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Fault Management Requirements for the ATN Internet Communications Service

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SUMMARY

This document inventories the error cases that may occur at ICS level in ATN ES and IS and discusses the importance of these events and their possible consequences on the operation/performance of the network.

For each of the identified error cases, the objective of this paper is to analyse whether the event deserves to be notified to system management and if corrective operations require specific actions to be made accessible to system management.

The actual goal of this paper, is the identification of the Managed Object attributes, notification and actions that would be required to implement in ATN system for fault management.

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1. Introduction

This document inventories the error cases that may occur at ICS level in ATN ES and IS and discusses the importance of these events and their possible consequences on the operation/performance of the network.

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2. Inventory of Error Cases

2.1 General

This section attempts to make a list, as exhaustive as possible, of the potential error cases that could be encountered at ICS level in ATN ES and IS, without assessing their importance and their possible consequences.

2.2 Subnetwork level error cases

1. fixed/mobile X.25 SN Call Request clearing
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3. fixed/mobile X.25 SN Unexpected VC clearing
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3. High Level Requirements for fault management

Fault Management is the detection of problem, fault isolation and correction to normal operation. Althought fault management can to a certain extent be achieved by polling the managed objects, and searching for error conditions, fault management deals most commonly with notifications as they occur on the network. Data reporting mechanisms to report alarms or alerts is the best way to accomplish health checks of specific managed object's performance without having to double the amout of polling being accomplished. ISO has defined a specific notification (communicationAlarm) for reporting alarm conditions.

The ATN SARPs shall only cover aspects that are necessary to the correct behaviour of ATM services using the ATN offered between organisations across boundaries and between the air and the ground. As far as fault management is concerned, the ATN SARPs shall cover the management of faults which affect the ATN communication between organisations and between the air and the ground.

The following high level requirements for fault management are assumed:

HLIREQ1 Errors resulting in the loss of communication with an aircraft shall be notified to system management

HLIREQ2 Errors resulting in the loss of communication with an adjacent ground routing domain shall be notified to system management

HLIREQ3 Errors resulting in the degradation of the QoS on links supporting inter-organisations or air/ground communications shall be reported to system management

HLIREQ4 Errors leading to the systematic loss of NPDUs exchanged between organisations or between the air and the ground (e.g. routing black hole) shall be reported to system management

4. Consideration of Error Cases notifications

4.1 General

For each of the identified error cases, the objective of this chapter is to analyse whether the event deserves to be notified to system management and if corrective operations require specific actions to be made accessible to system management.

4.2 Subnetwork level error cases

4.2.1 Fixed/mobile X25 Call Request Clearing

error name	Fixed/mobile X25 Call Request Clearing
context	This error may occur during ground/ground or air/ground routing initiation between BISs for the establishment of a VC supporting the exchange of BIS-BIS connection. The error may also occur on the establishment of Dynamically assigned circuits for the forwarding of NPDU to a particular DTE address when no VC to this DTE address still exists.
Possible causes	SN Service provision problem (SN is out of order, SN interface is out of order, the requested facilities are not available, invalid called address, insufficient resources etc...) The called DTE rejects the call (called DTE is out of order, does not authorise the communication, does not support the proposed facilities, does not support the proposed SNDCF options
possible consequence	air/ground or ground/ground routing initiation failure persistent loss of NPDUs forwarded to an unreachable next-hop DTE.
simple counter measure	the call may simply be re-attempted. However this is valid only in case of transient problem.
associated standard ISO10737 notification	None
proposal	On the ground, errors with a diagnostic code indicating a permanent error shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation). errors with a diagnostic code indicating a transient error should be notified by the Managed Object and loged by the SM Agent (for possible further investigation) (rational is HLIREQ1, HLIREQ2)
SM corrective action other than change in configuration	None

4.2.2 Fixed/mobile Unacceptable incoming call

error name	Fixed/mobile X25 Unacceptable incoming call
context	This error may occur during ground/ground or air/ground routing initiation between BISs for the establishment of a VC supporting the exchange of BIS-BIS connection. The error may also occur on the establishment of Dynamically

	assigned circuits for the forwarding of NPDU to a particular DTE address when no VC to this DTE address still exists.
Possible causes	The calling DTE is not authorised, proposes unsupported/unacceptable facilities, or SNDCF options
possible consequence	air/ground or ground/ground routing initiation failure persistent loss of NPDUs forwarded to an unreachable next-hop DTE.
simple counter measure	the call may simply be re-attempted. However this is valid only in case of transient problem.
associated standard ISO10737 notification	None
proposal	On the ground, these errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation).
SM corrective action other than change in configuration	none

4.2.3 Unexpected X.25 Fixed/mobile VC clearing

error name	Unexpected X.25 Fixed/mobile VC clearing
context	This error may occur on VC established in ground/ground or air/ground context. The VC is cleared with the cause and diagnostic indicating an abnormal event
Possible causes	SN Service provision problem (SN is out of order, SN interface is out of order, X.25 protocol error, insufficient resources etc...) Failure/stop of the adjacent DTE.
possible consequence	loss of communication with an aircraft or an adjacent ground domain.
simple counter measure	automatic VC re-establishment attempt. However this is valid only in case of transient problem.
associated standard ISO10737 notification	X.25 PLE-DTE CommunicationAlarm notification
proposal	On the ground, errors with a diagnostic code indicating a permanent error shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation). Errors with a diagnostic code indicating a transient error should be notified by the Managed Object and loged by the SM Agent (for possible further investigation) (rational is HLIREQ1, HLIREQ2)
SM corrective action other than change in configuration	None

4.2.4 Unexpected X.25 Fixed/mobile VC reset

error name	Unexpected X.25 Fixed/mobile VC reset
context	This error may occur on VC established in ground/ground or air/ground context.
Possible causes	SN Service provision problem (SN transient error) mobile SNDCF compression error
possible consequence	loss of QoS
simple counter measure	N.A.
associated standard ISO10737 notification	X.25 PLE-DTE CommunicationAlarm notification
proposal	These errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation). (rational is HLIREQ3)
SM corrective action other than change in configuration	None

4.2.5 SN access failure (SN interface failure or SN failure)

error name	SN access failure (SN interface failure or SN failure)
context	This error may occur on any subnetwork attachment of an ATN ES or IS (X.25 fixed or mobile SN, ISO 8802 LAN, CIDIN SN, etc...)
Possible causes	SN is out of order, SN interface is out of order, problem with a wire.
possible consequence	loss of direct communications with all adjacent systems reachable via this subnetwork.
simple counter measure	switch to a backup SN interface
associated standard ISO10737 notification	« X.25 PLE DTE » MO, stateChange notification
proposal	On the ground, these errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation).
SM corrective action other than change in configuration	None

4.3 SNDCF level error cases

4.3.1 mobile SNDCF protocol error (interoperability problem)

error name	mobile SNDCF protocol error (interoperability problem)
context	This error may occur during and after routing initiation, in the communication between an A/G and an airborne BIS.
Possible causes	data has been corrupted in the transfer; invalid configuration of one of the equipment software error see example in SARPs 5.7.6.2.1.6.1.5
possible consequence	The mobile Virtual Circuit is cleared
simple counter measure	None
associated standard ISO10737 notification	None
proposal	The error will be notified with the notification on the X.25 VC Clearing (see section 0 of this document). It is not necessary to add another notification, provided that the X.25 VC clearing diagnostic is explicit enough
SM corrective action other than change in configuration	None

4.3.2 SNSDU discarded due to unavailability of a suitable VC (5.7.6.3.2.1.5)

error name	SNSDU discarded due to unavailability of a suitable VC
context	SARPS ref. 5.7.6.3.2.1.5 « If no virtual circuit exists to the SN-Destination-Address, and the circuit is not classified as dynamically assigned by the ISO/IEC 10589 (IS-IS) routing protocol or under a static routing regime, then the SN-UNITDATA shall be discarded, with an error report sent to a System Manager. *Note.— Virtual Circuits between Intermediate Systems and between Intermediate Systems and End Systems are initially established by procedures associated with the specific routing procedures employed. If no such virtual circuit has been established, or may be established under the routing procedures, then no route exists and hence it is an error if an attempt is made to send a PDU over such a route.* SNSDUs may also be discarded in congestion case, when the number of SNSDUs waiting to be transmitted over a VC exceeds a given threshold.
Possible causes	SN failure, SN interface failure invalid routing information Congestion
possible consequence	persistent loss of NPDUs forwarded to an unreachable next-hop DTE. transient loss of NPDUs forwarded an a congestioned X.25 VC

simple counter measure	None
associated standard ISO10737 notification	None
proposal	If the SNDCF attempts to open a VC with the addressed DTE, the error will be notified with X.25 Call Clearing notifications. In such a case, It is not necessary to define another notification. On the other hand, if the router only supports statically configured circuits, a specific notification may be required. The silent discarding of SNSDU would indeed cause the unexplained systematic loss of NPDUs in the network; and the cause could be difficult to diagnostic without having these errors logged or notified. The error should therefore be notified to the SM Agent (for logging and further investigation) (rational is HLIREQ4)
SM corrective action other than change in configuration	None

4.3.3 SNSDU discarded because it conveys a PDU with an unrecognised SPI (5.7.6.3.2.2.4)

error name	SNSDU discarded because it conveys a PDU with an unrecognised SPI
context	see SARPs section 5.7.6.3.2.2.4
Possible causes	Data Corruption Software Error
possible consequence	The loss of an individual packet
simple counter measure	None
associated standard ISO10737 notification	None
proposal	It does not seem necessary to issue a notification for such a type of error. Maybe, a counter of discarded SNSDUs is sufficient
SM corrective action other than change in configuration	None

4.3.4 generation of an SNDCF Error Report PDU

error name	generation of an SNDCF Error Report PDU
context	an LREF compression error has been detected on a mobile VC.
Possible causes	see SARPs Table 5.7-7 « SNDCF Error Report Diagnostic Codes
possible consequence	Reset of the Virtual Circuit

	loss of QoS
simple counter measure	N/A
associated standard ISO10737 notification	None
proposal	The error will be notified with the notification on the X.25 VC Reset (see section 4.2.4 of this document). It does not seem necessary to add another notification, provided that the X.25 VC reset diagnostic is explicit enough
SM corrective action other than change in configuration	None

4.3.5 reception of an SNDCF Error Report PDU

error name	reception of an SNDCF Error Report PDU
context	an LREF compression error has been detected on a mobile VC.
Possible causes	see SARPs Table 5.7-7 « SNDCF Error Report Diagnostic Codes
possible consequence	Reset of the Virtual Circuit loss of QoS
simple counter measure	N/A
associated standard ISO10737 notification	None
proposal	The error will be notified with the notification on the X.25 VC Reset (see section 4.2.4 of this document). It does not seem necessary to add another notification, provided that the X.25 VC reset diagnostic is explicit enough
SM corrective action other than change in configuration	None

4.3.6 deflate(/ACA?) decompression error

error name	deflate(/ACA?) decompression error
context	deflate/ACA decompression of a packet received by the mobile SNDCF of an Airborne or ground router, does not produce a valid PDU
Possible causes	data corruption a previous packet was lost
possible consequence	Reset of the Virtual Circuit loss of QoS
simple counter measure	Reset of the Virtual Circuit
associated standard ISO10737	None

notification	
proposal	The error will be notified with the notification on the X.25 VC Reset (see section 4.2.4 of this document). It does not seem necessary to add another notification, provided that the X.25 VC reset diagnostic is explicit enough
SM corrective action other than change in configuration	None

4.4 CLNP level error cases

4.4.1 a received NPDU is discarded

error name	a received NPDU is discarded
context	an IS cannot forward a received NPDU an ES cannot process a received NPDU
Possible causes	protocol procedure error incorrect checksum/header syntax error congestion segmentation needed but not permitted received PDU is incomplete destination address unreachable/unknown lifetime expired unsupported option reassembly interference
possible consequence	loss of one NPDU, loss of all received NPDUs having the same characteristics as the discarded PDU
simple counter measure	None
associated standard ISO10737 notification	cLNS MO, cLNS8473-P Package, communication alarm notification issued in all cases except when the PDU is discarded due to congestion.
proposal	The error may be the consequence of a transient or exceptional event (e.g. PDU corruption). In such a case notification to a manager is not really necessary. However, the error may correspond to a more serious problem which requires intervention of the System manager (e.g. the IS is a routing black hole) When in doubt, the error shall be notified. (In any case, The generation of the CMIS-M-EVENT-REPORT may be suppressed by the event forwarding discriminator) The cLNS MO, cLNS8473-P Package, communication alarm notification, shall be implemented (rational is HLIREQ4)
SM corrective action other than change in	None

configuration	

4.4.2 Congestion experienced

error name	Congestion experienced
context	A router receives more NPDUs than it can send. Under low congestion condition, the NPDUs are forwarded with the congestion experienced flag set. Under heavy congestion condition, the router may be compelled to discard the received NPDUs
Possible causes	high traffic
possible consequence	End Systems decrease the size of the transport advertised window. loss of QoS loss of NPDUs
simple counter measure	None
associated standard ISO10737 notification	None
proposal	The error may be the consequence of a transient or exceptional event (e.g. peak in traffic). In such a case notification to a manager is not really necessary. However, the error may indicate that the network is not correctly dimensioned. In order to avoid reporting every NPDU discard, a mechanism should be implemented to report transitions to a state where the routers is discarding a large proportion of NPDUs due to congestion, and to report when a normal situation is resumed. (rational is HLIRE3)
SM corrective action other than change in configuration	None

4.5 IDRP level error cases

4.5.1 IDRP connection establishment failure

error name	IDRP connection establishment failure
context	a ground/ground or air/ground BIS-BIS connection fails to be established
Possible causes	protocol error, configuration error, authentication
possible consequence	air/ground or ground/ground routing initiation failure
simple counter measure	None
associated standard ISO10747 notification	idrpConfig MO, communicationsAlarm
proposal	On the ground, these errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the

	Managed Object and loged by the SM Agent (for possible further investigation).
SM corrective action other than change in configuration	action to re-attempt the IDRP connection (activate)

4.5.2 IDRP protocol error - generation of an ERROR BISPDU

error name	IDRP protocol error - generation of an ERROR BISPDU
context	A BIS detects a protocol error on a ground/ground or air/ground BIS-BIS connection. An ERROR BISPDU is generated
Possible causes	protocol error, software error, failure of the adjacent BIS, failure of the subnetwork used to communicate with the adjacent BIS, configuration error
possible consequence	loss of communication with an aircraft or an adjacent ground domain.
simple counter measure	automatic re-opening of the IDRP connection
associated standard ISO10747 notification	idrpConfig MO, communicationsAlarm
proposal	On the ground, these errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation).
SM corrective action other than change in configuration	action to re-attempt the IDRP connection (activate)

4.5.3 unexpected IDRP connection clearing (receipt of a CEASE or ERROR BISPDU)

error name	unexpected IDRP connection clearing (receipt of a CEASE or ERROR BISPDU)
context	A ground/ground or air/ground BIS-BIS connection is closed by the adjacent BIS.
Possible causes	adjacent BIS is stopped, adjacent BIS detects an error
possible consequence	loss of communication with an aircraft or an adjacent ground domain.
simple counter measure	automatic re-opening of the IDRP connection
associated standard ISO10747 notification	idrpConfig MO, communicationsAlarm
proposal	On the ground, these errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation).

SM corrective action other than change in configuration	action to re-attempt the IDRP connection (activate)

4.5.4 RIB corruption detected

error name	RIB corruption detected
context	see ISO 10747 clause 7.10.2
Possible causes	router software/hardware error
possible consequence	routing error
simple counter measure	IDRP RIB REFRESH procedure
associated standard ISO10747 notification	idrpConfig MO, communicationsAlarm
proposal	On the ground, these errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation).
SM corrective action other than change in configuration	

4.5.5 internal inconsistency detected

error name	internal inconsistency detected
context	see ISO 10747 clause 7.15.1
Possible causes	configuration error
possible consequence	routing error
simple counter measure	automatic RIB REFRESH procedure
associated standard ISO10747 notification	None; However, clause 7.15.1 of IDRP standard states that the error shall be reported to system management
proposal	This is a local error. However, if the concerned routing domain is a transit RD, the possible routing errors may affect communications between organisation and between the air and the ground These errors shall be notified to the SM manager (rational is HLIREQ4)
SM corrective action other than change in configuration	None

4.5.6 CPU Overload

error name	CPU Overload
context	see annex H of ISO 10747
Possible causes	high routing traffic condition
possible consequence	routing error, IDRP connections clearing
simple counter measure	automatic clearing of some BIS-BIS connections
associated standard ISO10747 notification	None
proposal	These errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2)
SM corrective action other than change in configuration	action to close a BIS-BIS connection

4.5.7 RIB Overload

error name	RIB Overload
context	see annex G of ISO 10747
Possible causes	high routing traffic condition
possible consequence	routing error, IDRP connections clearing
simple counter measure	automatic purge of Adj-RIB-In automatic clearing of BIS-BIS connections
associated standard ISO10747 notification	None
proposal	These errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2)
SM corrective action other than change in configuration	action to close a BS-BIS connection

4.6 A/G Routing initiation specific error cases

4.6.1 Invalid calling DTE address - call rejected

error name	Invalid calling DTE address - call rejected
context	see SARPs section 5.3.5.2.2.1.2 The responding BIS does not recognise the calling DTE address as a valid address
Possible causes	emergency situation for an aircraft

	configuration error (omission of a valid calling DTE address) attack from an unauthorised DTE
possible consequence	The call is rejected air/ground or ground/ground routing initiation failure
simple counter measure	in air/ground context, procedure for the emergency use of mobile connection (SARPs section 5.3.5.2.2.2)
associated standard notification	none
proposal	On the ground, these errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2). On board, these errors should at least be notified by the Managed Object and loged by the SM Agent (for possible further investigation).
SM corrective action other than change in configuration	None

4.6.2 Invalid calling DTE address - call accepted in case of emergency use of a mobile SN

error name	Invalid calling DTE address - call accepted in case of emergency use of a mobile SN
context	see SARPs section 5.3.5.2.2.2 The responding BIS does not recognise the calling DTE address as a valid address but must accept the call for compliance with SARPs section 5.3.5.2.2.2
Possible causes	emergency situation for an aircraft configuration error (omission of a valid calling DTE address) attack from an unauthorised DTE
possible consequence	security problem: an unauthorised DTE succeed in opening a VC with an ATN BIS
simple counter measure	None
associated standard notification	none
proposal	These errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2)
SM corrective action other than change in configuration	None

4.6.3 Non Validation of the received NET (ref. 5.3.5.2.7)

error name	Non Validation of the received NET
context	see SARPs section 5.3.5.2.7

	The responding BIS does not recognise the BIS attempting the routing initiation procedure as a valid BIS
Possible causes	emergency situation for an aircraft configuration error (omission of a valid NET in the list of authorised NET) attack from an unauthorised system
possible consequence	air/ground or ground/ground routing initiation failure
simple counter measure	None
associated standard notification	none
proposal	These errors shall be notified to the SM manager (rational is HLIREQ1, HLIREQ2)
SM corrective action other than change in configuration	None

4.6.4 parallel use and non-use of IDRP

error name	parallel use and non-use of IDRP
context	see SARPs section 5.3.5.2.10.7 and 5.3.5.2.12.2.6 non-use and use of IDRP procedure are concurrently used between the same aircraft and the same A/G BIS
Possible causes	None - it is not understood how this error can occur since the NET of the airborne BIS unambiguously determine whether or not the airborne BIS supports IDRP
possible consequence	?
simple counter measure	None
associated standard notification	none
proposal	This error cannot occur - It is not necessary to implement a notification
SM corrective action other than change in configuration	None

4.6.5 ISH Holding Timer expiration on an A/G link

error name	ISH Holding Timer expiration on an A/G link
context	see SARPs section 5.3.5.2.13 Although the associated Virtual Circuit is still open, the Holding Timer of ISHs

	exchanged over this VC elapses
Possible causes	the mobile subnetwork failed to report the VC clearing ISH HT/CT timer configuration error
possible consequence	Except in the case of a configuration error, the expiration of the timer has a beneficial consequence since it allows to detect and correct an abnormal situation. The VC is cleared; If this is the last VC established between the airborne and the A/G BIS, this terminates the A/G routing session.
simple counter measure	None
associated standard notification	none
proposal	The error indicates the end of a very abnormal situation where a route to the aircraft existed whereas communication via this route was not possible. This false route could have had the effect of a routing black hole preventing communication with the aircraft. This event deserves to be notified to the SM Manager. (rational is HLIREQ1, HLIREQ4)
SM corrective action other than change in configuration	None

4.7 Transport level error cases

4.7.1 Outgoing transport connection establishment failure

error name	Outgoing transport connection establishment failure
context	The managed ES does not succeed in opening a Transport connection with a remote ES
Possible causes	invalid destination address, Network Service provision problem, Transport protocol error,
possible consequence	An application will fail to establish an association Consequences depend on the application
simple counter measure	Depend on the application
associated standard ISO10737 notification	transportConnection MO, object deletion notification
proposal	The application is better placed to assess the severity of the problem, and should be responsible for reporting a problem of establishment of connection/association with a peer application if required. For Fault Management, a communicationAlarm notification at Transport level is not justified.
SM corrective action other than change in configuration	None

4.7.2 Incoming transport connection establishment failure

error name	Incoming transport connection establishment failure
context	The managed ES does not accept the establishement of a Transport Connection requested by a remote ES
Possible causes	invalid called TSEL, Transport protocol error, the application using this TSEL is not operational, addresses provided by the CM application were invalid.
possible consequence	The remote application will fail to establish an association Consequences depend on the application
simple counter measure	Depend on the application
associated standard ISO10737 notification	transportConnection MO, object deletion and communicationInformation notification
proposal	This error case is different from the previous one. In this case no local application will be informed about the problem. The only entity capable of issuing a notification is therefore the transport entity. These errors shall be notified to the SM manager (rational is HLIREQ1)
SM corrective action other than change in configuration	None

4.7.3 unexpected transport connection clearing - generation/receipt of a DR TPDU

error name	protocol error - generation of a DR TPDU
context	A Transport connection is prematurely cleared
Possible causes	Network Service provision problem, Transport protocol error,
possible consequence	The application using the TC receives a Provider ABORT indication. Consequences depend on the application
simple counter measure	Depend on the application
associated standard ISO10737 notification	transportConnection MO, object deletion notification
proposal	The application is better placed to assess the severity of the problem, and should be responsible for reporting the problem if required. For Fault Management, a notification a Transport level is not justified.
SM corrective action other than change in configuration	None

5. Summary of Requirements

The following errors shall be notified to system management:

- Fixed/mobile X25 Call Request Clearing
- Fixed/mobile X25 Unacceptable incoming call
- Unexpected X.25 Fixed/mobile VC clearing
- Unexpected X.25 Fixed/mobile VC reset
- SN access failure (SN interface failure or SN failure)
- SNSDU discarded due to unavailability of a suitable VC
- a received NPDU is discarded
- Congestion experienced
- IDRP connection establishment failure
- IDRP protocol error - generation of an ERROR BISPDU
- unexpected IDRP connection clearing (receipt of a CEASE or ERROR BISPDU)
- RIB corruption detected
- internal inconsistency detected
- CPU Overload
- RIB Overload
- Invalid calling DTE address - call rejected
- Invalid calling DTE address - call accepted in case of emergency use of a mobile SN
- Non Validation of the received NET
- ISH Holding Timer expiration on an A/G link

The following system management operation shall be implemented:

- operation to initiate the IDRP connection establishment (IDRP activate)
- operation to close an IDRP connection