown in clause 5.2.3.

5.1.6. Message descriptions

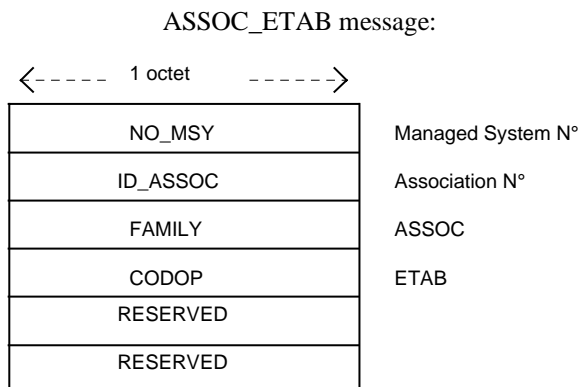
The message families are:

- ASSOC for association related messages;
- TRANSAC for operation transaction messages (reserved);
- REPORT for event reports.

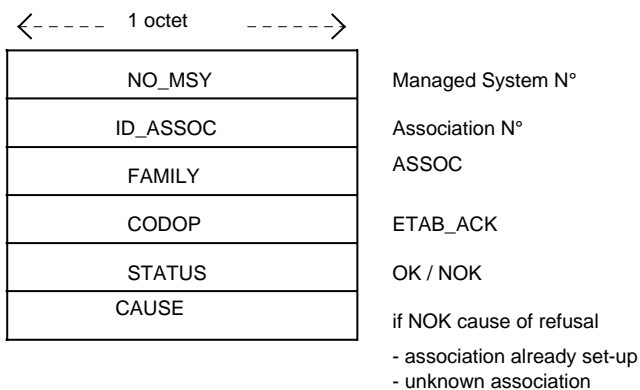
Possible fields values are listed in the "Field value descriptions".

5.1.6.1. ASSOC family messages

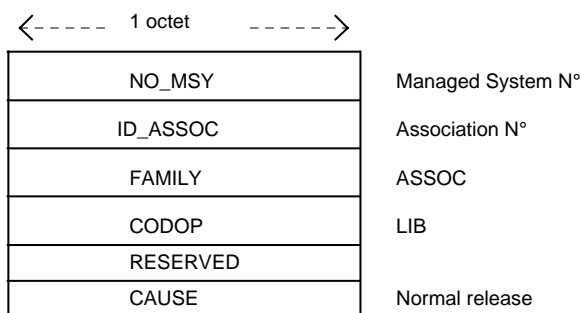
The ASSOC family messages are described in figure 4:



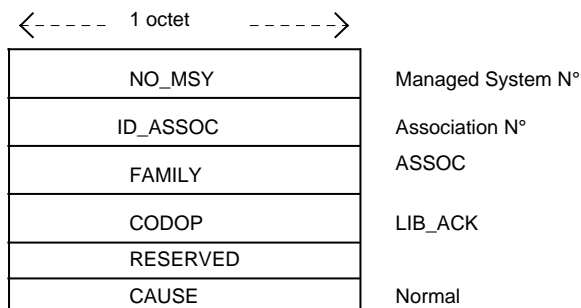
ASSOC_ETAB_ACK message:



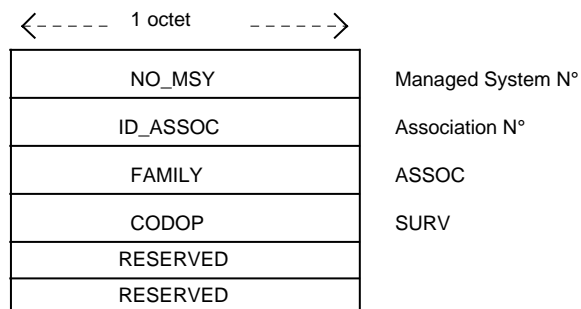
ASSOC_LIB message:



ASSOC_LIB_ACK message:



ASSOC_SURV message:



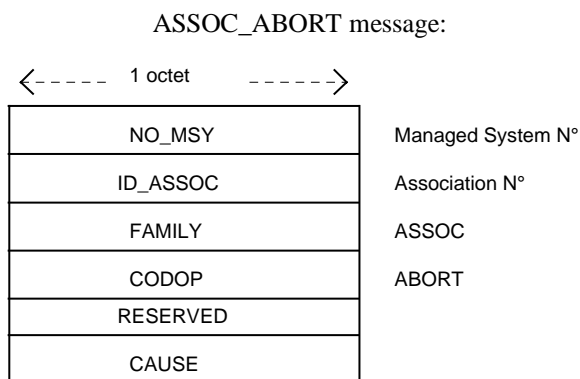
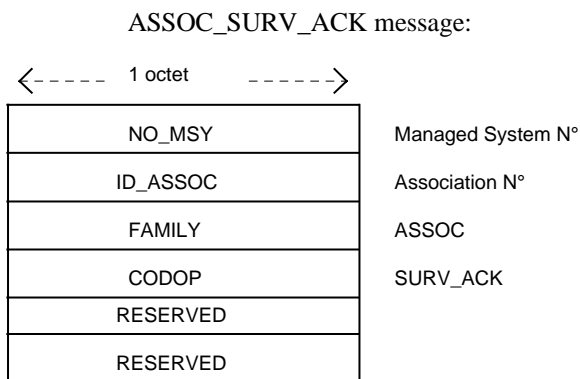


Figure 4: ASSOC messages

CAUSE field information:

- Unknown association identifier;
- Communication layer problem;
- Application decision.

5.1.6.2. TRANSAC family message

This message is used to transport future transaction messages (reserved).

5.1.6.3. Report family message

This message carries all the event reports issued by MSY to TCE.

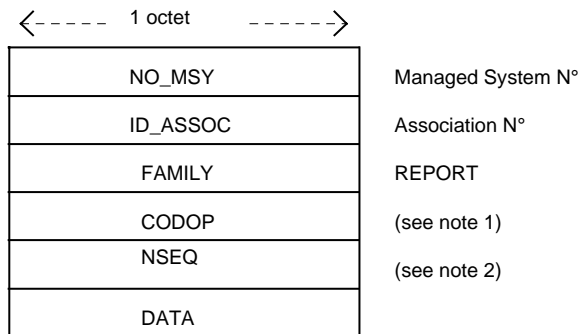


Figure 5: REPORT message

NOTE 1: The defined operation codes (CODOP) are:
 - OBS: for voice call tickets and for registration tickets

- REPORT_ACK: for acknowledgement

NOTE 2: Sequential number per association allocated by MSY

This message is used for processing event report sending on an association. It may be used to purge the last event report message saved in one of the association files.

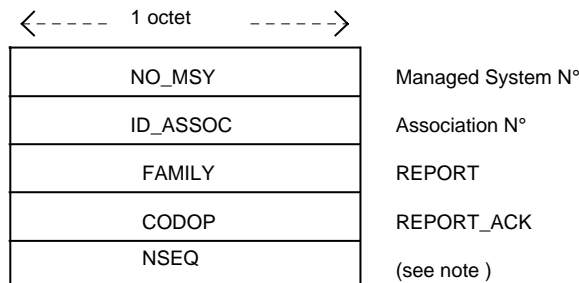


Figure 6: REPORT_ACK message

NOTE: Number allocated to an event report by MSY (see REPORT message).
AN EVENT REPORT acknowledgement is always positive.

The NSEQ field is a number varying from 0 to 255. It is managed per association. It is initialised with 0 whenever the ADB is created, and then evolves as a function of modulo value 255.

5.1.6.4. Data of report message

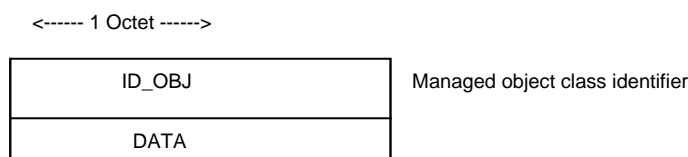


Figure 7: REPORT format

5.1.7. Field value descriptions

Possible FAMILY field values are:

- ASSOC = 0
- TRANSAC = 1 (reserved)
- REPORT = 2

FAMILY = ASSOC:

CODOP field:

- ETAB = 0
- ETAB_ACK = 1
- LIB = 2
- LIB_ACK = 3
- ABORT = 4
- SURV = 5
- SURV_ACK = 6

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STATUS field:

- OK = 0
- NOK = 1

CAUSE field:

- ASSOC_ETAB = 0 Association already set-up
- ASSOC_INC = 1 Unknown association identifier
- ASSOC_LIB = 2 Normal release
- ASSOC_TRANS = 3 Communication layer problems
- ASSOC_APPLI = 4 Application decision

FAMILY = TRANSAC:

reserved

FAMILY = REPORT:

CODOP field:

- OBS = 10
- REPORT_ACK = 14
- FULL_CONFIG = 131
- MOD_CONFIG = 132
- HOR = 133

5.2. Dataflows

This subclause contains descriptions of data flows (DFD) between applications. They describe the dialogues between same-level layers.

5.2.1. Connection management sequence

The DFD describes Transport connection set-up and release principles.

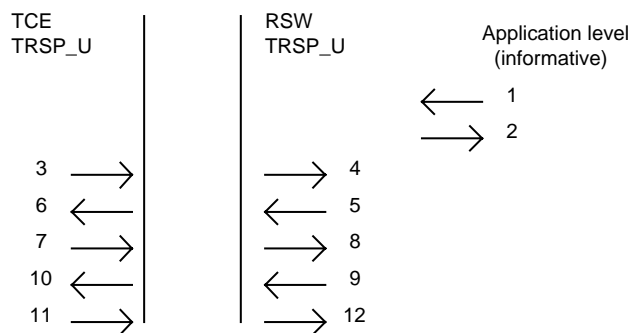


Figure 8: CNX set-up and release

- 1 Wait for transport connection. This message informs the transport layer that TRSP_U is ready to set-up the transport connection.
- 2 Acknowledgement from transport level.
- 3 Set-up transport connection request. Always initiated by TCE.
- 4 Received set-up transport connection indication.
- 5 Transport connection indication acceptance.
- 6 Set-up transport connection acknowledgement.
- 7 Data transfer from TCE to MSY.
- 8 Received data indication.
- 9 Data transfer from TCE to MSY.
- 10 Received data indication.
- 11 Transport connection release.
- 12 Transport disconnection indication.

5.2.2. Association management sequence

This DFD describes the ASSOCIATION level management principles.

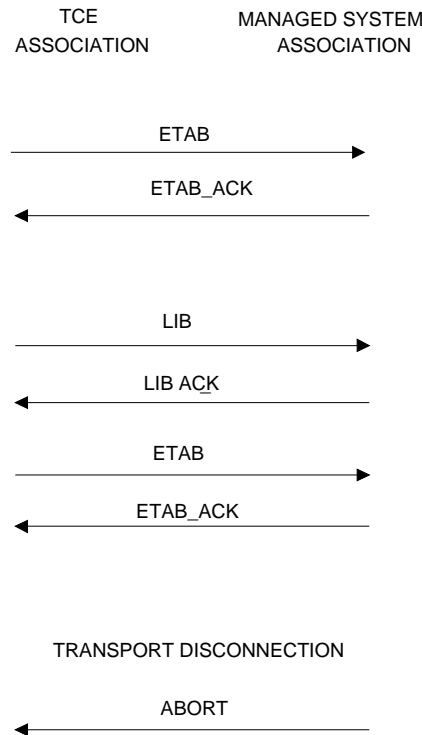


Figure 9: TP disconnect

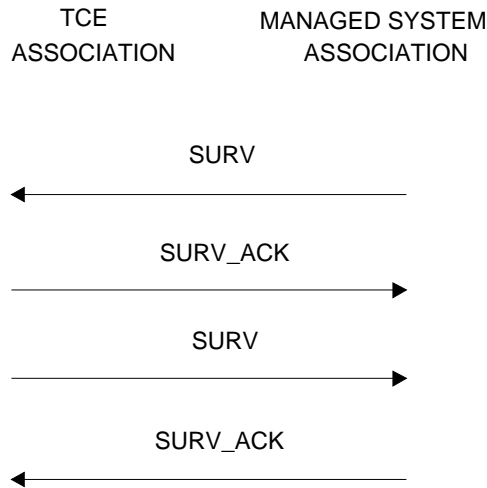


Figure 10: Monitoring

Monitoring may or may not be bi-directional depending on parameters.

5.2.3. Event report management sequence

This DFD describes the event report protocol.

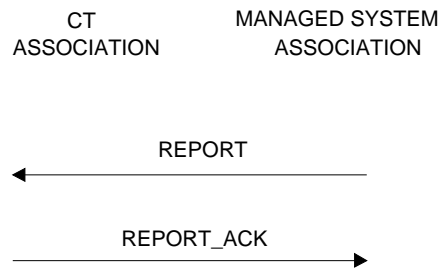


Figure 11: Event report DFD

5.2.4. Transaction message structures

Reserved (family TRANSAC).

5.2.5. Message sending rules

The bits in a 2 octets integer are transmitted in the following order:

msb	8	7	6	5	4	3	2	1	lsb
-----	---	---	---	---	---	---	---	---	-----

for an integer value in 2 octets

8	7	6	5	4	3	2	1
12	15	14	13	12	11	10	9

Least significant bit
most significant bit

5.2.6. Message description conventions

When no parameter values are indicated, all possible values are assumed within field length limits.

> , >> ,>>> ,>>>> characters indicate that this particular part of the message may be repeated n times, where n is the value of the previous field (TLV encoding).

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6. RSW - SADP Message definitions

This clause describes the protocol elements used in the RSW-SADP and interface contexts.

6.1. Implementation principles

The information exchanged by RSW applications and by SADP applications shall be based on the protocol defined in this Clause 5.

The application information sent by the RSW to the SADP shall include:

- voice call set up ticket messages;
- end of voice call tickets;
- registration tickets.

6.2. Set up Phase

The RSW acts as MSY and the SADP as TCE.

One transport connection and one association is set-up between SADP and RSW. SADP is always the initiator and RSW the acceptor.

The managed system number is 1.

The association number is 0.

6.3. Dialogue Phase

RSW-SADP and RSW-DP dialogues use REPORT family messages (event messages sent spontaneously by MSY to TCE and acknowledged by a REPORT_ACK message).

In REPORT messages containing an operation code field, the following values are used:

OPERATION CODE = OBS (observation)
OPERATION CODE = REPORT_ACK (acknowledgement)

REPORT messages contain a Data field initialised by observation and management functions. This field is detailed in the following descriptions.

6.4. System Observation messages

6.4.1. Description

The OBS function feeds back the following messages:

- voice call set up tickets;
- end of voice call tickets;
- registration tickets;

The slave observation and monitoring function of the RSW collects this information system-wide and sends it on to the RSW master observation and monitoring function, from where it is forwarded to TCE access function.

This information is periodically feedback to SADP when the RSW-SADP link is set-up.

6.4.1.1. Field values

This Clause provides a number of special field values.

- subscriber addresses are in RFSI format and BCD encoded in 5 right aligned octets.

e.g.: the following address R=750, F=1, S=01, I=150 is translated into an octet string 07 50 10 11 50.

- the value of a non significant (NS) octet is FF h

when the field value is not significant (NS), all the octets are set to FF h.

6.4.1.2. Message details

6.4.1.2.1. Call release message

Table 1: Call setup and release message

The call trace messages are composed of two phases messages: the first one corresponds to the end of the call setup (START) the second one at the end of the communication (END) .

These messages can be sent at the end of a phase: the call setup emits on END message and then a START followed later by a END, corresponding to elementary events traced from different subsystems at different times. When the END is received it indicates that a full trace of the communication has been done.

Field semantics	Field length in octets	Comments	Field value in decimal or hexa (H)
object class	2	temporary monitoring	700B (H)
object instance	3	not significant	00 33 (H) 00
date	7	-year (2) -month (1) -day (1) -hour (1) -min (1) -sec (1)	
observation reference	8	not significant	
number of RSW providing results	2		
>id of RSW	2		
>associated data length	2		
>runtime	2	unused by TCE	
>number reports in message	2		
>>report reference	2	unused by TCE	
>>report state	1	complete event	0
>>number of phases in report	2		2
>>>phase	1	- START - END	0 2
>>>data length	2		

for phase = START

>>>type of voice call	1	High 4 bits: 0 : trace emitted in calling RSW 2 : trace emitted in the RSW initiator of the group call. 4 : trace emitted by the receiving RSW. 8 : trace emitted by the transmit RSW. Low 4 bits: 0 : individual call 1 : group call 2 : multiple call 3 : dispatcher call 9 : PABX call	
>>>calling party address	5	RFSI if type=0 NS if type=1	FF H
>>>calling party location	3	BN system number RSW number Cell number or NS if type of voice call=1	FF H
>>>Group communication	6	Octet 1 : type of group communication - emergency - open channel - group call Octets 2 and 3 : reference of group communication Octet 4 : reserved Octet 5 : number of the RSW if emergency Octet 6 : number of the radio cell if emergency	=1 =3 =4
>>>use or not of encrypting	1	clear encrypted	=0 =1
>>>call priority	1	not significant routine urgent flash	=0 =3 =7 =11
>>>date and time of set up message acceptance by RSW	9	-sec (1) -min (1) -hour (1) -day of week (1) -day of month (1) -month (1) -year (1) -G.M.T. offset in hours (1) -G.M.T. offset in minutes (1)	0 to 59 0 to 59 0 to 23 0 to 6 (0=Sunday) 1 to 31 0 to 11 (0=January) 0 to 99 -11 to +11 0 to 30

>>>date and time of conversation start or call release if unsuccessful set up	9	-sec (1) -min (1) -hour (1) -day of week(1) -day of month (1) -month (1) -year (1) -G.M.T. offset in hours (1) -G.M.T. offset in minutes (1)	0 to 59 0 to 59 0 to 23 0 to 6 (0=Sunday) 1 to 31 0 to 11 (0=January) 0 to 99 -11 to +11 0 to 30
>>>reason for unsuccessful set up	1	OK	0
>>>addresses dialled by calling party and forwarding flag	4x 27 octets	directory address dialled by the caller (5 octets) forwarding indication (1 octet) PABX sub address (21 octets)	
>>>number of called party	1		Nc
>>>number of voice connections	1	reserved	0
>>>number of participating OG	1		Ng
>>>>called party locations	Ncx3	- BN system number (1 octet) - RSW number (1 octet) - cell number (1 octet)	
>>>>list of participating OG	Ngx2	OG identifiers	

for phase = END

>>>date and time of call release	9	-sec (1) -min (1) -hour (1) -day of week (1) -day of month (1) -month (1) -year (1) -G.M.T. offset in hours (1) -G.M.T. offset in minutes (1)	0 to 59 0 to 59 0 to 23 0 to 6 (0=Sunday) 1 to 31 0 to 11 (0=January) 0 to 99-11 to +11 0 to 30
>>>reason for unsuccessful set up	1		
>>>calling party	5	significant if type of group communication is 1	

6.4.1.2.2. Registration report message

The format is:

Table 3: Registration report message

Field semantics	Field length in octets	Comments	Field value
object class	2	temporary monitoring	700B (H)
object instance	3	not significant	00 35(H) 00
date	7	-year (2) -month (1) -day (1) -hour (1) -min (1) -sec (1)	
observation reference	8	unused by TCE	
number of RSW providing results	2		
>id of RSW	2		
>associated data length	2		
>runtime	2	effective runtime unused by TCE	
>number reports in message	2		
>>report reference	2	unused by TCE	
>>report state	1	incomplete START event	1
>>number of phases in report	2		1
>>>phase	1	END	2
>>>data length	2	fixed	16(H)
registered RT address	5	RFSI	
registration type	1	- complete registration - normal registration - deregistration - attach or detach	0 1 2 3
registration state	1	confirmed refused local other (attach or detach)	0 1 2 3

date and time of registration	9	-sec (1) -min (1) -hour (1) -day of week (1) -day of month (1) -month (1) -year (1) -G.M.T. offset in hours (1) -G.M.T. offset in minutes (1)	
attach state	1	- RT attached - RT detached - not significant	0 1 FF (H)
home registration	1	- yes - no - not significant	0 1 FF (H)
traffic capability	1	- traffic disabled - traffic enabled - not significant	0 1 FF (H)
forwarded RT	1	- forwarded - not forwarded - not significant	0 1 FF (H)
UDT connected	1	- yes - no - not significant	0 1 FF (H)
ciphering capability	1	- yes - no - not significant	0 1 FF (H)
RT versions	1	reserved	
registered terminal location	3	RN syst. number (1) RSW number (1) Cell number (1)	
registration sequence	2	Num. of roaming between RN Num. of roaming between RSW	
Number of complete registrations	1		
profile	1	reserved	
type of preferential communication	1	reserved	
preferential communication	1	reserved	

7. OMC - SADP Messages and Protocol

This Clause describes the REPORT messages relative to network infrastructure elements, open channel, coverage references and time which are sent from the Operations and Maintenance Centre (OMC) to the Stand Alone Dispatch Position (SADP).

7.1. Implementation principles

The OMC-SADP dialogue shall use the protocol defined in Clause 5 to set-up transport connections and associations, and also for transferring messages.

Lengths are given in octets.

For integer values sent in several octets, the lowest order octet is first sent.

7.2. Set up Phase

The OMC acts as MSY and the SADP as TCE.

One transport connection and one association is set-up between SADP and OMC. SADP is always the initiator and OMC the acceptor.

The managed system number is: 2.

The association number is: 0.

7.3. Dialogue Phase

When the association is set-up, the OMC sends the required information to SADP in "REPORT" message family.

The message operation codes are:

OPERATION CODE = REPORT_ACK (acknowledgement)
OPERATION CODE = FULL_CONFIG (full configuration)
OPERATION CODE = MOD_CONFIG (modification of configuration)
OPERATION CODE = HOR (date)

The first message only contains the time.

The following messages contain the complete regional network infrastructure description defined in OMC with operation code =CREATE for each MO.

All subsequent messages, until the connection is released, contain:

- managed objects modifying the network infrastructure;
- time only (time changes or periodic resetting every 3 hours to prevent drift).

If no acknowledgement message is received within a given time-out, another message is sent (the content is not necessarily identical to the unacknowledged message). After no more than three attempts, the connection is released.

The SADP shall be able to handle repeated deliveries of the same message.

7.4. Release Phase

Whenever a connection is released then set up again, the queue of messages pending acknowledgement is purged. Any message which was not acknowledged before the connection was released is discarded.

Whenever an association break or protocol error occurs (set up or dialogue), the transport connection is released.

7.5. Standard Message Format

The general application message part is defined below:

Table 5: Report format

7	6	5	4	3	2	1	0
Length of data							
Data breakdown							
Reserved							
Number of MO instances (N)							
MO instance n° 1							
MO instance n° 2							
.							
.							
MO instance n° N							

- Length of data: (2 octets)

Length of remaining message.

The maximum overall message length is 8192 octets.

- Data breakdown: (1 octet)

Several messages sent to obtain full data load.

Field values are:

- If 1 message to be sent : END=2.
- If 2 messages to be sent : START=0 then END=2
- If more than 2 messages to be sent : START=0 then NEXT=1 then END=2.

- Number of managed object instances : (2 octets)

Number of managed object instances contained in remaining message.

- Managed object instance.

Data specific to each managed object class described in the remaining document.

Instances of a same MO class are regrouped.

7.6. Managed infrastructure object descriptions

7.6.1. Radio Switch object (RSW)

Table 6: RSW object

Field semantics	Field value	Length
Object class	ID_CLA_OE_CR=0x7428	2
Operation code	CREATE=0, DELETE=1, SET=2	1
MO identifier	RSW number	1
	0	1
	0	1
	0	1
MO alias	Character string	16

7.6.2. Cell object (CEL)

Table 7: Cell object

Field semantics	Field value	Length
Object class	ID_CLA_OE_CEL=0x742B	2
Operation code	CREATE=0,DELETE=1,SET=2	1
MO identifier	RSW number	1
	CEL number	1
	0	1
	0	1
type of cell	0 = not used 1 = radio BS 2 = simulcast cell 3 = LABS 4 = remote LABS not significant if codop=DELETE	1
cell configuration	0 = single 1 = covered cell 2 = umbrella cell FF (H) if type = LABS not significant if codop=DELETE	1
MO alias	Character string	16
Site number	number of BS in the cell not significant if code=DELETE	1

7.6.3. Physical Base Station Object (RRP)

Table 8: BS object

Field semantics	Field value	Length
Object class	ID_CLA_OE_RRP=0x742E	2
Operation code	CREATE=0,DELETE=1,SET=2	1
MO identifier	RSW number	1
	CEL number	1
	RRP number	1
	0	1
MO alias	Character string	16
Number of Tx/Rx	NS if Op.code=DELETE	1

7.7. Managed communication object descriptions

7.7.1. Open channel reference object (CNF) ou Coverage object (COV)

Table 9: Open channel reference object

Field semantics	Field value	Length
Object class	ID_CLA_OE_CNF=0x740A	2
Operation code	CREATE=0,DELETE=1,SET=2	1
MO identifier		4
MO alias	Character string	16
administrative state	reserved	1
Partition number	reserved	1
Encryption mode	0, 2,3 or 4 = encrypted 0xFE=clear 0xFF=not significant if coverage	1
Fleet number	number of the fleet or 0xFD=NS for no partitionned communication	1

Partitionning for set up	No=0 if non partitionned Yes=1 if partitionned NS=0xFF for coverage NS if codop=DELETE	1
Partitionning for participation	No=0 if non partitionned Yes=1 if partitionned NS=0xFF for coverage NS if codop=DELETE	1
Master RSW	reserved	1
Set-up OG: OG type	NS if op. code=DELETE main=1; national=2; local=3; external=4	1
OG number		2
Number of participation OG	0 if op. code=DELETE	1
Per OG: >>OG type	main=1; national=2; local=3; external=4	1
>>OG number	0 if op. code=DELETE	2
Number of cells		1
Per cell: >>RSW number		1
>>Cell number		1
Number RSW master	reserved	1
Number of slave RB	reserved	1
per slave RB: >> Number of RSW	reserved	1

MO identifiers (4 octets):

Field semantics	Field value	Length
emergency open channel	1	1
RSW number		1
Cell number		1
Padding	0	1

or

Field semantics	Field value	Length
open channel	3	1
Open channel number		2
Padding	0	1

or

Field semantics	Field value	Length
coverage	4	1
Coverage number		2
Padding	reserved	1

7.7.2. Operational Group Object (OG)

Table 10: Operational Group object

Field semantics	Field value	Length
Object class	ID_CLA_OE_GFA =0x7404	2
operation code	CREATE=0, DELETE=1, SET=2	1
MO Identifier:		
OG number		2
padding	0	1
OG type	main=1; national=2; local=3; external=4	1
COV number	not significant if Codop=DELETE	2
Partition number	reserved	1
Encryption mode	0, 2,3 or 4 = encrypted 0xFE=clear 0xFF=not significant	1
Fleet number	reserved	1
Number of SADP participants	reserved	1
Per SADP:		
>>Number of significant octets of address	1 to 15	1
>>address	reserved	1 to 15

7.8. Time object description

Table 11: Time object

Field semantics	Field value	Length
Object class	ID_CLA_OE_HEU=0x7007	2
Operation code	ACTION=4	1
Sub-Operation code	MODIF_HEURE=0x08	1
Year	Integer in 4 digits	2
Month	Integer between 1 and 12	1
Day	Integer between 1 and 31	1
Hour(s)	Integer between 0 and 23	1
Minute(s)	Integer between 0 and 59	1
Second(s)	Integer between 0 et 59	1
GMT offset :		
in hour(s)	Integer between -11 and +11	1
in minute(s)	Integer equal to 0 or 30	1

8. LCT - TCE interface

This Clause describes the data exchange protocol between the LCT and a micro-computer TCE.

8.1. General description

The interface between LCT and TCE is designed to enable the exchange of data over an asynchronous line.

8.2. Terminal connections to the TCE

The LCT may be connected to a TCE on either a test or radio data terminal interface. These two connections are asynchronous serial links, with electrical TTL / V.28 conversion, if necessary.

The only signals handled are send data (SD) and receive data (RD).

8.3. Interface description

The interface implements three different levels:

- physical level;
- link level;
- application level.

8.3.1. Physical level

The physical level is enabled by a serial line in asynchronous mode. Asynchronous line features are listed below. It should be noted that the line is only slightly affected by outside factors liable to cause transmission errors:

- transmission speed (4 800, 9 600 or 19 200 baud);
- 8 bit character mode;
- no parity;
- one START bit;
- one STOP bit;
- leading LSB.

Future parameter changes will have no effect on the remaining document.

8.3.2. Link level

The link level corresponds to the Mobile PC Asynchronous Protocol (MPAP) as defined in document PAS 001-13-6 [4].

8.3.2.1. Frame formats

Frames are delimited by a start octet, two end octets and a checksum octet. The link level also handles transparent data characters to prevent any misinterpretation of start and end octets conveyed in the frame body.

The starting character is DLE (0x10) and the two end characters are DLE ETX (0x10, 0x03). A DLE character transmitted in the frame body is always repeated to prevent misinterpretation.

This type of coding means that any frame may be transmitted, provided that the first data character is not a data link escape character (DLE).

The checksum is an "exclusive OR" of all the octets in the transmitted frame, including delimiters and transparent characters after encoding (or before encoding).



Figure 12: Generic frame format

All errored frames (checksum error) are ignored on reception.

8.3.2.2. Link protocol

The link level enables connection, data exchanges and manages frame acknowledgements.

4 types of frame are implemented:

- unnumbered connect frames;
- connect acknowledgement frames;
- numbered data frames;
- data acknowledgement frames.

The first octet containing the frame control code identifies the frame. The codes shall be different from the start character (see provision in previous Clause). Where:

- connect frame: CNX = 0x30 ("0");
- connect acknowledgement frame: ACQ_CNX = 0x31 ("1");
- data frame: DATA = 0x32 ("2");
- data acknowledgement frame: ACQ_DATA = 0x33 ("3").

NOTE 1: Acknowledgements are always referred to as ACK.

NOTE 2: Data frames do not convey acknowledgements.

The second octet of data and data acknowledgement frames contains a sequence number which is the transmission sequence number in data frames, and the sequence number of the next expected frame in acknowledgement frames.

Data frames then contain a size field in two octets (lsb, msb). This field indicates the length of data submitted by the application level (therefore before transparent character coding). The length of data is limited to 768 octets. The frame is ignored if an error is detected in this field, and is therefore not acknowledged.

The next octets in data frames contain the information managed by the application level.

DLE	CNX	DLE	ETX	CS
-----	-----	-----	-----	----

Figure 13: Connect frame format

DLE	ACQ_CNX	DLE	ETX	CS
-----	---------	-----	-----	----

Figure 14: Connect acknowledgement frame

DLE	Data	Seq. n°	Lg.	Data	DLE	ETX	CS
-----	------	---------	-----	------	-----	-----	----

Figure 15: Data frame format

DLE	ACQ_DATA	Seq. n°	DLE	ETX	CS
-----	----------	---------	-----	-----	----

Figure 16: Data frame acknowledgement format

8.3.2.2.1. Sequence number management

Each end has its own transmission sequence number managed in modulo 256. This number is increased by 1 whenever a new frame is transmitted. The number is returned to 0 on connections (sent or received).

Look ahead mechanisms are not implemented. One end cannot send any frame other than connect until the previous frame is acknowledged.

The receiver end checks that the sequence number in the new frame is just one higher than the sequence number in the previously received frame. In this case, the link level acknowledges the frame by giving the sequence number of the next expected frame. Otherwise, the frame is ignored, no acknowledgement is sent unless the frame is a retransmitted frame (previous frame acknowledgement lost), in which case an acknowledgement is sent but the received frame is ignored.

8.3.2.2.2. Retransmitted frame management

The sender end manages retransmitted frames. Each frame may be retransmitted **NbRepeat** time when unacknowledged, when the **TpoAcq** time-out expires. If the last retransmitted frame is not acknowledged the connection status changes to disconnected, and no further exchange is possible until a new connection is set-up.

In disconnected status, all received frames are ignored other than connect frames.

Given NbRepeats = 2 and TpoAcq = 2s.

8.3.3. SDL data link model

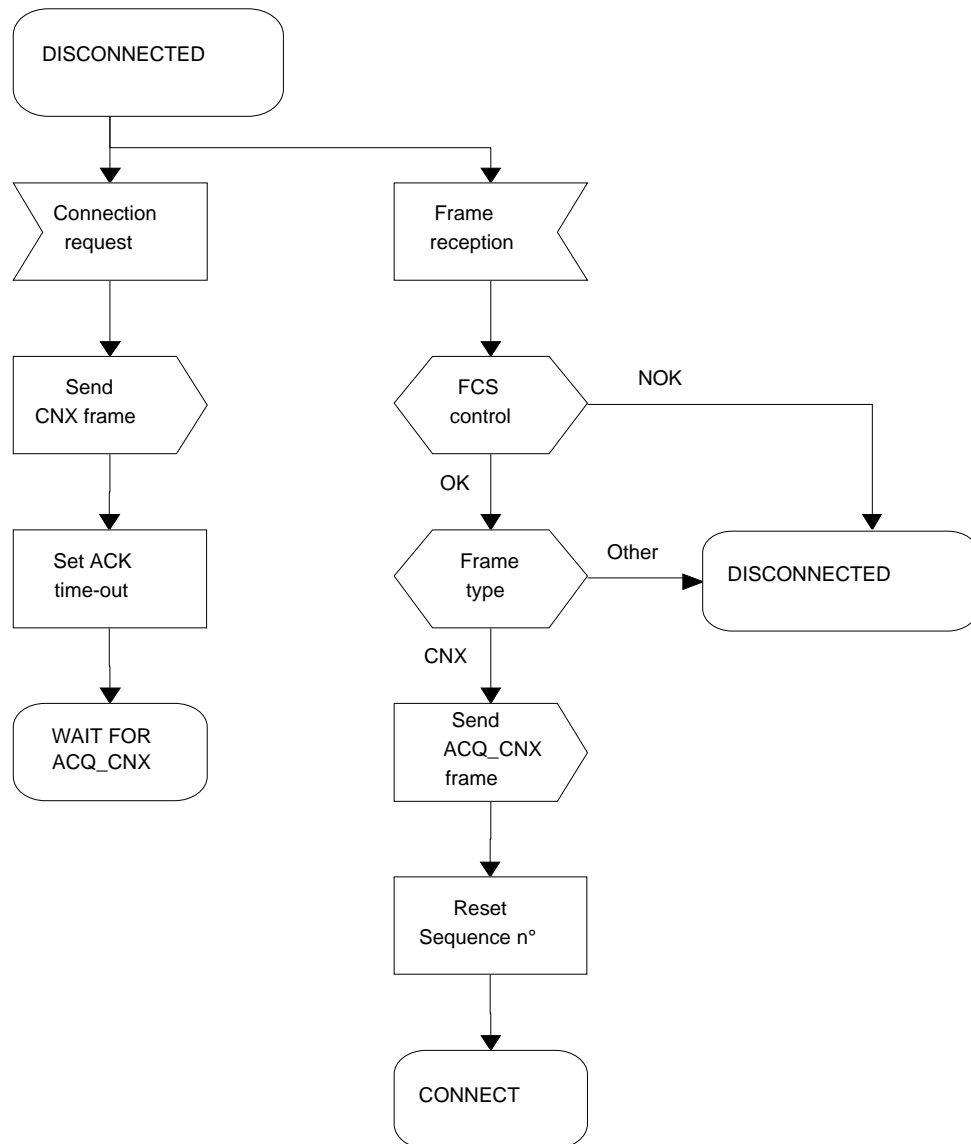


Figure 17: SDL Data Link Model

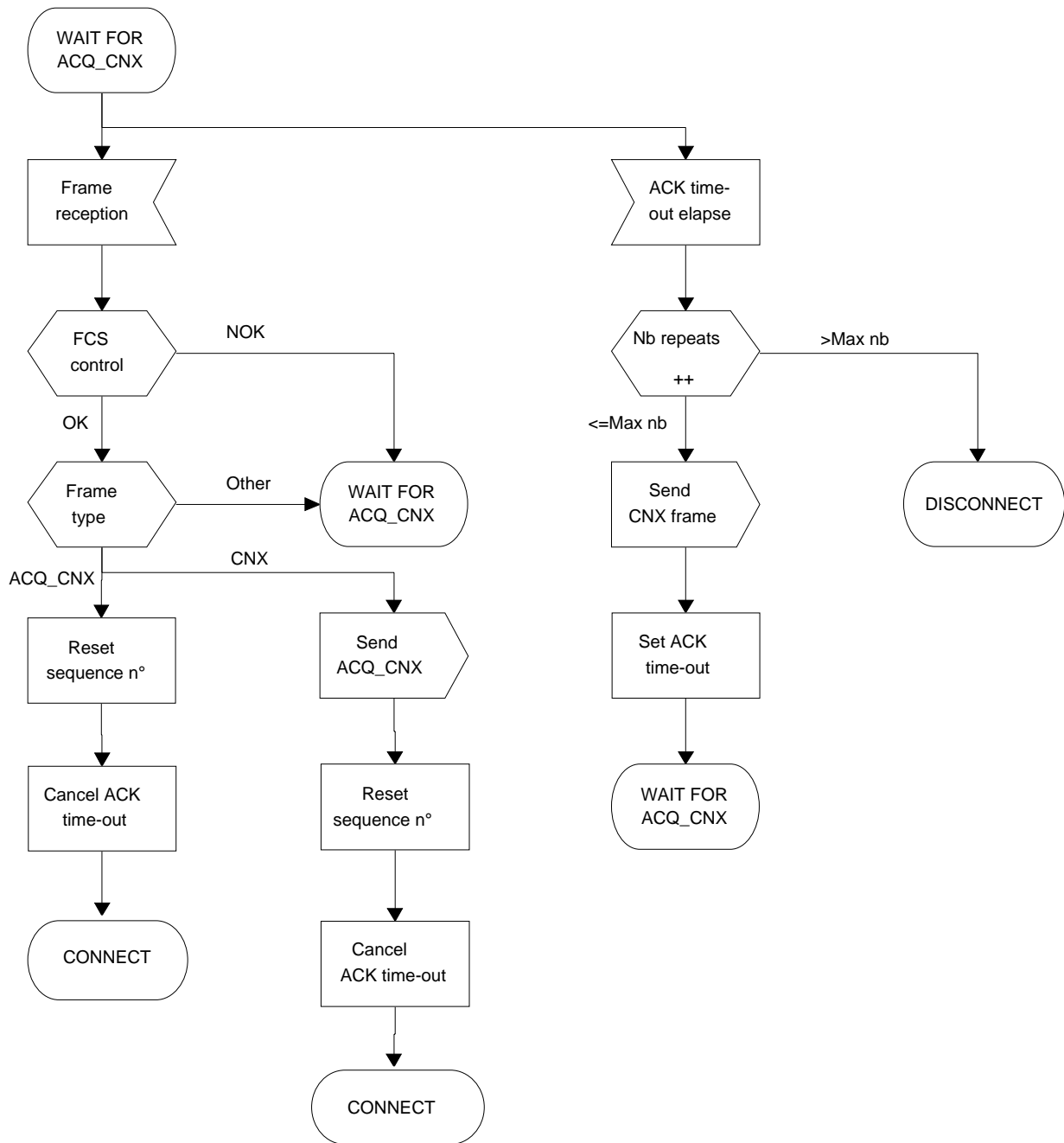


Figure 24: SDL Data Link Model (continued)

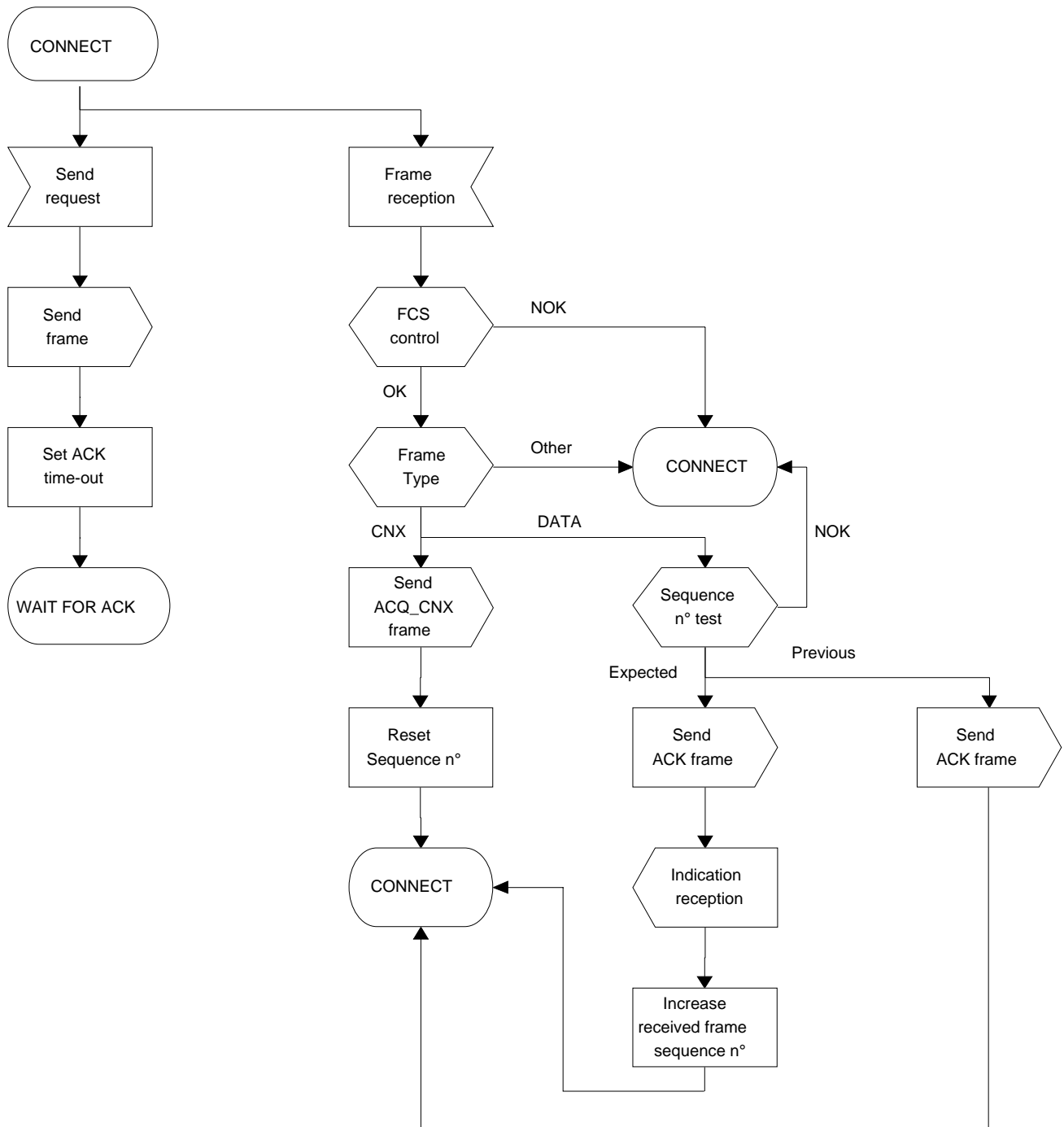


Figure 24: SDL Data Link Model (continued)



Figure 24: SDL Data Link Model (continued)

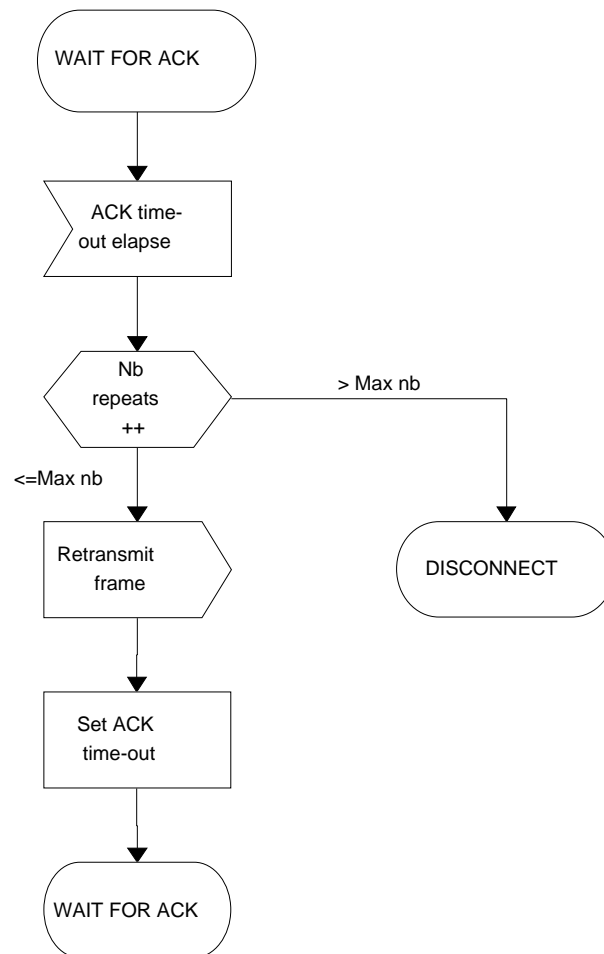


Figure 24: SDL Data Link Model (continued)

8.4. Application Level

The application level corresponds to the System Terminal Control Protocol described in PAS 0001-19-2 [6]

Annex A (Informative)

A.1. Dimensioning

OMC and SADP access the RSW by an external X.25 link.

RSW has to manage one transport connection for each connected SADP, plus one for OMC.

Since SADP receive information streams at different rates, at least 2 associations are defined with a different dump time-out for each association.

Minimum static RSW dimensions are as follows:

- Number of message types : 100
- Number of transport connections : 30
- Number of associations : 50
- Number of circular storage files : 50

A.1.1. SADP Identifies

The entities communicating with MSY are necessarily calling over a transport connection across the external network and are identified by their Transport address.

A Transport address comprises an Address, Sub-address:

- the address is defined by external network topology and usually designates the concentrator via which the SADP gains access to the network;
- the sub-address unambiguously designates the SADP.

To avoid linking the configuration file with external network data, MSY only uses the sub-address part of the received transport address to identify callers.

A.1.2. Circular file size

File size has to be tailored to contain only limited numbers of messages of each type.

In case of SADP connection release or external X.25 link saturation, the messages are overwritten, not accumulated, entailing a significant and useless "catching up" time.

A.1.3. Message Switching

A same message (designated by its type and/or observation domain) has to be routed towards each SADP. The message is written into each circular file of the given message type for each SADP association. It is subsequently sent to the SADP using the applicable association protocol.

A.1.4. Constraints

Two points may be critical in terms of direct message routing from RSW to SADP:

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- The RSW load induced by copying messages into the various files and reading prior to transfer to the final destination address;

The circular files partnered with SADP associations shall therefore be memory files, otherwise the disk load resulting from the writing and reading operations would be prohibitive;

- Potential saturation of the external network access link passband (see paragraph on configuration).

A.2. Type of information transferred to SADP

Various types of information can be feedback to SADP. The type of information differs with projects and may be configured.

History

Document history		
Date	Status	Comment
24 November 1995	First version	Version 0.0.1
01 April 1996	Formatting	Version 0.1.0
30 April 1996	Tetrapol Forum approval	Version 1.0.0
06 June 1996	Formatting	Version 1.0.1
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11 December 1997	Reference to Part PAS 001-19-2 and delete common clauses	Version 1.0.5
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