PAS 0001-12 V1.0.5 (1996-12)

Publicly Available Specification

TETRAPOL Specifications
Part 12: Network Management Centre interface

Reference

Keywords

Tetrapol

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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

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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

Part 17 Guide to TETRAPOL features

Part 18 Base station to Radioswitch interface

Part 19 Stand Alone Dispatch Position interface

1. Scope

This part provides of the NMC-OMC interface protocol description at the R5 Reference Point [1] of the TETRAPOL System. It defines the message sequences, the format and content of the different messages.

2. Normative references

This PAS incorporates by dated and undated reference, provisions from other applications. 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 revision 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 publication referred to applies.

[1] PAS 0001-1-1: "TETRAPOL Specifications; General Network Design: Reference Model".

[2] ITU-T Recommendation X.214 | ISO 8072: "Information Technology; Open Systems Interconnection; Transport service definition".

[3] ITU-T Recommendation X.224 | ISO 8073: "Open Systems Interconnection; Transport; Protocol specification".

[4] ISO ISP 11183-1 (1991): "Information technology; International Standardised Profiles AOMnn.OSI Management; Management Communication Protocols; Specification of ACSE, presentation and session protocols for the use by ROSE and CMISE".

[5] ITU-T Recommendation X.215 | ISO 8326: "Information processing systems; Open Systems Interconnection; Basic connection oriented session service definition.

[6] ITU-T Recommendation X.225 | ISO 8327: "Information processing systems; Open Systems Interconnection; Connection oriented session protocol specification".

[7] ITU-T Recommendation X.216 | ISO 8822: "Information processing systems; Open Systems Interconnection; Connection oriented presentation service definition".

[8] ITU-T Recommendation X.226 | ISO 8823: "Open Systems Interconnection; Basic connection oriented presentation protocol specification".

[9] ITU-T Recommendation X.208: "Open Systems Interconnection; Specification of Abstract Syntax Notation One (ASN.1)".

[10] ITU-T Recommendation X.209: "Open Systems Interconnection; Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1)".

[11] ITU-T Recommendation X.217: "Open Systems Interconnection; Association control service element (ACSE); Service definition".

[12] ITU-T Recommendation X.227: "Open Systems Interconnection; Association control service element (ACSE); Protocol specification".

[13] ITU-T Recommendation X.219 | ISO 9072: "Open Systems Interconnection; Remote operations; Model, Notation and Service".

[14] ITU-T Recommendation X.229: "Open Systems Interconnection; Remote operations; Protocol specification".

[15] ISO/IEC 9595: "Information technology; Open systems interconnection; Common management information service definition".

[16] ISO/IEC 9596-1: "Information technology; Open systems interconnection; Common management information protocol specification".

[17] PAS 0001-17: "TETRAPOL Specifications; Guide to TETRAPOL features".

3. Definitions and abbreviations

3.1. Abbreviations

A/I	Air Interface
ACSE	Association Control Service Element
AIS	Alarm Indication Signal
AP	Application Personal (messaging)
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation 1
BN	Base Network
BS	Base Station
BSC	Base Station Controller
CCH	Control CHannel
CMIS(P)	Common Management Information Service (Protocol)
CRP	Connection Reference Point
CTR	Counter
CUG	Closed User Group
DB	DataBase
DC	Dispatch Centre
DCH	Data CHannel
DCN	Delivery Confirmation Notification
DCS	Dispatch Centre Server
DFN	Delivery Failure Notification
DL	Data Link
DM	Direct Mode
DM/NM	Direct Mode / Network Monitoring
(P)DN	(Public) Data Network
DP	Dispatch Position
DPS	Dispatch Position Switch
DPSI	Dispatch Position Switch Interface
EDT	External Data Terminal
EER	Excessive bit Error Rate
EN	Enabled state
FBM	FallBack Mode
IDPSAP	Identity of Presentation Service Access Point
IDSSAP	Identity of Session Service Access Point
IDTSAP	Identity of Transport Service Access Point
IP	InterPersonal (messaging)
ISI	Inter System Interface
ISO	International Standard Organisation
KMC	Key Management Centre
LAPB	Link Access Protocol B
LCIU	Line Connection Interface Unit
LCT	Line Connected Terminal
LFA	Loss of Frame Alignment
LLC	Logical Link Control
LS	Loss of Signal
MAC	Medium Access Control
MER	Management Elementary Response
MET	Management Elementary Transaction
MM	Mobility Management
MMI	Man Machine Interface
MOCH	Multisite Open CHannel
MRI	Mobile Random Identity
MS	Mobile Station
MSC	Message Sequence Chart
MSG APPLI	Messaging APPLIcation

RSW	Radio SWitch
NMC	National Management Center
NSAP	Network Service Access Point
ODB	Operation Data Base
OG	Operational Group
OMC	Operation and Maintenance Centre
PAS	Publicly Available Specification
PABX	Private Automatic Branch eXchange
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PMR	Private Mobile Radiocommunications
PSTN	Public Switched Telecommunications Network
PTT	Push-To-Talk
Ri	Reference point index i
RLCC	Remote Line Connected Controller
ROSE	Remote Operation Service Element
RP	RePeater
RSW	Radio SWitch
RT	Radio Terminal
SADP	Stand Alone Dispatch Position
SCN	Submit Confirmation Notification
SDL	Specification and Description Language
SDP	Submit Delivery Protocol
SFN	Submit Failure Notification
SIM	Subscriber Identity Module
ST	System Terminal
SwMI	Switching and Management Infrastructure
TCH	Traffic CHannel
TCP/IP	Transmission Control Protocol/Internet Protocol
TDX	Telephone and Data eXchange
TMSG-Id	Temporary MeSsaGe Identifier
TP	TransPort layer
TTI	Temporary Terminal Identifier
UA	User Agent
UDT	User Data Terminal
VC	Virtual Circuit
VCH	Voice CHannel
X.400 MTA	X.400 Message Transfer Agent

3.2. Definitions

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

Basic dialogue: defines an application message exchange between the NMC and the OMC.

Operation type: defines an NMC function.

Question_response mode: a basic dialogue where a message (command) sent by the NMC to the OMC is followed by a response returned by the OMC to the NMC.

Scan mode: a basic dialogue in question_response mode, where the NMC periodically retransmits the message (command).

Spontaneous mode: a basic dialogue where a message issued by the OMC is spontaneously fedback to the NMC.

Grouped command mode: a basic dialogue where the data length is limited to 4 koctets, transferred in a single application message.

Network monitoring: a type of operation where information (observation counters, state of common OMC/NMC objects) is fedback to the NMC by the OMC. The NMC-OMC dialogue in this type of operation are in scan mode.

4. Protocol definitions

4.1. General principles

The NMC application may dialogue with the OMC application in 4 different modes: question-response, scan, grouped command and spontaneous mode.

- network monitoring:
    - permanent observations: the NMC and the OMC dialogue in scan mode;
    - synthetic common object state (including alarms). The NMC and the OMC dialogue in scan mode;
- command sending: the NMC and the OMC dialogue in grouped command mode.

4.1.1. Functions

4.1.1.1. Permanent observation

The NMC shall scan all the OMCs every [30] mn in order to retrieve the last [half hour's] operational group counters. The OMC stores these counters in circular files.

4.1.1.2. Synthetic state, list of the OMC-NMC alarms

The NMC shall scan all the OMC every [5] mn to retrieve common object states. This message includes the alarms on inter-group exchanges and problems detected by the OMC which are of use to the NMC.

Only the main object states are scanned (RSW, DL, BS) and fedback to the NMC followed by OMC-NMC alarms.

To maintain a reasonable scanning period (of around [5]mn), the size of the response message that the OMC returns to the NMC shall be limited. Since the response message is limited to [3] Koctets, priority shall be given to object state (around [450] octets, then to alarms up to [2] Koctets. Any alarm which cannot be sent in the first time, is sent the second time.

The NMC attendant may ask for another round of scanning to obtain the states of a given object's sub-objects.

4.1.1.3. Grouped commands

The NMC sends a command file to the OMC. The file length is limited to [4] koctets, one command contains an average of [80] characters.

4.2. NMC-OMC interface

4.2.1. Communication layers

The communication layers shall comply with ISO standards and CCITT recommendations, they are:

layer 1: physical V.24-V.28 link at 19,2 kbit/s

layer 2: LAPB data link

layer 3: X.25 network for layers 1, 2 and 3 (refer to CCITT X.25) (NSAP is not implemented).

No more than one VC open between the NMC and an OMC at a given time.

layer 4: transport class 0 CCITT X.214 | ISO 8072 [2] and X.224 | ISO 8073 [3]

where calling ID TSAP = "tp0" and called ID TSAP = OMC

For layers 5 to 7 see profiles and PICS defined by ISO recommendation (refer to ISO ISP 11183-1 (1991) [4])
where OMC IDSSAP = "OMC" and IDPSAP = "",
and where the NMC IDSSAP = "ses0" and IDPSAP = "12345678".

layer 5: ITU-T X.215 | ISO 8326 [5] and X.225 | ISO 8327 [6] protocol version 2

The supported functional units are: kernel, duplex transmission

layer 6: ITU-T X.216 | ISO 8822 [7] and X.226 | ISO 8823 [8]. The kernel functional unit is used.

Abstract syntax and ASN.1 coding rules defined in ITU-T X.208 [9] and X.209 [10] shall be used.

layer 7: Application. Use of ACSE service elements (application association management).
The service and protocol are defined in ITU-T X.217 [11] and ITU-T X.227 [12], ACSE shall be used in normal mode (the association is initiated and closed by the NMC).

No more than one open association between the NMC and an OMC is allowed at a given time.

ROSE (remote operation management). The service and protocol are defined in ITU-T Recommendations X.219 | ISO 9072 [13] and X.229 [14].

CMIS and CMIP (management information processing) services and protocols are defined in ISO standards ISO/IEC 9595 [15] and ISO/IEC 9596-1 [16].

M_ACTION, M_EVENT_REPORT services are used. The M_SET, M_GET, M_CREATE, M_DELETE services are not used.

Scope, filter, synchronisation, linked_identifier parameters are not used.

SMASE PT_ACTION and PT_EVENT_REPORT are used, the primitives have the same parameters as the corresponding CMIS primitives.

4.2.2. Application Protocol: Application association, application access control

4.2.2.1. Application association

The NMC always initiates association opening and closing. Application associations are managed by the Openview platform and are entirely independent of current applications.

4.2.2.2. Access control

Access control shall be implemented whenever a request is sent to the NMC (CMIS "access control" primitive field). It is only checked by the OMC.

Access control is not checked at association time.

4.2.2.3. General rule

All the optional fields in CMIP APDU which are not defined in this document, are not transmitted.

All the global parameters formats shall be defined in the managed information tree (with the exception of the object instance which is given in local format). The global object class format, for example, is entered and its value is obtained from the record tMER.

4.2.2.4. Versions compatibility

The control is made by the identification of the OMC object of the managed information tree within the parameter "Base_Object_class", which is in all messages coming from the NMC.

The NMC should not send more messages on error occurrence. The messages in "scan mode" are suspended.

4.2.3. Application Protocol: Permanent observation

4.2.3.1. From the NMC to the OMC

An ACTION type CMIP APDU is sent to the OMC with the following parameters:

Invoke_IDentifier = see definition given in standards

Mode = CONFIRMED

Base_object_class = OMC

Access_control

Base_object_instance = NUM_SYS

Action_Type = PERMANENT_OBS

Action_info_argument = observation starting time.

4.2.3.2. From the OMC to the NMC

The OMC replies by sending an ACTION_RESULT CMIP ADPU to the NMC with the following parameters:

Invoke_IDentifier = see definition given in standards

If the action is successful

then

Action_Reply_info is defined in the Clause of message definitions. It contains all the processed permanent counters stored in the OMC.

else

Error = processing_failure

error_id = error_type_0

any defined by error_id = ERROR_CODE followed by TEXT_LENGTH and possibly an ASCII text identifying the error.

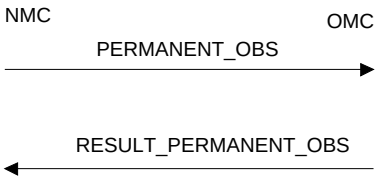


Figure 1: Permanent observation

4.2.4. Application Protocol: Synthetic state

4.2.4.1. Common object states: NMC to the OMC

This command is sent to the OMC in an ACTION APDU with the following parameters:

Invoke_IDentifier = see definition given in standards

Mode = CONFIRMED

Base_object_class = OMC

Base_object_instance = NUM_SYS

Access_control

Action_Type = COMMON_OBJECT_STATE

Action_info_argument = scan_number (number used by the application to acknowledge alarms acceptance, it is incremented by the NMC)

4.2.4.2. From the OMC to the NMC

The OMC replies by sending an ACTION_RESULT CMIP APDU to the NMC with the following parameters:

Invoke_IDentifier = see definition given in standards

Action_Type = COMMON_OBJECT_STATE

if action is successful
then
Action_reply_info = is defined in the Clause defining the messages. It contains the scan number, the synthetic common object state (common object states can be obtained on the OMC), and possibly the NMC-OMC alarms.

The alarm text is in ASCII code.

else

Error = processing_failure

error_id = error_type_1

any defined by error_id = ERROR_CODE

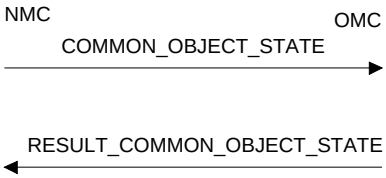


Figure 2: Synthetic state

4.2.4.3. Common object sub-object states: NMC to the OMC

This command shall be sent to the OMC in an ACTION APDU with the following parameters:

Invoke_IDentifier = see definition given in standards

mode = CONFIRMED

Base_object_class = OMC

Base_object_instance = NUM_SYS

Access_control

Action_Type = SUB_OBJECT_STATE

Action_info_argument = object_type, object_identifier

4.2.4.4. From the OMC to the NMC

The OMC shall reply by sending an ACTION_RESULT CMIP APDU to the NMC with the following parameters:

Invoke_IDentifier = see definition given in standards

Action_Type = SUB_OBJECT_STATE

if action is successful

then

Action_reply_info = is defined in the Clause defining the messages. It contains the synthetic state of the requested object sub-objects.

else

Error = processing_failure

error_id = error_type_1

any defined by error_id = ERROR_CODE

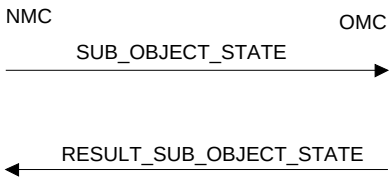


Figure 3: Object state MSC

4.2.5. Application protocol: send grouped commands

4.2.5.1. From the NMC to the OMC

The NMC shall send an ACTION APDU to the OMC with the following parameters:

Invoke_IDentifier = see definition given in standards

Mode = CONFIRMED

Base_object_class = OMC

Base_object_instance = NUM_SYS

Access_control

Action_type = SEND_GROUPED_COMMANDS

Action_info_argument = list of commands (in ASCII format)

4.2.5.2. From the OMC to the NMC

The OMC shall reply by sending an ACTION_RESULT CMIP APDU to the NMC with the following parameters:

Invoke_IDentifier

Action_type = SEND_GROUPED_COMMANDS

if the action is not successful

then

Error = processing_failure

error_id = error_type_1

any defined by error_id = ERROR_CODE

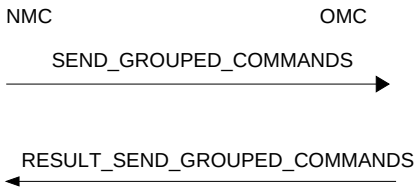


Figure 4: Send grouped commands MSC

4.2.6. CMIP APDU Coding

The ASN.1 description of CMIP APDUs is defined in ISO IS 9596 [15] and [16]. All the parameters are not entirely coded in ASN.1 format, a parameter may therefore be coded in "octet string" format and contain a set of fields of different types. In this case, the parameters are: Access_control, Action_argument, Action_result. Parameter coding is described in the remaining subclause.

- Acces_control: integer (4 octets) (in the direct_external_ref ASN.1 field)
- Action_argument: depends on Action_type_id

if Action_type_id = SUB_OBJECT_STATE or PERMANENT_OBS

then action_argument = octet string (object_type followed by object_identifier for the first and observation starting time for the second (if the value is significant, i.e., different from FF))

if Action_type_id = SEND_GROUPED_COMMANDS

then Action_argument = octet string and the octet string.

if Action_type_id = COMMON_OBJECT_STATE

then Action_argument is an octet string containing an integer: scan_number

-Action_result is an octet string, the content depends on Action_type_id and Action_argument is defined in Clause 5.

-Base_object_instance = local_distinguished_name

-Event_argument is an octet string, the content is in ASCII format

4.2.7. Behaviour on error occurrence

4.2.7.1. Common application error codes

The OMC controls Base_object_class, Base_object_instance, Access_control, Action_Type parameters.

The error codes defined in the standards are used: noSuchObjectClass, noSuchObjectInstance, accessDenied, noSuchAction, invalidArgumentValue (the latter is used when the OMC cannot decode the CMIP primitive argument field).

4.2.7.2. Application specific error codes

The Permanent_observation_unavailable error code shall be returned to the NMC when the permanent observation counters have not yet been processed by the OMC.

4.2.7.3. Scan number management

On successful delivery of the response to a regular scan message, the NMC shall increment the number of the scan message sent by the OMC. On receipt of a scan message with the same number as the previous message, the OMC shall send the NMC the usual message containing alarms not previously acknowledged by the NMC.

5. Message content

5.1. Introduction

Action results may be send in ASCII or binary code, depending on the application. A global description of response content is given below.

A single error (error_code or error_code followed by text length and text in ASCII code) may be generated in response to a CMIP request.

Any ASCII string sent or received by the NMC only contains one "\0\" at the end of the string (case for example of each inter-group alarms, certain command responses, application error messages).

The maximum length of message sent by the OMC shall be 8K.

Permanent observation: the response is coded in binary form. For each permanent observation domain it shall contain: header containing the domain name, observation starting time, effective counting time, number of counters. The header shall be followed by the list of counters (i.e., their identifier and value).

Common object state: the response is in the MER parts, first the state of binary objects in binary code, followed by inter-group alarms in ASCII The common object state shall contain the object type, its instance and state.

Sub-object state: the response is binary coded. For all the sub-objects of the object in question, it contains the sub-object type, its instance and state.

Send grouped commands: the response is coded in binary form. It shall contain the message reception acknowledgement.

5.2. Sending rules

The order in which the bits are sent shall be:

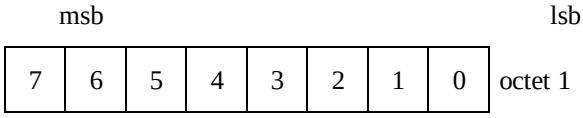


Figure 5: order for an octet

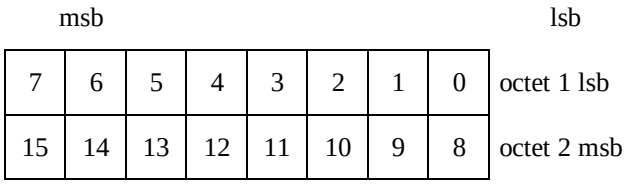


Figure 6: order for an integer in 2 octets

msb lsb

7	6	5	4	3	2	1	0	octet 1 lsb.
15	14	13	12	11	10	9	8	
23	22	21	20	19	18	17	16	
31	30	29	28	27	26	25	24	octet 4 msb

Figure 7: order for an integer in 4 octets

5.3. Message parameter descriptions

This clause defines all the parameters not previously defined in Clause 4.

5.3.1. Permanent observation messages

5.3.1.1. From the NMC to the OMC

Description of the ACTION APDU Action_info_Argument parameter when the counters for a given time band are requested on the OMC.

octet	1	H_START_OBS
	2	"

Figure 8: Permanent observation message

5.3.1.2. From the OMC to the NMC

Description of ACTION_RESULT APDU Action_Reply_info parameter

octet 1	NB_DOMAIN		
x NB_DOMAIN			
octet i	NUM_RSW = 0		
i+1	NAME_DOMAIN		
i+2	reserved for future use		
i+3	REF_PERIOD	not used	
	"		
i+5	H_START_OBS		
	"		
i+7	NB_CTR		
	"		
i+9	NB_RSW		
octet p	NUM_RSW	x NB_RSW	
p+1	EFFECTIVE COUNTING TIME		
p+2	"		
octet h	TYPE_CTR_RSW	x number of RSW counters	
h+1	RSW counters (see figure 10)		

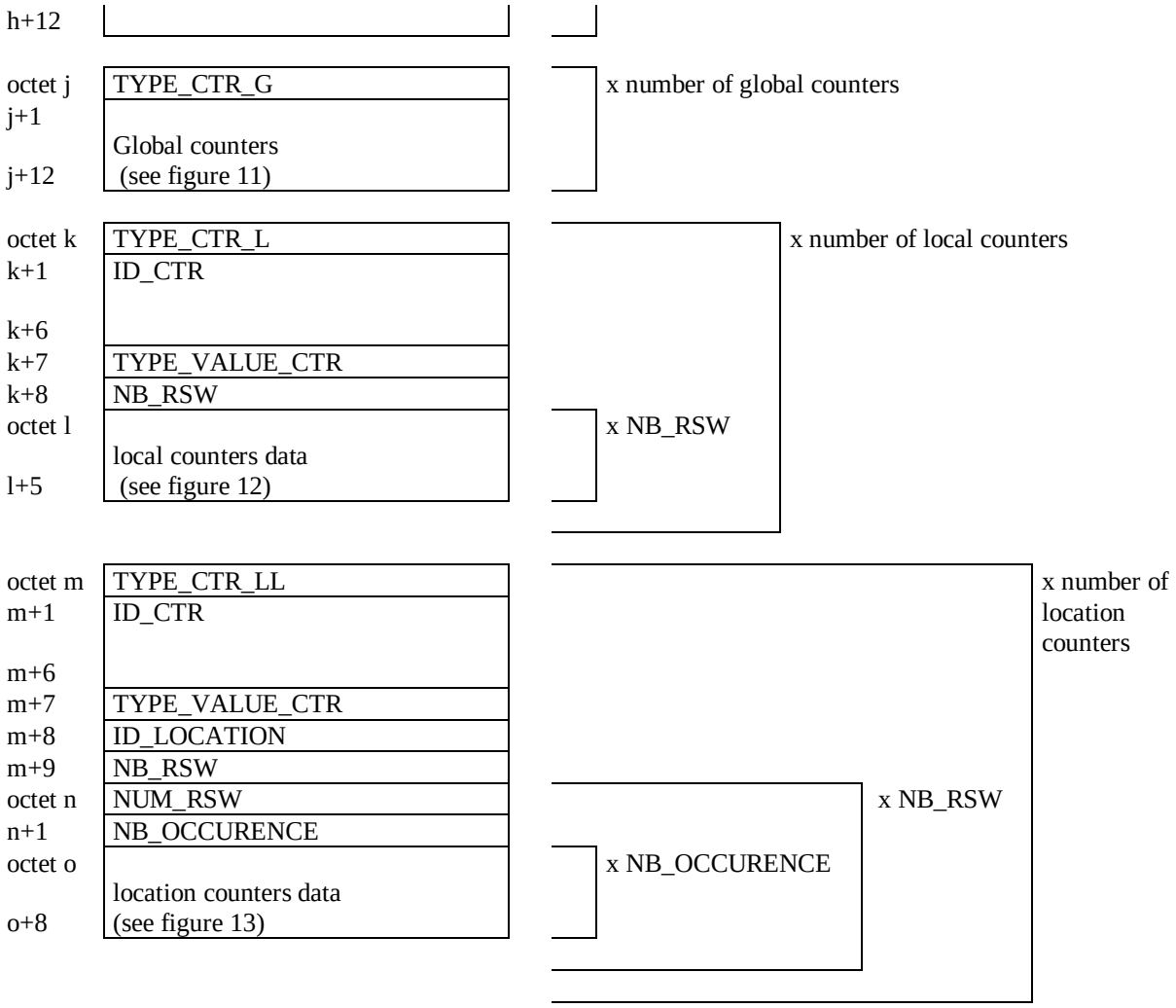


Figure 9: Action result reply

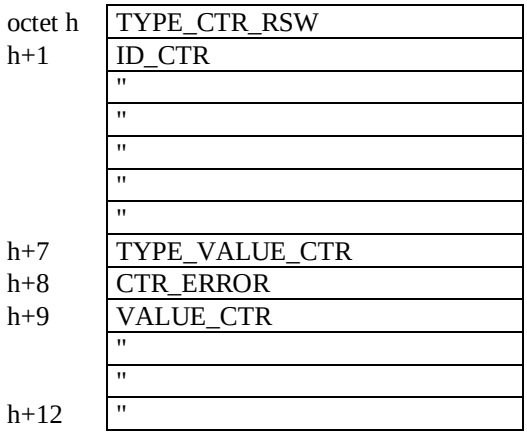
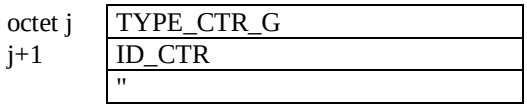


Figure 10: RSW counters



	"
	"
	"
	"
j+7	TYPE_VALUE_CTR
j+8	CTR_ERROR
j+9	VALUE_CTR
	"
	"
j+12	"

Figure 11: Global counters

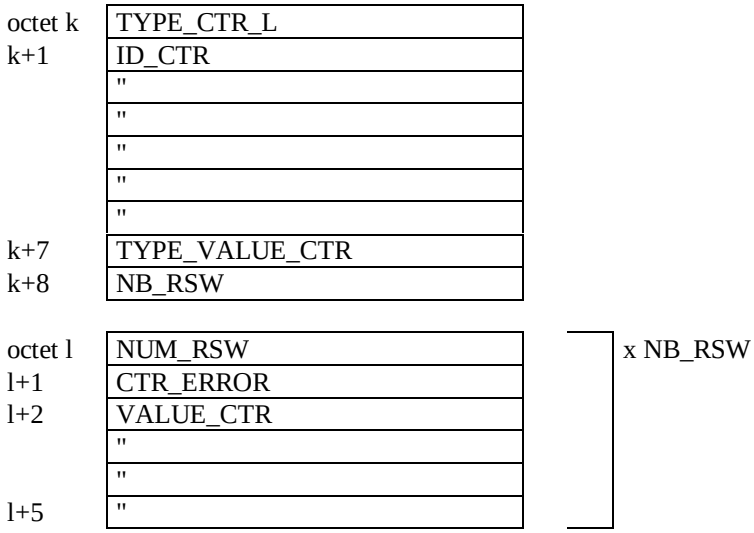


Figure 12: local counters

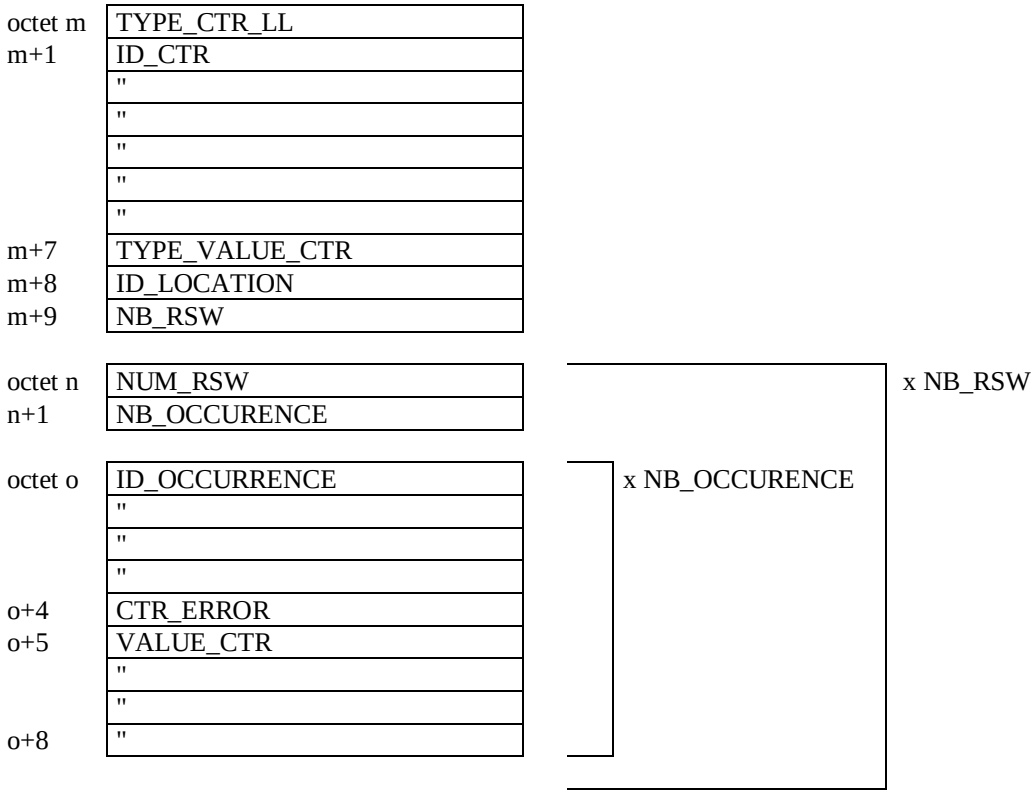


Figure 13: Location counters

5.3.2. Message definition: Synthetic state

5.3.2.1. From the NMC to the OMC (action = common object state)

octet 1	NUM_SCAN

Figure 14: Description of ACTION APDU Action_info_argument parameter.

5.3.2.2. From the OMC to the NMC (action = common object state)

Description of ACTION_RESULT APDU Action_reply_info parameter.

TYPE and NB_OBJ fields are always present even if NB_OBJ=0.

octet 1	NUM_SCAN		
f	TYPE = TYPE_RSW		
f+1	NB_OBJ		
i	NUM_RSW		
i+1	ADM_STATE	OPER_STATE	x NB_OBJ
i+2	INTERNAL_STATE		
x	TYPE = TYPE_BSC		
x+1	NB_OBJ		
y	NUM_RSW		
y+1	NUM_CELL		x NB_OBJ
y+2	NUM_BSC		
y+3	ADM_STATE	OPER_STATE	
y+4	INTERNAL_STATE		
z	TYPE = TYPE_CELL		
z+1	NB_OBJ		
a	NUM_RSW		
a+1	NUM_CELL		x NB_OBJ
a+2	ADM_STATE	OPER_STATE	
a+3	INTERNAL_STATE		
z	TYPE = TYPE_BS		
z+1	NB_OBJ		
a	NUM_RSW		
a+1	NUM_CELL		x NB_OBJ
a+2	NUM_BS		
a+3	ADM_STATE	OPER_STATE	
a+4	INTERNAL_STATE		
t	TYPE = TYPE_DL		
t+1	NB_OBJ		
u	NUM_RSW		
u+1	NUM_CELL		=FF if not significant
u+1	NUM_BSC		=FF if not significant
u+1	DL_TYPE		
u+2	NUM_DL		x NB_OBJ
u+3	ADM_STATE	OPER_STATE	
u+4	INTERNAL_STATE		

Figure 15: Common object state message

followed by the NMC-OMC alarms

octet j	NB_ALARMS	
	LG_ALARM_MSG	
	text	x NB_ALARMS
	LG_ALARM_MSG	
	text	

Figure 16: Alarm message

5.3.2.3. From the NMC to the OMC (action = sub-object state)

Definition of ACTION APDU Action_info_argument parameter.

	octet 1	TYPE_COMMON_OBJECT
if TYPE_RSW		
	octet 2	NUM_RSW
if TYPE_BS		
	octet 2	NUM_RSW
	3	NUM_CELL
	4	NUM_BS
if TYPE_DL		
	octet 2	NUM_RSW
	3	NUM_CELL (FF if not significant)
	4	NUM_BSC (FF if not significant)
	5	DL_TYPE
	6	NUM_DL
if type = BSC		
	octet 2	NUM_RSW
	3	NUM_CELL
	4	NUM_BSC

Figure 17: Action message

5.3.2.4. From the OMC to the NMC (action = sub-object state)

TYPE and NB_OBJ fields are always present even if NB_OBJ=0

For the RSW object class:

j	TYPE = TYPE_CHAIN		
j+1	NB_OBJ		
k	NUM_RSW		
k+1	ID_CHA		x NB_OBJ
k+2	ADM_STATE	OPER_STATE	
k+3	INTERNAL_STATE		

l	TYPE = TYPE_DC		x NB_OBJ
l+1	NB_OBJ		
m	NUM_RSW		
m+1	ID_CHA		
m+2	NUM_DC		
m+3	ADM_STATE	OPER_STATE	
m+4	INTERNAL_STATE		

n	TYPE = TYPE_IRT		x NB_OBJ
n+1	NB_OBJ		
o	NUM_RSW		
o+1	ID_CHA		
o+2	NUM_IRT		
o+3	ADM_STATE	OPER_STATE	
o+4	INTERNAL_STATE		

p	TYPE = TYPE_UTE		x NB_OBJ
p+1	NB_OBJ		
q	NUM_RSW		
q+1	NUM_CELL = FF		
q+2	NUM_BSC = FF		
q+3	sub type TYPE_UTE		
q+4	NUM_UTE		
q+5	ADM_STATE	OPER_STATE	
q+6	INTERNAL_STATE		

r	TYPE = TYPE_BRA		x NB_OBJ
r+1	NB_OBJ		
s	NUM_RSW		
s+1	NUM_CELL = FF		
s+2	NUM_BSC = FF		
s+3	ID_CHA		
s+4	ADM_STATE	OPER_STATE	
s+5	INTERNAL_STATE		

f	TYPE = TYPE_RSW	
f+1	NUM_RSW	
f+2	ADM_STATE	OPER_STATE
f+3	INTERNAL_STATE	

for the BSC object class:

p	TYPE = TYPE_UTE		x NB_OBJ
p+1	NB_OBJ		
q	NUM_RSW		
q+1	NUM_CELL		
q+2	NUM_BSC		
q+3	sub type of TYPE_UTE		
q+4	NUM_UTE		
q+5	ADM_STATE	OPER_STATE	
q+6	INTERNAL_STATE		

r	TYPE = TYPE_BRA
r+1	NB_OBJ = 1

s	NUM_CR	
s+1	NUM_CELL	
s+2	NUM_BSC	
s+3	NUM_BRA = 0	
s+4	ADM_STATE | OPER_STATE	
s+5	INTERNAL_STATE	

x NB_OBJ

u	TYPE = TYPE_BS
u+1	NUM_RSW
u+2	NUM_CELL
u+3	NUM_BS
u+4	ADM_STATE | OPER_STATE
u+5	INTERNAL_STATE

t	TYPE = TYPE_BSC
t+1	NUM_RSW
t+2	NUM_CELL
t+3	NUM_BSC
t+4	ADM_STATE | OPER_STATE
t+5	INTERNAL_STATE

v	TYPE = TYPE_CELL
v+1	NUM_RSW
v+2	NUM_CELL
v+3	ADM_STATE | OPER_STATE
v+4	INTERNAL_STATE

for the BS object class:

x	TYPE = TYPE_TRX	
x+1	NB_OBJ	
y	NUM_RSW	
y+1	NUM_CELL	
y+2	NUM_BS	
y+3	NUM_TRX	
y+4	ADM_STATE | OPER_STATE	
y+5	INTERNAL_STATE	

x NB_OBJ

u	TYPE = TYPE_BS
u+1	NUM_RSW
u+2	NUM_CELL
u+3	NUM_BS
u+4	ADM_STATE | OPER_STATE
u+5	INTERNAL_STATE

t	TYPE = TYPE_BSC
t+1	NUM_RSW
t+2	NUM_CELL
t+3	NUM_BSC
t+4	ADM_STATE | OPER_STATE
t+5	INTERNAL_STATE

v	TYPE = TYPE_CELL

v+1	NUM_RSW	
v+2	NUM_CELL	
v+3	ADM_STATE	OPER_STATE
v+4	INTERNAL_STATE	

for the DL object class:

z	TYPE = TYPE_VTL		
z+1	NB_OBJ		
a	NUM_RSW		x NB_OBJ
a+1	VTL_TYPE		
a+2	NUM_VTL		
a+3	ADM_STATE	OPER_STATE	
a+4	INTERNAL_STATE		
b	TYPE = TYPE_DTL		
b+1	NB_OBJ		
c	NUM_RSW		x NB_OBJ
c+1	DTL_TYPE		
c+2	NUM_DTL		
c+3	ADM_STATE	OPER_STATE	
c+4	INTERNAL_STATE		
f	TYPE = TYPE_DL		
f+1	NUM_RSW		
f+2	NUM_CELL		
f+3	NUM_BSC		
f+4	DL_TYPE		
f+5	NUM_DL		
f+6	ADM_STATE	OPER_STATE	
f+7	INTERNAL_STATE		

Figure 17: Action message response

6. Field definitions

The field definitions are given in the messages in Clause 5.

Any non significant octet shall be coded FFH.

The integers shall be unsigned.

Extended ASCII code shall be used.

6.1. CTR_ERROR

definition: counter processing fault code

value: integer = 1 if counter is valid

else

= 2 if 1 raw counter is missing in the OMC from the processed counter sent to the NMC

= 3 if division by 0 in the OMC

= 4 if counter capacity is overrun in the OMC

6.2. DM_STATE

definition: administrative state of object involved

value: integer:

- 01 = not created
- 02 = disabled
- 03 = locked

- 04 = enabled

6.3. DL_TYPE

definition: the type of DL depends of the types of node of its point of reference.

value: integer:

0 = RSW
1 = BSC
2 = RLCC

6.4. ERROR_CODE

definition: application error codes

value: integer

-Permanent_observation_not_available	= 01
-Temporary_observation_not_available	= 02
-Temporary_observation_stopped	= 03
-Observation_requested_by_OMC	= 04
-More_than_3_temporary_observations	= 05
-Unknown_observation_domain	= 06
-Unknown_RSW	= 07
-No_moMER	= 08
-OMC_in_remote_operation_mode	= 09
-OMC_not_in_remote_operation_mode	= 10
-Audit_impossible	= 11
-File_overflow	= 12
-Synthetic_state_not_valid	= 13
-Detailed_synthetic_state_not_valid	= 14
-Common_object_type_not_valid	= 15
-Exclusivity_fonction	= 16
-Audit_not_ready	= 17

-TO_identifier_used = 21

-Unknown_TO_Identifier = 22

6.5. H_START_OBS

definition: observation starting time.

value: in 2 octets

1st octet = hour (from 0 to 23) integer

2nd octet = minutes (from 0 to 59) integer

6.6. ID_CHA

definition: chain identifier

value: integer
1 = chain A
0 = chain B
2 = chain A and B

6.7. ID_CTR

definition: counter identifier

value: in ASCII format (upper case).

Counter identifiers are defined in Annex E. Binary value "0" shall mark the end of the identifier.

6.8. ID_LOCATION

definition: location identifier

value: integer

BS	= 49
CHANNELS	= 44
Data trunk group	= 24
Voice trunk group	= 21
Data link	= 03
RSW	= 40
radio	= 46

6.9. ID_OCCURRENCE

definition: identifies the location occurrence (serial number)

value: integer

6.10. INTERNAL_STATE

definition: synthetic object state

value: This state is defined in appendix.

- 00 = OK

- 01 = NOK

6.11. LG_ALARM_MSG

definition: length of alarm message (ASCII text)

value: integer, expresses a number of octets

6.12. TEXT_LENGTH

definition: length in octets of an ASCII text following an error code 0

value: integer in 2 octets, expresses a number of octets

6.13. NAME_DOMAIN

definition: type of observation. In case of permanent observations:

- voice call
- data call
- registration
- logical radio link channels
- radio sub-system
- quality of Digital Links
- key distribution
- fall back mode

value: integer

- voice call = 51
- data call = 52
- registration = 53
- logical radio link channels = 67
- radio sub-system = 68
- quality of Digital Links = 59
- key distribution = 73
- fall back mode = 74

6.14. NB_ALARMS

definition: number of alarm messages

value: integer

6.15. NB_CTR

definition: total number of counters

NB_CTR = number of RSWs counters

number of global counters

\+ number of local counters

\+ number of location counters

value: integer

6.16. NB_RSW

definition: number of RSW concerned

value: integer (from 0 to 9)

6.17. NB_DOMAIN

definition: number of domains

value: integer

6.18. NB_OBJ

definition: number of objects

value: integer

6.19. NB_OCCURRENCE

definition: number of location occurrences (observation)

value: integer

6.20. NUM_BS

definition: number of Base Station

value: integer = [0, 2]

6.21. NUM_DL

definition: number of digital link accesses

value: integer = [0, 4]

6.22. NUM_CELL

definition: cell number

value: integer = [0, 15]

6.23. NUM_DTL

definition: number of data trunk access

value: integer = [0, 14]

6.24. NUM_RSW

definition: number of RSW concerned

value: integer = [0, 9]

6.25. NUM_VDL

definition: number of voice trunk access

value: integer = [0, 14]

6.26. NUM_SCAN

definition: number of scanning round of the OMC

value: integer = [0 to 255]

6.27. NUM_SYS

definition: operational group system number

value: integer = [0, 119]

6.28. NUM_TRX

definition: number of Transmitter/Receiver

value: integer = [0, 24]

6.29. NUM_UTE

definition: number of the UTE board concerned

value: integer = [0, 4]

6.30. OPER_STATE

definition: operational state of object involved

value: integer

- 00 = unreachable
- 01 = working
- 10 = hierarchically unreachable
- 03 = system isolated

- 02 = defective state

6.31. TO_IDENTIFIER

definition: is used to identify a set of temporary observation results

value: integer

6.32. TYPE_CTR_G

definition: global counter

value: integer = 1

6.33. TYPE_CTR_I

definition: local counter

value: integer = 2

6.34. TYPE_CTR_II

definition: local localisation counter

value: integer = 3

6.35. TYPE_CTR_RSW

definition: type of counter read in RSW

value = 0

6.36. TYPE_COMMON_OBJECT

definition: type of common NMC/OMC object (sub_objet)

value: integer

40 = TYPE_RSW radio switch

00 = TYPE_CHAIN object which manages duplex switch-over

01 = TYPE_DC synchronous X25 interface controller

02 = TYPE_IRT local equipment controller used in specific RSW architecture

03 = TYPE_UTE board used in specific RSW architecture

41 = TYPE_BSC base station controller

43 = TYPE_BS base station

27 = TYPE_DL digital link

21 = TYPE_VTL voice trunk group

24 = TYPE_DTL data trunk group

44 = TYPE_TRX transmitter receiver

67 = TYPE_BRA switching matrix

6.37. TYPE_RATE

definition: percentage value

value: integer

0 if percentage 1 else

6.38. TYPE_VALUE_CTR

definition: indicates the kind of counter

value: integer

1 = rate counter

2 = average counter

0 = other

6.39. VALUE_CTR

definition: counter value

value: integer
real counter value multiplied by 100

Annex A (normative): Management information tree

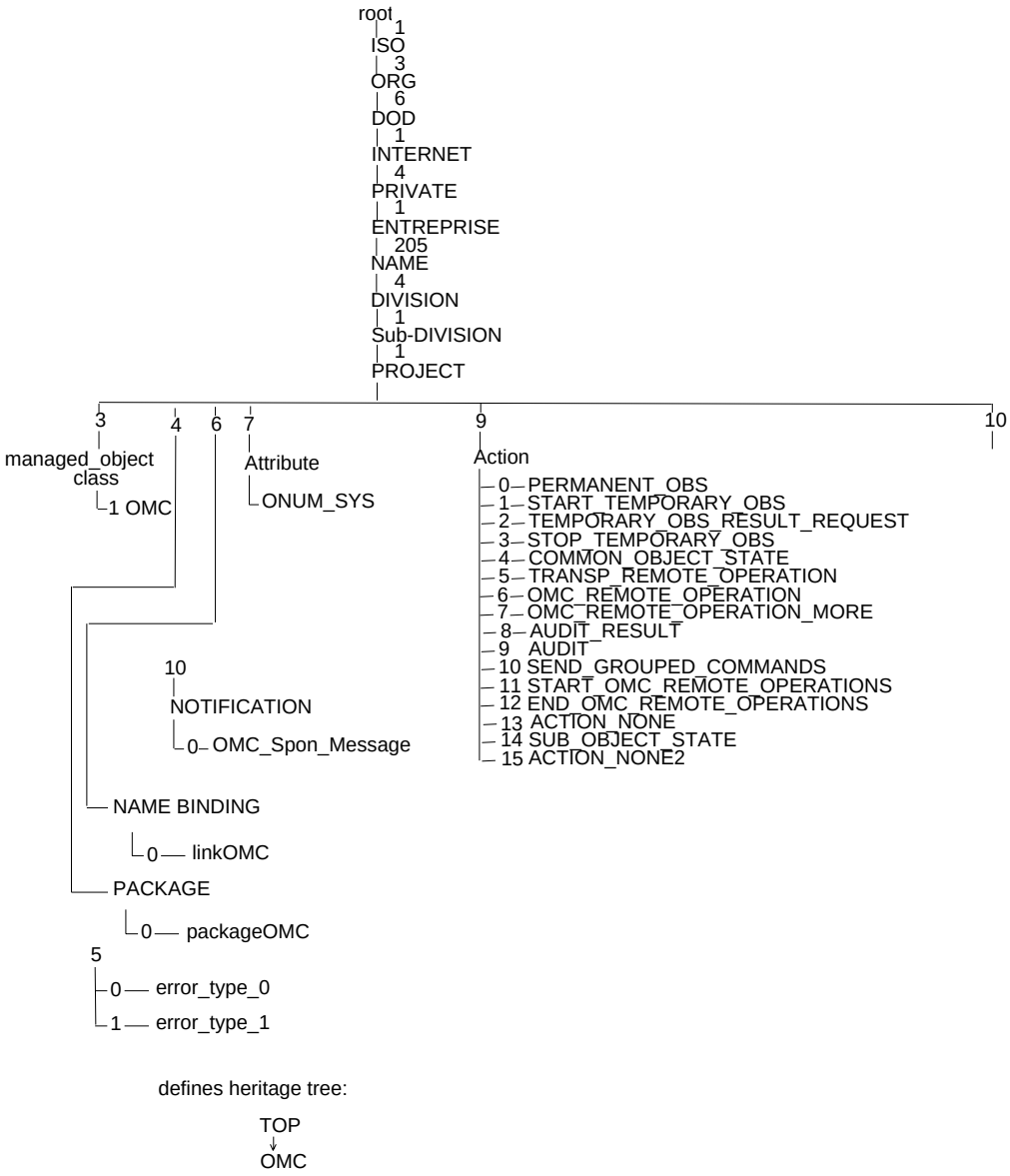


Figure A.1: Record MER

Annex B (informative): Internal state

Definition of NMC object state calculation from the synthetic state.

The TETRAPOL objects shown in NMC diagrams may be:

- fully operational (object and sub-objects are operational);
- operational defective (the object is operational but at least one of its sub-objects is not operational);
- not operational;
- not supported.

Object state calculation

An object is:
-fully operational:

IF administrative state = Enabled

AND operational state = Working

AND internal state = OK

-operational defective:

IF administrative state = Enabled

AND operational state = Working

AND internal state = NOK

-not operational in all other cases.

Digital link state calculation

The digital link object is an NMC object. For an intra-BN DL, It corresponds to 2 OMC digital link access objects. For an inter-BN DL, it corresponds to one OMC digital link access object and one remote OMC digital link access object.

In both cases a DL is:

- operational if the 2 DL access are operational;
- operational defective if one of the 2 DL access is operational defective, and if neither of the 2 access is not operational;
- not operational if at least one of the 2 access is not operational.

Annex C (normative):Specific fields in counter messages

Detailed descriptions of fields ID_OCCURENCE according to location identifiers (field ID_LOCATION): an integer in 4 octets:

- for RSW:

RSW number	00	00	00
octet 1	octet 2	octet 3	octet 4

- for BS:

RSW number	CELL number	00	00
octet 1	octet 2	octet 3	octet 4

- for a board:

RSW number	CELL | BS	XX	board number
octet 1	octet 2	octet 3	octet 4

- for CHANNELS:

RSW number	CELL number	00	channel number
octet 1	octet 2	octet 3	octet 4

Annex D (informative): Description of the interface behaviour

Functional description (the state shown are operational states) of the OMC interface behaviour.

This description uses SDL on a pseudo NMC process.

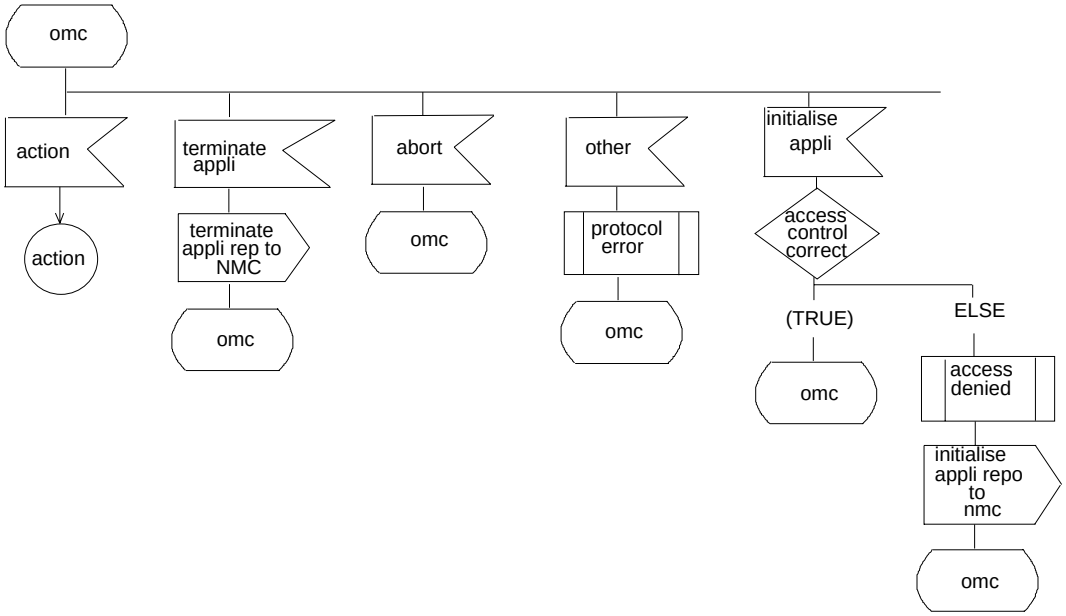


Figure D.1: OMC - NMC interface SDL

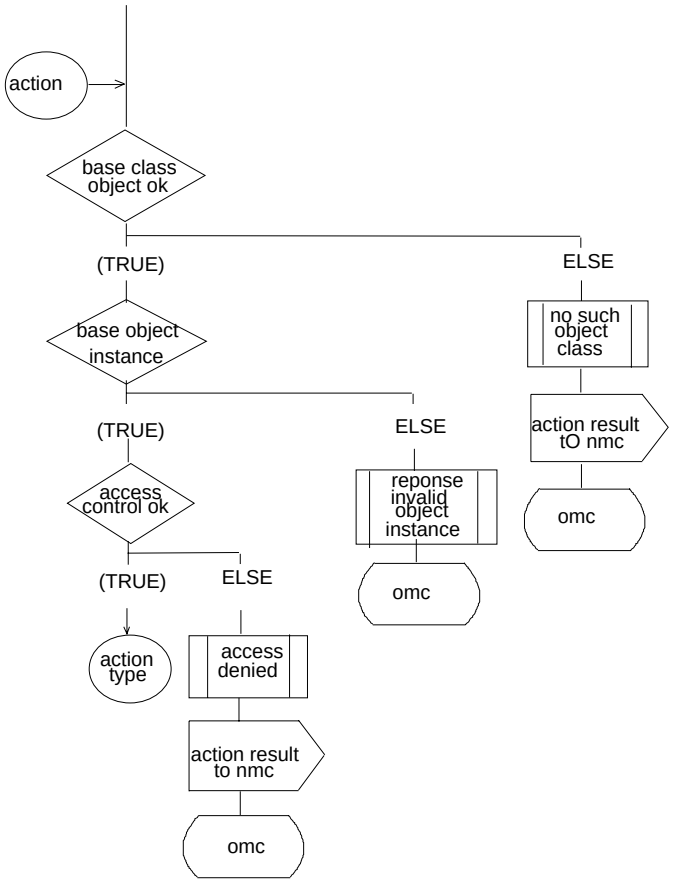


Figure D.1: OMC - NMC interface SDL (continued)

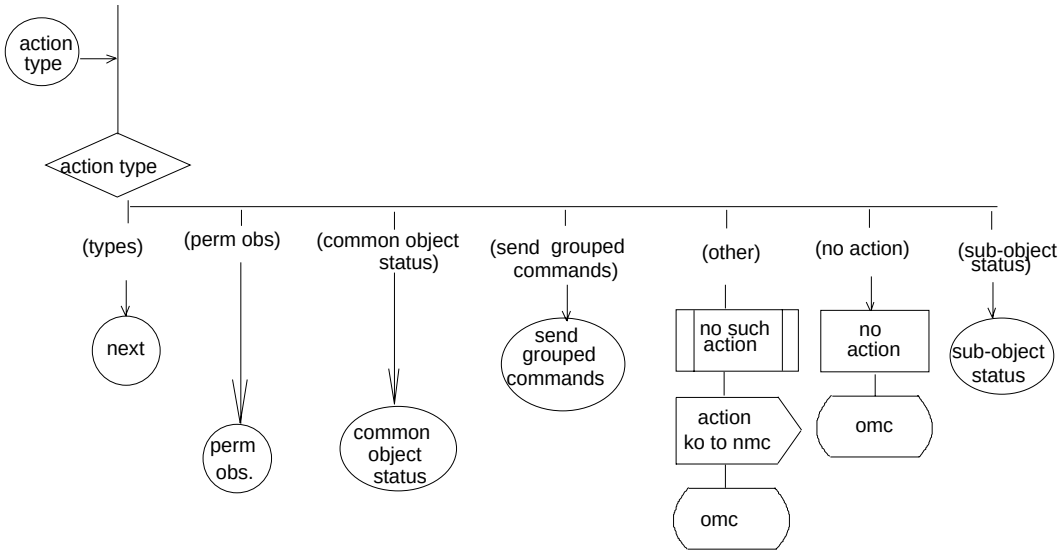


Figure D.1: OMC - NMC interface SDL (continued)

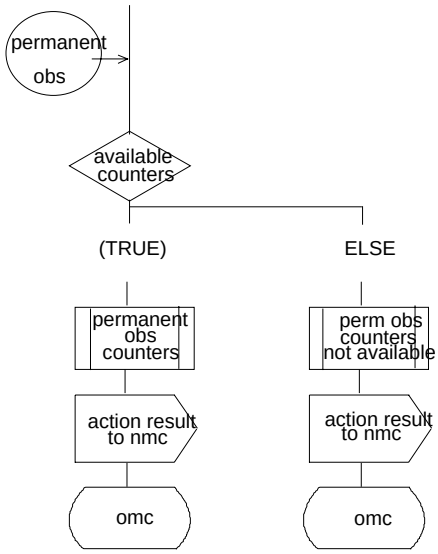


Figure D.1: OMC - NMC interface SDL (continued)

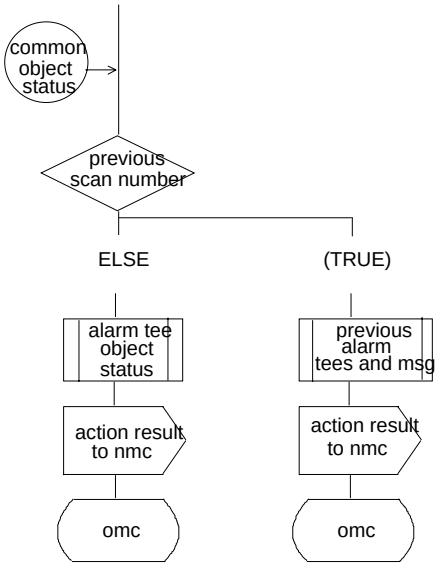


Figure D.1: OMC - NMC interface SDL (continued)

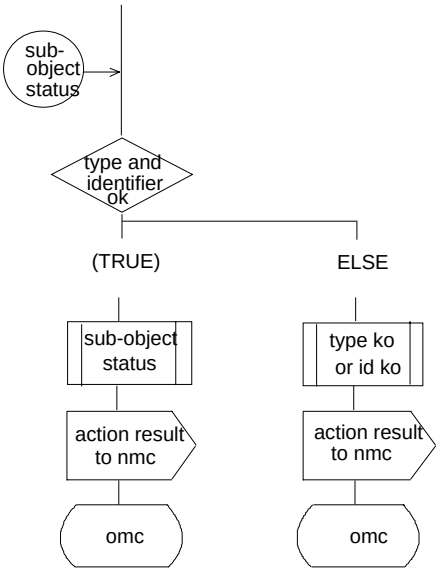


Figure D.1: OMC - NMC interface SDL (continued)

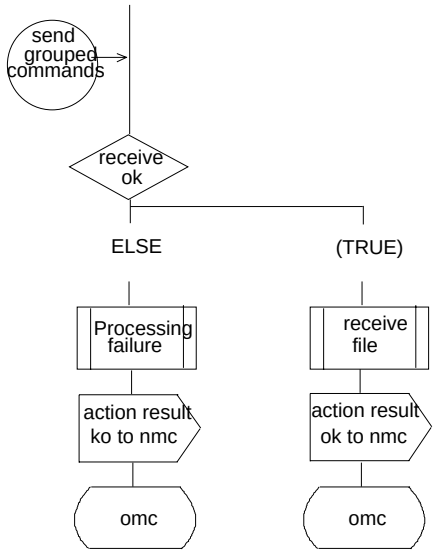


Figure D.1: OMC - NMC interface SDL (continued)

Annex E (informative): Observation function

E.1 Scope

This Annex defines the external observation function enabled by the TETRAPOL system.

It specifies results of system measurement counters and their corresponding identifiers.

E.2 Definitions

For the purposes of this Annex, the following definitions apply:

Local call: call initiated in a given RSW

Outgoing call: local call to establish a voice communication, where the intended recipient is another RSW

Internal call: local call to establish a voice communication, where the intended recipient is the same RSW

Incoming call: call originating in another RSW, to establish a multi-RSW communication or open channel with the given RSW.

Transit call: call originating in another RSW to establish a communication or open channel with another RSW.

Successful call: call or open channel set up request resulting in the effective interconnection of calling/called parties (following a command to terminals to switch to the VCH). For a multisite open channel, the call is successful when all the resources have been engaged. For a transit call, the call is successful if the ongoing voice channel connection is effectively established.

Note: The notion of successful call is not defined for PABX calls.

External call: incoming call originating in another operational group or outgoing call destined for another group.

Service call: call to register or cancel a forwarding request.

Individual voice call: individual voice call, via PABX or not, or third party intervention.

Open channel: multisite or emergency open channel.

Unsuccessful call: failure to establish a successful communication in response to a call request.

Voice call release: release of previously established communication resources (successful call).

Visiting terminal: terminal registered in an operational group which is not its home BN.

Registered terminal: any terminal registered in a given BN, whether or not that BN is its home BN.

IPM message interpersonal message.

The messages are:

- user to user;
- user to predefined user group.

EXAM message: inter application personal message.

The messages are:

- application to user or user group;
- user to application.

Only down link messaging and file query EXAM messages are within the scope of the present document.

E.3 Review of TETRAPOL observations

Measurements are enabled by raw data counters which the applications shall update.

Permanent measurements consist of counters which are used to assess the network load generated by a Base Network (globally, per RSW or per base station).

These counters are automatically collected by the OMC at regular intervals without operator involvement.

There are three types of raw data counters (see PAS 0001-17 [17]):

- pegging counters;
- load counters;
- value counters.

The OMC uses the raw data counters to produce the processed results.

The result counters provide:

- total sums;
- average values;
- rates;
- speeds;
- etc.

There are 3 families of counters:

- traffic counters which measure network activity;
- resource counters which measure the use of system resources;
- radio counters specific to the radio sub-system.

E.4 Permanent measurements

E.4.1 Overview

Permanent measurements are processed in half-hour periods, starting on the hour. Their accuracy is not guaranteed in case of Base Network time resetting, RSW restart or in main switch disconnected operating mode.

Permanent measurements results are stored in OMC and are available also on the dispatch position.

The results of the last N periods (up to 96) are stored in a circular disk file.

E.4.2 Voice calls

E.4.2.1 Local RSW Counters

E.4.2.1.1 Individual voice calls

E.4.2.1.1.1. General counters

CL01 number of individual voice call set-up requests submitted to RSW (internal, outgoing and incoming calls).

CL03 successful call rate, not including non-encrypted PABX calls.

NOTE: CL01 and CL03 are values for the ID_CTR counter identifier defined in subclause 6.7. Other values are defined in the following subclauses.

E.4.2.1.1.2. External calls

CE01 number of external incoming calls.

CE03 number of external outgoing calls.

NOTE: CE01 and CE03 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.1.2 Multisite open channels

TL01 number of multisite open channel set up requests submitted to RSW. This concerns multisite open channels where the RSW is the open channel master.

TL02 number of emergency open channel set up.

NOTE: TL01 and TL02 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.1.3 Multiparty calls

PL01 number of multiparty call set up requests submitted to RSW (locally initiated and incoming calls).

NOTE: PL01 is a value for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.1.4 Service calls

Number of service calls submitted to RSW, distributed by:

VL01 registered forwarding requests;

VL02 cancelled forwarding requests.

NOTE: VL01 and VL02 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.1.5 Shared voice call resources

The reasons for unsuccessful voice calls are divided into three main categories:

- subscriber responsible (e.g. incorrect address dialling);
- network responsible: the call cannot be set up due to an external RSW failure, radio faults are also included in this category);
- lack of RSW resources.

RL01 number of calls submitted to RSW: the calls may or may not be initiated locally and cover all types of voice calls (including transit calls).

RL02 failure rate of calls submitted to RSW due to lack of resources.

RL03 failure rate of calls submitted to RSW due to subscribers (including call TRANSFER failures due to subscriber).

RL04 failure rate of calls submitted to RSW due to the network.

NOTE: RL01, RL02, RL03 and RL04 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.2 Global BN counters

E.4.2.2.1 Individual calls

CG01 total number of individual voice call set up requests submitted to the BN.

Σ RSW (internal calls + outgoing calls + external incoming calls).

CG03 rate of successful calls, not including unencrypted PABX calls set up in the BN.

NOTE: CG01 and CG03 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.2.1.1 Intrusion

JG01 number of set up requests with operator involvement submitted to the BN.

NOTE: JG01 is a value for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.2.1.2 Multisite open channels

TG01 total number of multisite open channel set up requests submitted to RSW in BN (user and operator).

Σ RSW multisite open channel set up request with RSW as open channel master.

TG02 number of emergency open channel set up.

NOTE: TG01 and TG02 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.2.2 Multiparty calls

PG01 total number of multiparty call set up requests.

Σ RSW locally initiated multiparty call set up.

NOTE: PG01 is a value for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.2.3 Service calls

Number of service calls submitted to the BN, distributed into:

VG01 registered forwarding requests.

VG02 cancelled forwarding requests.

NOTE: VG01 and VG02 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.2.2.4 Shared voice call resources

RG01 total number of calls submitted to BN RSW, all call types included.

RG02 failure rate of calls submitted to BN RSW, due to lack of resources.

RG03 failure rate of calls submitted to BN RSW, due to subscriber.

RG04 failure rate of calls submitted to BN RSW, due to network.

RG05 efficiency rate voice calls.

RG06 release rate of calls submitted to BN RSW due to preempted resources.

NOTE: RG01, RG02, RG03, RG04, RG05 and RG06 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.3 Data calls

E.4.3.1 Local RSW Counters

The term "message" as used in this subclause designates IPM and EXAM messages. The term "notification" designates SCN, SFN, DFN, DCN notifications.

ML01 number of locally submitted messages (RT → RSW).

ML03 rate of submit failures by RSW.

$$\frac{\text{number of submit failure notifications generated by RSW}}{\text{number of locally submitted messages}} \times 100$$

ML04 number of locally delivered messages and notifications (RSW → RT).

ML08 number of message and notification delivery failures.

ML11 number of locally submitted messages (EDT → RSW).

ML13 rate of submit failures by RSW (EDT → RSW).

$$\frac{\text{number of submit failure notifications generated by RSW}}{\text{number of locally submitted messages}} \times 100$$

ML14 number of locally delivered messages and notifications (RSW → EDT).

ML18 number of message and notification delivery failures (RSW → EDT).

NOTE: ML01, ML03, ML04, ML08, ML11, ML13, ML14 and ML18 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.3.2 Global BN counters

The term "message" as used in this subclause designates IPM and EXAM messages. The term "notification" designates SCN, SFN, DFN, DCN notifications.

MG01 number of messages submitted (RT → RSW) in BN RSW.

Σ RSW submissions (ML01).

MG02 rate of messages submitted by home terminals (RT → RSW).

MG03 rate of submit failures (RT → RSW).

$$\frac{\text{number of submit failure notifications generated by RSW}}{\text{number of submitted messages}} \times 100$$

MG04 number of messages and notifications delivered in BN (RSW → RT).

MG05 rate of messages delivered to alternate terminals (EDT and RT).

MG06 rate of messages and notifications delivered to backup terminal (EDT and RT).

MG07 rate of messages and notifications delivered to home terminals (RT).

MG11 number of messages locally submitted (EDT → RSW).

MG13 rate of submit failures (EDT → RSW).

$$\frac{\text{number of submit failure notifications generated by RSW}}{\text{number of submitted messages}} \times 100$$

MG14 number of messages and notifications delivered locally (RSW → EDT).

MG18 number of submit failure messages and notifications locally delivered (RSW → EDT).

MG21 number of primary recipients of messages and notifications (MR, DCN, DFN).

MG22 rate of primary addresses not reached through primary terminals.

MG23 rate of primary addresses reached through back-up.

NOTE: MG01, MG02, MG03, MG04, MG05, MG06, MG07, MG11, MG13, MG14, MG18, MG21, MG22 and MG23 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.4 Registration

E.4.4.1 Local RSW counters

IL01 number of registration message submitted to RSW.

IL02 rate of registration failures submitted to RSW (failure determined at RSW or BN level).

NOTE: IL01 and IL02 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.4.2 Global BN counters

IG01 number of registration message submitted to BN.

IG02 registration failure rate.

IG03 average number of locally registered terminals.

IG04 average rate of visitor terminals in BN.

IG05 average number of inactive terminals.

IG06 average number of terminal registered in BN.

NOTE: IG01, IG02, IG03, IG04, IG05, and IG06 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.5 Key distribution and monitoring

E.4.5.1 Local RSW counters

DL01 number of RT to which 1 BN key could not be distributed.

NOTE: DL01 is a value for the ID_CTR counter identifier defined in subclause 6.7.

E.4.6 Logical radio link channels

For each data channel (CCH, DCH1, DCH2 and DCH3)

ND03 rate of retransmitted frames on no reply from terminal (not including SNRM frame to prevent counting retransmissions to switched off terminals).

NOTE: ND03 is a value for the ID_CTR counter identifier defined in subclause 6.7.

E.4.7 Radio sub-system

For physical equipment only:

RV01 average received power level corresponding to channel noise (unsuccessfully decoded frames)

NOTE: RV01 is a value for the ID_CTR counter identifier defined in subclause 6.7.

E.4.8 Digital link quality

For each digital link endpoint:

AT01 sum of erroneous seconds: if CRC4 is implemented, total of S1 or S2 or S5 seconds, else the counter value is not significant.

AT02 sum of seriously erroneous seconds: if CRC4 is implemented, total of S1 or S2 or S6 seconds, else total of S1 or S2 or S3 seconds.

NOTE: AT01 and AT02 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.4.9 Fall back mode

DE01 rate of time in inter-BN disconnected mode.

DE02 rate of time in MSW disconnected mode

NOTE: DE01 and DE02 are values for the ID_CTR counter identifier defined in subclause 6.7.

E.5 Cases of observation subsystem malfunctions

E.5.1 Measurements

E.5.1.1 Overview

The various cases of measurement malfunctions are:

- overrun of raw measurement counter capacity:
- unreachable RSW: the OMC-RSW link is down, no measurements or observation commands can be collected;
- RSW restart: at RSW restart time, the raw counters in the RSW are reset;
- correcting permanent measurement offset;
- base station in disconnected mode.

E.5.1.2 Capacity Overrun

Measurement mechanisms consider the capacity of a raw counter to be overrun when it reaches it maximum value. It remains at the same value until the next reading. When the capacity of a raw counter is seen to be overrun, the corresponding result counters are not processed. When a result counter is empty, a character string identifying the error is output instead of the counter value.

Threshold crossing:

The OMC sends an alarm message to the local operator when the thresholds of the following counters are crossed:

- rate of unsuccessful registrations (IG02 and IL02);
- rate of unsuccessful voice calls due to network conditions or a key problem (RG04, RG05, RL04);
- average number of home located terminal registrations (IG03);
- rate of message submit failures at RSW (MG03).

E.5.1.3 Unreachable RSW

The OMC detects an unreachable RSW, when the RSW returns a value of zero for the number of counters for a given RSW.

If raw counters are seen to be missing when the result counters are collected by OMC for the last processing period, then the processed results are false for the period in question, and for the next period. A message is output at the same time as the results warning that the results are false. If, however, counters are missing during a result processing period, then the previously unread values are collected at the end of the last processing period unless the counter capacity is overrun (see previous case).

Example 1:

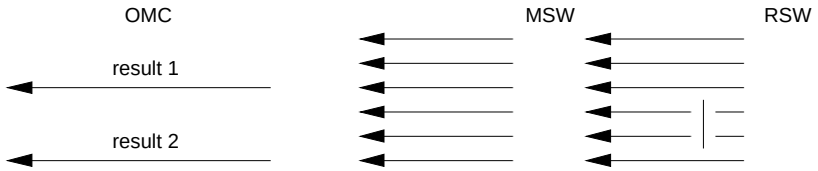


Figure E.3: Scenario 1

Previously unread values of counters are collected and returned with result 2, unless counters have overrun.

Example 2:

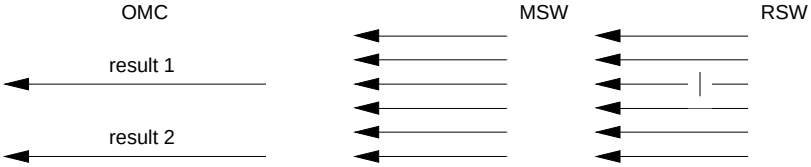


Figure E.4: Scenario 2

Results 1 and 2 are false. The first value is missing one collection period for the RSW, the second has one too many, except in case of restart.

NOTE: The counters are returned to zero in each RSW after being read.

E.5.1.4 Unreachable RSW

In case of OMC-RSW link outage, the RSW logs the measurement message due to be forwarded to OMC. When the link is restored, the message are sent on to OMC. At the end of each result processing period, 3 cases are encountered:

- all the expected measurement messages are received (normal case);
- all the expected measurement messages are not received: messages logged by RSW which is now unreachable;
- a greater number of messages than expected is received: when the link is restored, the logged messages are forwarded to OMC. Some of the messages may belong to the previous processing period.

Whatever the case, the result counters are processed, the operator is however warned in the last two cases.

E.5.1.5 RSW restart

When a RSW restarts, raw counter values are lost. The processed result counters based on raw counter contents are therefore false. An alarm message sent to the operator when the RSW starts up again. Since the link is released when the RSW starts up, the case is handled in the same way as above.

E.5.1.6 Correction of permanent measurement offset

Permanent measurement counter results are processed every half hour, starting on the hour.

In case of time changes or RSW raw counter collection time offset the OMC stops permanent measurements and starts off again at the beginning of the next full half hour period.

E.5.1.7 Base Station operations in disconnected mode (RSW or BSC)

If the Base Station is operating in disconnected mode because of the master processing unit (UTM) failure, then the RSW is considered as unreachable.

If the Base Station is operating in disconnected mode the base station counters are no longer reachable. This case is detected when a value of zero for the number of base station counters is fed back. The case of base station result counters is handled in the same way as unreachable RSW result counters.

History

Document history		
Date	**Status**	**Comment**
July 1995	First Version	Version 0.0.1
29 March 1996	Formatting	Version 0.0.2
15 April 1996	Update following Review	Version 0.1.0
30 April 1996	Tetrapol Forum approval	Version 1.0.0
07 June 1996	Formatting	Version 1.0.1
31 July 1996	Update	Version 1.0.2
16 October 1996	Editorial	Version 1.0.3
29 October 1996	Update (DM 1287 and 1273)	Version 1.0.4
16 December 1996	Editorial following update	Version 1.0.5