Technical Specification Group Services and System Aspects **TSGS#23(04)0120**
Meeting #23, Phoenix, USA, 15 - 18 March 2004

Source: SA5 (Telecom Management)

Title: 2 Rel-6 CR 32.111-2/4 Abort GetAlarmList

Document for: Decision

Agenda Item: 7.5.3

Doc-1st-Level	Spec	CR	R	Pha	Subject	C	Vers.	Doc-2nd-L	Workitem
SP-040120	32.111-2	029	-	Rel-6	Addition of a method to abort an ongoing alarm alignment process in the asynchronous mode of the operation getAlarmList	B	6.0.1	S5-046153	OAM-NIM
SP-040120	32.111-4	026	-	Rel-6	Addition of a method to abort an ongoing alarm alignment process in the asynchronous mode of the operation getAlarmList	B	6.0.1	S5-046211	OAM-NIM

3GPP TSG-SA5 (Telecom Management) **S5-046153**
Meeting #37, Malaga, SPAIN, 23 - 27 Feb 2004

CR-Form-v7

CHANGE REQUEST

⌘ **32.111-2 CR 029** ⌘**rev** **-** ⌘ Current version: **6.0.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network [X] Core Network [X]

Title:	⌘	Addition of a method to abort an ongoing alarm alignment process in the asynchronousn mode of the operation *getAlarmList*
Source:	⌘	**SA5** (olaf.pollakowski@siemens.com)
Work item code:	⌘	OAM-NIM
Date:	⌘	27/02/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Curently it is not possible to abort an ongoing alarm alignment process.
Summary of change:	⌘	The definition of the operation *getAlarmList* is extended by the statement that a method to abort an ongoing alarm alignment process shall be provided in he asynchronous mode.
Consequences if not approved:	⌘	

Clauses affected:	⌘	6.3.2				
		Y	**N**			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
		X		O&M Specifications		32.111-4
Other comments:	⌘	Child 32.111-4 CR in S5-046211.				

Change in Clause 6.3.2

6.3.2 getAlarmList (M)

6.3.2.1 Definition

The `IRPManager` invokes this operation in order to request the `IRPAgent` to provide either the complete list of `AlarmInformation` instances in the `AlarmList`, including (when supported) the IOC instances associated with the `AlarmInformation` instances (full alarm alignment), or only a part of this list (partial alarm alignment).

The parameters `baseObjectClass` and `baseObjectInstance` are used to identify the part of the alarm list to be returned. If they are absent, then the complete alarm list shall be provided (full alarm alignment). If they identify a certain MO, then only the `AlarmInformation` instances (and associated IOC instances) related to this MO and its subordinate MOs shall be provided (partial alarm alignment).

There are two modes of operation. One mode is synchronous. In this mode, the list of `AlarmInformation instances` in `AlarmList` is returned synchronously with the operation. The other mode is asynchronous. In this mode, the list of `AlarmInformation` instances is returned via notifications. In asynchronous mode of operation, the only information returned synchronously is the status of the operation. A method allowing to abort an ongoing alarm alignment process shall be available in the asynchronous mode. The mode of operation to be used is determined by means outside the scope of specification. To use asynchronous mode, the `IRPManager` must have established a subscription with the IRPAgent notificationIRP via the `subscribe` operation specified in 3GPP TS 32.302 [5].

End of Change in Clause 6.3.2

3GPP TSG-SA5 (Telecom Management) **S5-046211**
Meeting #37, Malaga, SPAIN, 23 - 27 Feb 2004

CR-Form-v7

CHANGE REQUEST

⌘	**32.111-4**	**CR**	**026**	⌘ **rev**	**-**	⌘	Current version:	**6.0.1** ⌘

For ***HELP*** *on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [ ] Radio Access Network [X] Core Network [X]

Title:	⌘	Addition of a method to abort an ongoing alarm alignment process in the asynchronous mode of the operation *getAlarmList*	
Source:	⌘	SA5 (olaf.pollakowski@siemens.com)	
Work item code:	⌘	OAM-NIM	***Date:*** ⌘ 27/02/2004
Category:	⌘	**B**	***Release:*** ⌘ Rel-6

Use one of the following categories:
- ***F*** *(correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(addition of feature),*
- ***C*** *(functional modification of feature)*
- ***D*** *(editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Curently it is not possible to abort an ongoing alarm alignment process
Summary of change:	⌘	The GDMO/ASN.1 definitions of such a method are added.
Consequences if not approved:	⌘	

Clauses affected:	⌘	4.1.6, 4.2.2, 5, 6

Other specs affected: ⌘

Y	N		
	X	Other core specifications	⌘
	X	Test specifications	
	X	O&M Specifications	

Other comments:	⌘	Parent 32.111-2 CR in S5-046153.

Change in Clause 4.1.6

4.1.6 Alignment of alarm conditions over the Itf-N

The IRP Manager is able to trigger the alarm conditions alignment using the Action *getAlarmList*

The following specifies the logical steps of the alignment procedure, by describing a possible implementation. Any other implementation showing the same behaviour on the Itf-N interface is compliant with the present document.

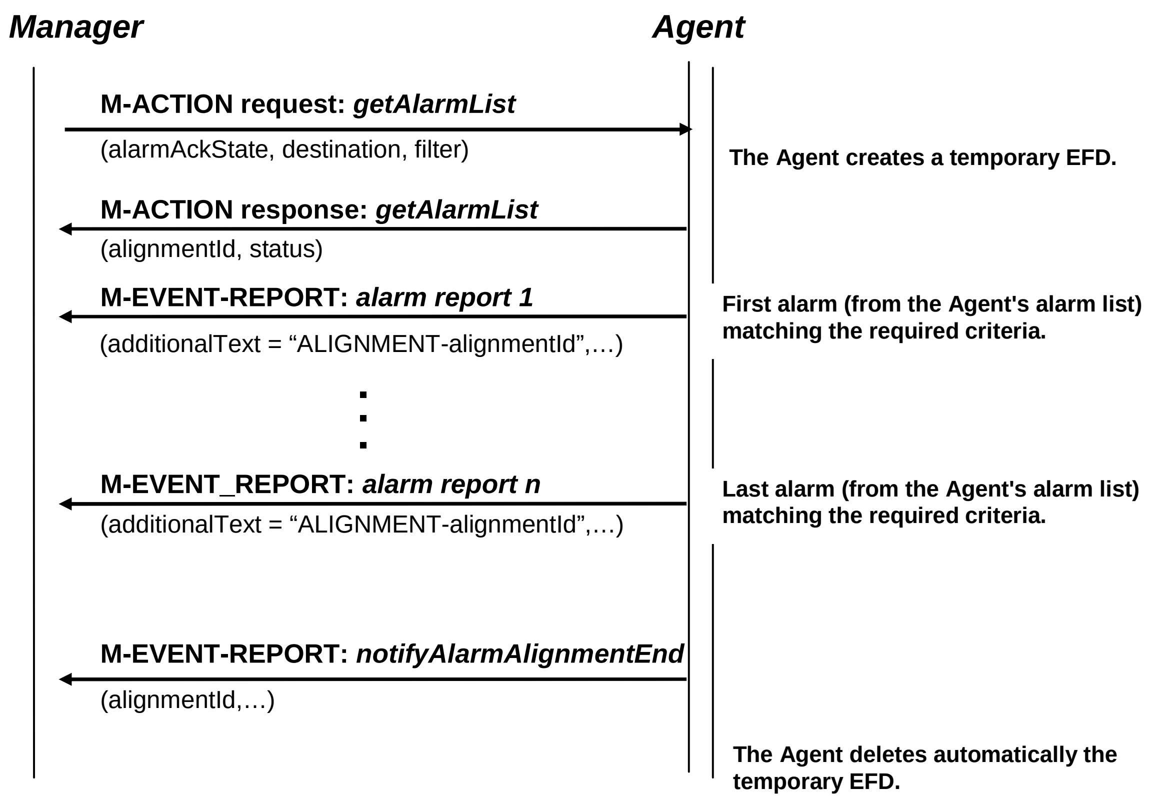
- The Manager sends to the Agent a *getAlarmList* request containing the following information:
  - *alarmAckState*, used to select the alarms from the Agent's alarm list for the current alignment (e.g. all active alarms).
  - *baseObjectClass*, *baseObjectInstance*, identifies the part of the alarm list to be uploaded.
  - *destination*, identifying the destination to which event reports that have passed the filter conditions are sent.
  - *filter*, this optional parameter defines the conditions an alarm notification shall fulfil in order to be forwarded to the Manager. It applies only for the current alignment request.
- After evaluation of the request, the Agent first generates an *alignmentId* value, which unambiguously identifies this alignment process. This value is used by the Manager to correlate alarm reports to the corresponding alignment requests, in case this Manager issues several alarm alignments in parallel.
- The Agent creates a temporary Event Forwarding Discriminator (EFD) instance for the purpose of this alarm alignment, using the parameters *destination* and *filter* received in the request. If the *filter* parameter is absent in the alarm synchronisation request, all alarm notifications are forwarded to the Manager through this EFD, taking into account both the *filter* constraint currently active for the event reporting to the manager having invoked the synchronisation request and the value of the parameter *alarmAckState*.
  The filter is set by the Agent automatically in order to forward only those alarm notifications containing, at the beginning of the field *additionalText*, the string "(ALIGNMENT-<alignmentId>)". The filter must also forward the notification *notifyAlarmAlignmentEnd* indicating the end of the alarm alignment process. The alarm alignment end notifications of other alignment processes shall be filtered out using the *alignmentId* carried by the event information parameter of *notifyAlarmAlignmentEnd*.
- The Agent sends back a *getAlarmList* response, which contains the *alignmentId* described above and the *status* information, indicating the result of the request. (see the message flow in Figure 1).
- The Agent scans now its alarm list. For every alarm, which matches the criteria defined by the *alarmAckState* parameter, the Agent inserts, at the beginning of the field *additionalText*, the string "(ALIGNMENT-<alignmentId>)". According to ITU-T Recommendation X.734 [6], the Agent forwards these alarm notifications towards all EFDs.

  NOTE: These alarm notifications can reach the current Manager only via the temporary EFD created for the current alignment. They are filtered out:

  a) By all the EFD instances used for "real-time" alarm reporting, due to the presence of the sub-string "ALIGNMENT" in the field *additionalText* (see 3GPP TS 32.304 [10]).

  b) By all temporary EFD instances possibly created for parallel alignments, due to the presence of the unambiguous sub-string "<alignmentId>" in the additionalText field.
- At the end of the alarm alignment process the Agent shall send the dedicated notification *notifyAlarmAlignmentEnd* in order to indicate the end of the current alignment process (unambiguously identified by the *alignmentId*). The temporary EFD of the current alarm alignment process shall forward only alarm alignment end notifications carrying in the event information field the *alignmnentId* of this alignment process. All other alarm alignment end notifications shall be filtered out.
- After sending the notification *notifyAlarmAlignmentEnd* the Agent automatically deletes the temporary EFD instance (see figure 1).

At the end of the alarm conditions alignment the acknowledgement state and the comments assigned to each alarm are implicitly synchronised between the IRPAgent and the IRPManager that has requested the alignment.



Manager
Agent
M-ACTION request: getAlarmList
(alarmAckState, destination, filter)
The Agent creates a temporary EFD.
M-ACTION response: getAlarmList
(alignmentId, status)
M-EVENT-REPORT: alarm report 1
(additionalText = “ALIGNMENT-alignmentId”,…)
First alarm (from the Agent's alarm list) matching the required criteria.
M-EVENT_REPORT: alarm report n
(additionalText = “ALIGNMENT-alignmentId”,…)
Last alarm (from the Agent's alarm list) matching the required criteria.
M-EVENT-REPORT: notifyAlarmAlignmentEnd
(alignmentId,…)
The Agent deletes automatically the temporary EFD.

Figure 1: Alignment arrow diagram

Figure 2 shows the handling of a "real-time" alarm notification (occurred during the execution of the *getAlarmList* operation), which is forwarded by the Agent (according to ITU-T Recommendation X.734 [6]) to all currently available EFD instances. Dependent on the *discriminatorConstruct* setting of every EFD, such an alarm may or may not reach the related Manager. In any case, this alarm is filtered out by the temporary EFD assigned to the Manager, which triggered the *getAlarmList* request.

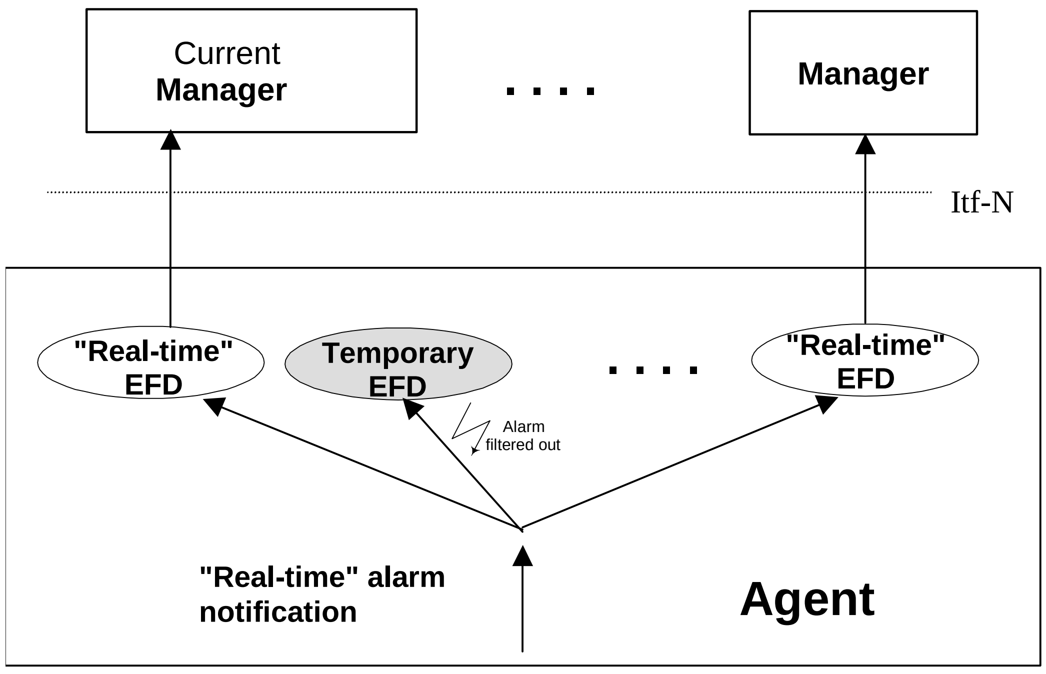


Figure 2: Treatment of "real time" alarms

Figure 3 shows the handling of an alarm notification from the alarm list, matching the criteria defined in the parameters *alarmAckState* of the *getAlarmList* request and forwarded by the Agent to all EFD instances as well. This alarm is filtered out by all EFD instances in charge of discrimination of "real-time" alarms and can reach only the Manager, which triggered the *getAlarmList* request, because it passes the temporary EFD instance assigned to this Manager.

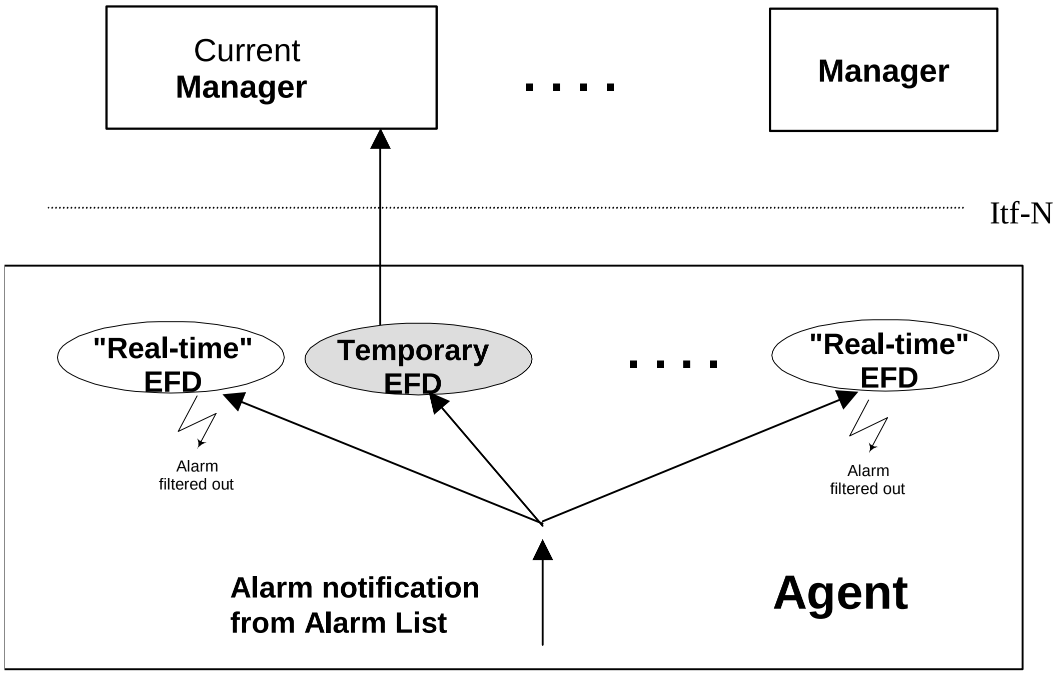


Figure 3: Treatment of "alignment" alarms

It is possible to abort an ongoing alarm alignment process by invoking the action *abortGetAlarmList*. Also in this case the notification *notifyAlarmAlignmentEnd* is emitted.

End of Change in Clause 4.1.6

Change in Clause 4.2.2

4.2.2 Mapping of Operations

Table 1 maps the Interface/Operations defined in the IS of the Alarm IRP to their equivalents in the CMIP SS. The equivalents are qualified as Mandatory (M) or Optional (O).

Table 1: Mapping of Operations

IS Interface	IS Operation	CMIP SS Equivalent	Qualifier
AlarmIRPOperations_1	acknowledgeAlarms	CMISE M-ACTION service, action type: acknowledgeAlarms	M
	getAlarmList	CMISE M-ACTION service, action type: getAlarmList environmentalAlarm ITU-T X.721 [4] equipmentAlarm ITU-T X.721 [4] qualityofServiceAlarm ITU-T X.721 [4] processingErrorAlarm ITU-T X.721 [4] communicationsAlarm ITU-T X.721 [4] integrityViolation ITU-T X.721 [4] operationalViolation ITU-T X.721 [4] physicalViolation ITU-T X.721 [4] securityServiceOrMechanismViolation ITU-T X.721 [4] timeDomainViolation ITU-T X.721 [4] CMISE M-EVENT-REPORT service, event type: notifyAlarmAlignmentEnd	M
	Method to abort an ongoing alarm alignment process	abortGetAlarmList	M
AlarmIRPOperations_2	getAlarmCount	CMISE M-ACTION service, action type: getAlarmCount	O
AlarmIRPOperations_3	unacknowledgeAlarms	CMISE M-ACTION service, action type: unacknowledgeAlarms	O
AlarmIRPOperations_4	setComment	CMISE M-ACTION service, action type: setComment	O
AlarmIRPOperations_5	clearAlarms	CMISE M-ACTION service, action type: clearAlarms	O
GenericIRPVersionOperation	getIRPVersion	CMISE M-ACTION service, action type: getAlarmIRPVersion	M
GenericIRPProfileOperation	getNotificationProfile	CMISE M-ACTION service, action type: getAlarmIRPNotificationProfile	O
	getOperationProfile	CMISE M-ACTION service, action type: getAlarmIRPOperationProfile	O

NOTE: The Interfaces GenericIRPVersionOperation and GenericIRPProfileOperation are defined in 3GPP TS 32.312 [11].

End of Change in Clause 4.2.2

Change in Clause 5 & 6

5 GDMO definitions

5.1 Managed Object Classes

5.1.1 alarmControl

```
alarmControl MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      alarmControlBasicPackage,
      alarmAcknowledgementPackage,
      alarmIRPVersionPackage;
   CONDITIONAL PACKAGES
      alarmCountPackage                     PRESENT IF   "an instance supports it",
      alarmCommentPackage                    PRESENT IF   "an instance supports it",
      alarmProfilePackage                    PRESENT IF   "an instance supports it",
      alarmUnacknowledgementPackage          PRESENT IF   "an instance supports it",
      alarmPotentialFaultyAlarmListPackage   PRESENT IF   "an instance supports it",
      alarmClearPackage                      PRESENT IF   "an instance supports it";
REGISTERED AS {ts32-111AlarmObjectClass 1};
```

5.2 Packages

5.2.1 alarmControlBasicPackage

```
alarmControlBasicPackage PACKAGE
   BEHAVIOUR
      alarmControlBasicPackageBehaviour;
   ATTRIBUTES
      alarmControlId       GET,
      alarmsCountSummary   GET;
   ACTIONS
      getAlarmList,
      abortGetAlarmList;
   NOTIFICATIONS
      notifyAlarmListRebuilt,
      notifyAlarmAlignmentEnd;
REGISTERED AS {ts32-111AlarmPackage 1};

alarmControlBasicPackageBehaviour BEHAVIOUR
DEFINED AS
   "The MOC alarmControl has been defined to provide information to the Manager about the currently
   alarms controlled by the Agent.
   An instance of the 'alarmControl' MOC is identified by the value of the attribute
   'alarmControlId'.
   The attribute 'alarmsCountSummary' provides a summary of the number of alarms managed in the
   Agent's alarm list (including the number of cleared but not yet acknowledged alarms).
   The action 'getAlarmList' is the means, for the Manager, to trigger an alarm alignment procedure
   in accordance with the parameter specified in the action request (this may be needed e.g. for
   first time alignment or after a link interruption between the Agent and the Manager). The alarm
   list is sent as a sequence of single alarm reports.
   The notification 'notifyAlarmListRebuilt' is sent by the Agent to the Manager to inform that the
   alarm list has changed. It is recommended that the Manager subsequently triggers an alarm
   alignment.
   The notification 'notifyAlarmAlignmentEnd' is sent by the Agent to the Manager to inform that the
   alarm alignment process identified by the 'alignmentId' is completed.";
```

5.2.2 alarmCountPackage

```
alarmCountPackage PACKAGE
   BEHAVIOUR
      alarmCountPackageBehaviour;
   ACTIONS
      getAlarmCount;
REGISTERED AS {ts32-111AlarmPackage 2};

alarmCountPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package has been defined to allow the Managers to get information from the Agent about the
   number of alarms currently present in the alarm list.";
```

5.2.3 alarmAcknowledgementPackage

```
alarmAcknowledgementPackage PACKAGE
   BEHAVIOUR
      alarmAcknowledgementPackageBehaviour;
   ACTIONS
      acknowledgeAlarms;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": communicationsAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": environmentalAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": equipmentAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": processingErrorAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": qualityofServiceAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": integrityViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": operationalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": physicalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": securityServiceOrMechanismViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": timeDomainViolation;
REGISTERED AS {ts32-111AlarmPackage 3};

alarmAcknowledgementPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package has been defined to provide information to the Manager about the acknowledgement
   status of the alarms controlled by the Agent.
   The action 'acknowledgeAlarms' allows the NM operator to acknowledge one or several alarms
   previously sent by the Agent as alarm notifications.
   The ITU-T Recommendation X.721 [4] compliant alarm notifications are sent by the Agent to the
   Manager to inform that one alarm has been acknowledged. The acknowledgement related information
   is carried in the additionalInformation attribute.";
```

5.2.4 alarmUnacknowledgementPackage

```
alarmUnacknowledgementPackage PACKAGE
   BEHAVIOUR
      alarmUnacknowledgementPackageBehaviour;
   ACTIONS
      unacknowledgeAlarms;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": communicationsAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": environmentalAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": equipmentAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": processingErrorAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": qualityofServiceAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": integrityViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": operationalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": physicalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": securityServiceOrMechanismViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": timeDomainViolation;
REGISTERED AS {ts32-111AlarmPackage 4};

alarmUnacknowledgementPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package has been defined to provide the Manager with the capability to un-acknowledge
   alarms.
   The action 'unacknowledgeAlarms' allows the NM operator to un-acknowledge one or several alarms
   previously acknowledged by him.
   The ITU-T Recommendation X.721 [4] compliant alarm notifications are sent by the Agent to the
   Manager to inform that one alarm has been unacknowledged. The acknowledgement related information
   is carried in the additionalInformation attribute.";
```

5.2.5 alarmCommentPackage

```
alarmCommentPackage PACKAGE
   BEHAVIOUR
      alarmCommentPackageBehaviour;
   ACTIONS
      setComment;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": communicationsAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": environmentalAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": equipmentAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": processingErrorAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": qualityofServiceAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": integrityViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": operationalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": physicalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": securityServiceOrMechanismViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": timeDomainViolation;
REGISTERED AS {ts32-111AlarmPackage 5};

alarmCommentPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package has been defined to allow the management of comments related to alarms.
   The action setComment allows the IRPManager to add a comment to one or several alarms. Also the
   IRPAgent may add comments to alarms.
   ITU-T Recommendation X.721 [4] compliant alarm notifications are generated once a comment is
   added to an alarm. The information in all comments associated to an alarm is carried in the
   attribute additionalInformation.";
```

5.2.6 alarmIRPVersionPackage

```
alarmIRPVersionPackage PACKAGE
   BEHAVIOUR
      alarmIRPVersionPackageBehaviour;
   ATTRIBUTES
      supportedAlarmIRPVersions   GET;
   ACTIONS
      getAlarmIRPVersion;
REGISTERED AS {ts32-111AlarmPackage 6};

alarmIRPVersionPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package has been defined to allow the Manager to get information about the Alarm IRP
   versions supported by the Agent.
   The attribute 'supportedAlarmIRPVersions' indicates all versions of the Alarm IRP currently
   supported by the Agent.
   The action 'getAlarmIRPVersion' may be invoked by the Manager to get information about the Alarm
   IRP versions supported by the Agent. Such Alarm IRP versions must compatible to each other. This
   means that the Manager may use any one of such Alarm IRP versions";
```

5.2.7 alarmProfilePackage

```
alarmProfilePackage PACKAGE
   BEHAVIOUR
      alarmProfilePackageBehaviour;
   ACTIONS
      getAlarmIRPOperationProfile,
      getAlarmIRPNotificationProfile;
REGISTERED AS {ts32-111AlarmPackage 7};

alarmProfilePackageBehaviour BEHAVIOUR
DEFINED AS
   "This package has been defined to allow the Manager to get detailed information about the profile
   of Alarm IRP.
   The action 'getOperationProfile' is invoked by the Manager to get detailed information about the
   operations supported by Alarm IRP.
   The action 'getNotificationProfile' is invoked by the Manager to get detailed information about
   the notifications supported by Alarm IRP.";
```

5.2.8 alarmPotentialFaultyAlarmListPackage

```
alarmPotentialFaultyAlarmListPackage PACKAGE
   BEHAVIOUR
      alarmPotentialFaultyAlarmListPackageBehaviour;
   NOTIFICATIONS
      notifyPotentialFaultyAlarmList;
REGISTERED AS {ts32-111AlarmPackage 8};

alarmPotentialFaultyAlarmListPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package allows the IRPAgent to inform the IRPManager that the alarm list held by the
   IRPAgent might be faulty.";
```

5.2.9 alarmClearPackage

```
alarmClearPackage PACKAGE
   BEHAVIOUR
      alarmClearPackageBehaviour;
  ACTIONS
      clearAlarms;
REGISTERED AS {ts32-111AlarmPackage 9};

alarmClearPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package allows the IRPManager to clear one or multiple alarms in the IRPAgent.";
```

5.2.10 x721AlarmNotificationsPackage

```
x721AlarmNotificationsPackage PACKAGE
   BEHAVIOUR
      x721AlarmNotificationsPackageBehaviour;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": communicationsAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": environmentalAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": equipmentAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": processingErrorAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": qualityofServiceAlarm,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": integrityViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": operationalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": physicalViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": securityServiceOrMechanismViolation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": timeDomainViolation;
REGISTERED AS {ts32-111AlarmPackage 10};

x721AlarmNotificationsPackageBehaviour BEHAVIOUR
DEFINED AS
   "This package contains all alarm notifications defined in ITU-T X.721.";
```

5.3 Actions

5.3.1 acknowledgeAlarms (M)

```
acknowledgeAlarms ACTION
   BEHAVIOUR
      acknowledgeAlarmsBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.AckOrUnackAlarmsInfo;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.AckOrUnackAlarmsReply;
REGISTERED AS {ts32-111AlarmAction 1};

acknowledgeAlarmsBehaviour BEHAVIOUR
DEFINED AS
   "The behaviour of this functionality is defined within 32.111-2 – below provides an overview and
   CMIP specific semantics.
   This action is invoked by the Manager to indicate to the Agent that one or several alarms
   (previously sent by the Agent as alarm notifications) have to be acknowledged. In the action
   request the NM supplies the parameter ackUserId and ackSystemId. The other acknowledgement
   history parameters, i.e. alarm acknowledgement state (in this case acknowledged) and the
   acknowledgement time are set by the Agent itself.
   The 'Action information' field contains the following data:
      •  alarmReferenceList
         This parameter contains a set of MOI (Managed Object Instance) and notificationIdentifier.
         Each pair identifies unambiguously in the scope of the Agent an alarm (previously received
         by the NM) that have to be now acknowledged.  MOI can be absent if scope of uniqueness of
         notificationIdentifier is across the IRPAgent.
      •  ackUserId
         It contains the name of the operator who acknowledged the alarm or a generic name
         (dependent on the operational concept). It may have also the value NULL.
      •  ackSystemId
         It indicates the management system where the acknowledgment is triggered. It may have also
         the value NULL.
   The 'Action response' contains the following data:
      •  status
         This parameter contains the results of the NM acknowledgement action. Possible values:
         noError (0, all alarms found and ack state changed according to the manager request),
         ackPartlySuccessful (some alarms not found / not changeable, see next parameter), error
         (value indicates the reason why the complete operation failed).
      •  errorAlarmReferenceList
         This parameter (significant only if status = ackPartlySuccessful) contains the list of moi
         (managed object instance) and notificationIdentifier pairs of the alarms which could not be
         acknowledged and, for each alarm, also the reason of the error.";
```

5.3.2 getAlarmCount (O)

```
getAlarmCount ACTION
   BEHAVIOUR
      getAlarmCountBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.GetAlarmCountInfo;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.GetAlarmCountReply;
REGISTERED AS {ts32-111AlarmAction 2};

getAlarmCountBehaviour BEHAVIOUR
DEFINED AS
   "The behaviour of this functionality is defined within 32.111-2 – below provides an overview and
   CMIP specific semantics.
   The NM invokes this action to receive the number of available alarms in the Agent' alarm list
   according to the specification in the action request. The Manager may use this action to find out
   the number of alarms in the alarm list before invoking a synchronisation by means of the
   getAlarmList operation. The request is possible also before the Manager creates an own event
   forwarding discriminator instance within the Agent.
   The 'Action information' field contains the following data:
      •  alarmAckState
         Depending on this optional parameter value, the NM gets the number of alarms of each
         perceivedSeverity value according to the following possible choices:
            -  all alarms
            -  all active alarms (acknowledged or not yet acknowledged)
            -  all active and acknowledged alarms
            -  all active and unacknowledged alarms
            -  all cleared and unacknowledged alarms.
         If the parameter is absent, all alarms from the Agent's alarm list are taken into
         consideration.
      •  filter
         The handling of this optional parameter is as follows:
            -  if present and not NULL, it indicates a filter constraint which shall apply in the
               calculation of the results
            -  if its value is NULL, no filter shall be considered and the Agent shall return the
               number of all alarms according to the value of the parameter alarmAckState (see
               above)
            -  if absent, the handling depends on the availability of an event forwarding
               discriminator instance within the Agent. If this instance is valid, the filter
               construct of the event forwarding discriminator shall apply. If no EFD instance is
               available, the Agent shall return the number of all alarms according to the value of
               the above-mentioned parameter alarmAckState.
   The 'Action response' is composed of:
      •  The numbers of alarms for each perceivedSeverity value (if applicable).
      •  The parameter status containing the results of the NM action. Possible values: noError (0),
         error (the value indicates the reason of the error).";
```

5.3.3 getAlarmList (M)

```
getAlarmList ACTION
   BEHAVIOUR
      getAlarmListBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.GetAlarmListInfo;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.GetAlarmListReply;
REGISTERED AS {ts32-111AlarmAction 3};

getAlarmListBehaviour BEHAVIOUR
DEFINED AS
   "This action starts an alarm alignment procedure between a NM and Agent, which takes into account
   the acknowledgment state of the alarms and a dedicated filter (valid only for the current
   request).
   The 'Action information' field contains the following data:
      •  alarmAckState
         Depending on this optional parameter value, the NM gets the alarm reports according to the
         following possible choices:
            -  all alarms
            -  all active alarms (acknowledged or not yet acknowledged)
            -  all active and acknowledged alarms
            -  all active and unacknowledged alarms
            -  all cleared and unacknowledged alarms.
         If the parameter is absent, all alarms from the Agent's alarm list are taken into
         consideration.
      •  baseObjectClass
         This parameter carries the object class of the managed object instance identified by the
         baseObjectInstance parameter.
      •  baseObjectInstance
         This parameter carries the DN of a certain managed object instance. Only alarm information
         instances related to this managed object and its subordinate objects shall be provided.
```

- *destination*
  This parameter identifies the destination to which the alarm reports that have passed the test conditions specified in the parameter 'filter' are sent. According to ITU-T Recommendation X.721 [4], if no destination is specified in the request, then the discriminator is created with the destination defaulted to the AE-Title of the invoker.
- *filter*
  The handling of this optional parameter (valid only for the current alignment request) is as follows:
  - if present and not NULL, it indicates a filter constraint which shall apply in the forwarding of the alignment-related alarm reports
  - if its value is NULL, no real filter shall be considered and the Manager receives the alarms according to the value of the parameter *alarmAckState* (see above).

The 'Action response' contains the following data:

- *alignmentId*
  The parameter is defined by the Agent and identifies unambiguously the current alarm alignment procedure. It allows the Manager to distinguish between alarm reports sent as consequence of several own alignment requests triggered in parallel.
- *status*
  The parameter contains the results of the NM action. Possible values: noError (0), error (the value indicates the reason of the error).
  After the action response is forwarded to the NM, the Agent sends the alarm list as a sequence of single alarm notifications in accordance with the values of the request parameters. Every alarm notification contains all fields of the alarm stored in the alarm list. In particular:
- The field *additionalText* contains at the beginning a string to allow a Manager to recognise that this alarm report is sent due to a previous *getAlarmList* request. The structure of this string is:
  - '(ALIGNMENT-alignmentId)' for every alarm report except the last one **or**
  - '(ALIGNMENTEND-alignmentId)' for the last alarm report sent by the Agent due to the current *getAlarmList* request.
- If available, the data related to the acknowledgment history (i.e. ackState, ackTime, ackUserId, ackSystemId) are provided in the field *additionalInformation*.
  Further details about the implementation of this operation are provided in the 'Introduction'.";

5.3.4 setComment (O)

```
setComment ACTION
   BEHAVIOUR
      setCommentBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.SetCommentInfo;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.SetCommentReply;
REGISTERED AS {ts32-111AlarmAction 4};

setCommentBehaviour BEHAVIOUR
DEFINED AS
```

"The behaviour of this functionality is defined within 32.111-2 – below provides an overview and CMIP specific semantics.
The NM invokes this action to associate a comment to one or more alarms.
The 'Action information' field contains:

- *alarmReferenceList*
  Contains a list of alarm identifiers to which the comment must be associated.
- *commentUserId*
  Contains the identity of the NM User that invokes this operation.
- *commentSystemId*
  Contains the identity of the NM that invokes this operation.
- *commentText*
  Contains the text of the comment.

The 'Action response' is composed of the following data:

- *errorAlarmReferenceList*
  List of pair of alarmId and failure reason.
- *status*
  It contains the results of the NM action. Possible values: actionSucceeded (0), actionPartiallyFailed (12) or another value indicating the reason of the error.";

5.3.5 getAlarmIRPVersion (M)

```
getAlarmIRPVersion ACTION
   BEHAVIOUR
      getAlarmIRPVersionBehaviour;
   MODE
      CONFIRMED;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.GetAlarmIRPVersionReply;
REGISTERED AS {ts32-111AlarmAction 5};

getAlarmIRPVersionBehaviour BEHAVIOUR
DEFINED AS
   "The behaviour of this functionality is defined within 32.111-2 – below provides an overview and
   CMIP specific semantics.
   The NM invokes this action to get information about the Alarm IRP versions supported by the
   Agent.
   The 'Action information' field contains no data.
   The 'Action response' is composed of the following data:
     •  versionNumbersList
        It defines a list of Alarm IRP versions supported by the Agent. A list containing no
        element, i.e. a NULL list means that the concerned Agent doesn't support any version of the
        Notification IRP.
     •  status
        It contains the results of the NM action. Possible values: noError (0), error (the value
        indicates the reason of the error).";
```

5.3.6 getAlarmIRPNotificationProfile (O)

```
getAlarmIRPNotificationProfile ACTION
   BEHAVIOUR
      getAlarmIRPNotificationProfileBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.IRPVersionNumber;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.GetNotificationProfileReply;
REGISTERED AS {ts32-111AlarmAction 6};

getAlarmIRPNotificationProfileBehaviour BEHAVIOUR
DEFINED AS
   "The behaviour of this functionality is defined within 32.111-2 – below provides an overview and
   CMIP specific semantics.
   A Manager invokes this action to enquiry about the notification profile (supported notifications
   and supported parameters) for this specific Alarm IRP version.
   The 'Action information' contains the following data:
     •  irpVersionNumber
        This mandatory parameter identifies the Alarm IRP version.
   The 'Action response' is composed of the following data:
     •  notificationNameProfile
        It contains a list of notification names, i.e. a NULL list means that the Alarm IRP doesn't
        support any notification.
     •  notificationParameterProfile.
        It contains a set of elements, each element corresponds to a notification name and is
        composed by a set of parameter names.
     •  status
        It contains the results of this action. Possible values: noError (0), error (the value
        indicates the reason of the error).";
```

5.3.7 getAlarmIRPOperationProfile (O)

```
getAlarmIRPOperationProfile ACTION
   BEHAVIOUR
      getAlarmIRPOperationProfileBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.IRPVersionNumber;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.GetOperationProfileReply;
REGISTERED AS {ts32-111AlarmAction 7};

getAlarmIRPOperationProfileBehaviour BEHAVIOUR
DEFINED AS
   "The behaviour of this functionality is defined within 32.111-2 – below provides an overview and
   CMIP specific semantics.
   A Manager invokes this action to enquiry about the operation profile (supported operations and
   supported parameters) for this specific Alarm IRP version.
   The 'Action information' contains the following data:
      •  irpVersionNumber
         This mandatory parameter identifies the Alarm IRP version.
   The 'Action response' is composed of the following data:
      •  operationNameProfile
         It contains a list of operation names.
      •  operationParameterProfile.
         It contains a set of elements, each element corresponds to an operation name and is
         composed by a set of parameter names.
      •  status
         It contains the results of this action. Possible values: noError (0), error (the value
         indicates the reason of the error).";
```

5.3.8 unacknowledgeAlarms (O)

```
unacknowledgeAlarms ACTION
   BEHAVIOUR
      unacknowledgeAlarmsBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.AckOrUnackAlarmsInfo;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.AckOrUnackAlarmsReply;
REGISTERED AS {ts32-111AlarmAction 8};

unacknowledgeAlarmsBehaviour BEHAVIOUR
DEFINED AS
   "The behaviour of this functionality is defined within 32.111-2 – below provides an overview and
   CMIP specific semantics.
   This action is used by the Manager to indicate to the Agent that one or several alarms
   (previously acknowledged) have to be unacknowledged. Subsequently the 'acknowledgement history'
   information of these alarms in the Agent's alarm list is completely removed (this operation may
   be used by operators in case of a previous acknowledgement by mistake).
   The 'Action information' field contains the following data:
      •  alarmReferenceList
         This parameter contains a set of MOI (Managed Object Instance) and notificationIdentifier
         pair. Each of them identifies unambiguously in the scope of the Agent an alarm (previously
         acknowledged by the NM) that have to be now unacknowledged. MOI can be absent if scope of
         uniqueness of notificationIdentifier is across the IRPAgent.
      •  ackUserId
         It contains the name of the operator who unacknowledged the alarm or a generic name
         (dependent on the operational concept). It may have also the value NULL. Note that only the
         user who previously acknowledged the alarm is allowed to un-acknowledge it later.
      •  ackSystemId
         It indicates the management system where the acknowledgment is triggered. It may have also
         the value NULL. Note that the un-acknowledgement is allowed only at the management system
         where previously the acknowledgement took place.
   The 'Action response' contains the following data:
      •  status
         This parameter contains the results of the NM un-acknowledgement action. Possible values:
         noError (0, all alarms found and ack state changed according to the manager request),
         unackPartlySuccessful (some alarms not found / not changeable, see next response
         parameter), error (value indicates the reason why the complete operation failed).
      •  errorAlarmReferenceList
         This parameter (significant only if status = unackPartlySuccessful) contains the list of
         MOI (Managed Object Instance) and notificationIdentifier pairs of the alarms which could
         not be unacknowledged and, for each alarm, also the reason of the error. MOI can be absent
         if scope of uniqueness of notificationIdentifier is across the IRPAgent. ";
```

5.3.9 clearAlarms (O)

```
clearAlarms ACTION
   BEHAVIOUR
      clearAlarmsBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.ClearAlarmsInfo;
   WITH REPLY SYNTAX
      TS32-111-4TypeModule.ClearAlarmsReply;
REGISTERED AS {ts32-111AlarmAction 9};

clearAlarmsBehaviour BEHAVIOUR
DEFINED AS
```

```
    "The behaviour of this functionality is defined within 32.111-2 – below provides an overview and
    CMIP specific semantics.
    This action is invoked by the IRPManager to clear manually one or multiple alarms.The M-ACTION
    request parameter 'Action information' ClearAlarmsInfo is composed of the following fields:
      •  alarmReferenceList
         This mandatory parameter identifies the alarms to be cleared. Each alarm is identified by
         the notification identifier of the notification that reported the alarm the first time and,
         if the notification identifier is not unique across the IRPAgent, by the instance of the
         managed object that emitted this notification.
      •  clearUserId
         This mandatory parameter identifies the user that has invoked the clearAlarms operation.
      •  clearSystemId
         This optional parameter identifies the system on which the IRPManager, where the
         clearAlarms operation has been invoked, is running. This parameter may be absent.
    The M-ACTION response parameter 'Action Reply' ClearAlarmsReply is composed of the following
    fields
      •  errorAlarmReferenceList
         This mandatory parameter identifies alarms that are specified in the alarmReferenceList,
         but which could not be cleared. The alarms are specified by the notification identifier of
         the notification that reported the alarm the first time and, if required, the instance of
         the managed object that emitted this notification. In addition to this, the parameter
         specifies for every alarm that could not be cleared the error reason. If all alarms
         specified in the alarmReferenceList exist and could be cleared, this parameter contains no
         information. If the operation failed completely due to a general error, this parameter is
         not significant.
      •  status
         This mandatory parameter provides informations about the result of the operation. If all
         alarms specified in the alarmReferenceList exist and are cleared, the value noError (0) is
         returned. If some alarms specified do not exist or could not be cleared, the value
         clearPartlySuccessful () is returned. In this case the parameter errorAlarmReferenceList
         provides additional information. If the operation failed completely due to a general error,
         this parameter returns the error reason.";
```

5.3.10 abortGetAlarmList (M)

```
abortGetAlarmList ACTION
    BEHAVIOUR
        abortGetAlarmListBehaviour;
    MODE
        CONFIRMED;
    WITH INFORMATION SYNTAX
        TS32-111-4TypeModule.AbortGetAlarmListInfo;
    WITH REPLY SYNTAX
        TS32-111-4TypeModule.AbortGetAlarmListReply;
REGISTERED AS {ts32-111AlarmAction 10};

abortGetAlarmListBehaviour BEHAVIOUR
DEFINED AS
    "This action is invoked by the IRPManager to abort an ongoing alarm alignment process.The M-
    ACTION request parameter 'Action information' AbortGetAlarmListInfo is composed of the following
    fields:
      •  alignmentIdReferenceList
         This parameter specifies the alarm alignment processes to be aborted. Each alarm alignment
         process is identified by its alignmentId.
    The M-ACTION response parameter 'Action Reply' AbortGetAlarmListReply is composed of the
    following fields
      •  errorAlignmentIdReferenceList
         This mandatory parameter identifies alarm alignment processes that are specified in the
         alignmentIdReferenceList, but which could not be aborted. In addition to this, the
         parameter specifies for every process that could not be aborted the error reason. If all
         alarm alignment processes specified in the alignmentIdReferenceList exist and could be
         aborted, this parameter contains no information. If the operation failed completely due to
         a general error, this parameter is not significant.
      •  status
         This mandatory parameter provides informations about the result of the operation. If all
         alarm alignment processes specified in the alignmentIdReferenceList exist and are aborted,
         the value noError (0) is returned. If some processes specified do not exist or could not be
         aborted, the value abortGetAlarmListPartlySuccessful (16) is returned. In this case the
         parameter errorAlignmentIdReferenceList provides additional information. If the operation
         failed completely due to a general error, this parameter returns the error reason.";
```

5.4 Notifications

5.4.1 notifyAlarmListRebuilt (M)

```
notifyAlarmListRebuilt NOTIFICATION
   BEHAVIOUR
      alarmListRebuiltBehaviour;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.NotifyAlarmListRebuiltInfo;
REGISTERED AS {ts32-111AlarmNotification 1};

alarmListRebuiltBehaviour BEHAVIOUR
DEFINED AS
   "This notification is used by the Agent to inform the NM that the alarm list has been rebuilt.
   The 'Event Information' field contains the following data:
     •  notificationIdentifier
        This ITU-T X.721 standardised parameter, together with MOI (Managed Object Instance),
        unambiguously identifies this notification.
     •  rebuiltObjectClass
        This parameter carries the IRPAgent MOC when the entire AlarmList has been rebuilt. It
        carries a different MOC when the AlarmList has been partially rebuilt.
     •  rebuiltObjectInstance
        This parameter carries DN of the IRPAgent when the entire AlarmList has been rebuilt. It
        carries the DN of another MOI when the AlarmList has been partially rebuilt  and only the
        MOIs subordinate of  this rebuilt MOI may be affected by this partial rebuilt.
     •  reason
        The parameter indicates the reason for alarm list rebuilding (if applicable).
     •  alarmListAlignmentRequirement
        This parameter indicates, if the IRPManager has to align its alarm list with the IRPAgent.
        Absence of this parameter means, that an alignment is required. ";
```

5.4.2 notifyPotentialFaultyAlarmList (O)

```
notifyPotentialFaultyAlarmList NOTIFICATION
   BEHAVIOUR
      notifyPotentialFaultyAlarmListBehaviour;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.NotifyPotentialFaultyAlarmListInfo;
REGISTERED AS {ts32-111AlarmNotification 3};

notifyPotentialFaultyAlarmListBehaviour BEHAVIOUR
DEFINED AS
   "This notification is used by the IRPAgent to inform the IRPManager that the IRPAgent has lost
   confidence in the integrity of its alarm list.
   The 'Event information' field contains the following data:
     •  potentialFaultyObjectClass
        This parameter specifies together with the parameter potentialFaultyObjectInstance the
        unreliable alarm information instances in the alarm list.
        If this parameter carries the MOC of the IRPAgent, then the entire alarm list is
        unreliable.
        If this parameter carries the MOC of another MO, then only a part of the alarm list is
        unreliable. The mechanism for identifying the unreliable part is described below.
     •  potentialFaultyObjectInstance
        This parameter specifies together with the parameter potentialFaultyObjectClass the
        unreliable alarm information instances in the alarm list.
        If potentialFaultyObjectClass carries the MOC of the IRPAgent, the this parameter carries
        the DN of the IRPAgent and the entire alarm list is unreliable.
        If potentialFaultyObjectClass carries the MOC of another MO, then this parameter carries
        the DN of an instance of this class. All alarm information instances representing alarms
        raised by this MOI and its subordinates may be unreliable in this case.
     •  notificationIdentifier
        This parameter specifies the notification identifier (ITU-T X.733 [5]), which, together
        with the instance of the object emitting this notification, unambiguously identifies this
        notification.
     •  reason
        This parameter specifies the reason why the IRPAgent has lost confidence in the integrity
        of its alarm list and needs to rebuild it.";
```

5.4.3 notifyAlarmAlignmentEnd (M)

```
notifyAlarmAlignmentEnd NOTIFICATION
   BEHAVIOUR
```

```
      notifyAlarmAlignmentEndBehaviour;
   WITH INFORMATION SYNTAX
      TS32-111-4TypeModule.NotifyAlarmAlignmentEndInfo;
REGISTERED AS {ts32-111AlarmNotification 4};

notifyAlarmAlignmentEndBehaviour BEHAVIOUR
DEFINED AS
   "This notification is used by the Agent to inform the NM that the alarm alignment related to the
   current alignmentId value is completed or has been aborted before completion by
   abortGetAlarmList.
   The 'Event Information' field contains the following data:
      •  notificationIdentifier
         This ITU-T X.721 standardised parameter, together with MOI (Managed Object Instance),
         unambiguously identifies this notification.
      •  alignmentId
         The parameter is defined by the Agent (in the getAlarmList response) and identifies
         unambiguously the current alarm alignment process. It allows the Manager to distinguish
         between alarm reports sent as consequence of several own alignment requests triggered in
         parallel."
```

5.5 Attributes

5.5.1 alarmControlId

```
alarmControlId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX
      TS32-111-4TypeModule.GeneralObjectId;
   MATCHES FOR
      EQUALITY;
   BEHAVIOUR
      alarmControlIdBehaviour;
REGISTERED AS {ts32-111AlarmAttribute 1};

alarmControlIdBehaviour BEHAVIOUR
DEFINED AS
   "This attribute names an instance of a 'alarmControl' object class.";
```

5.5.2 alarmsCountSummary

```
alarmsCountSummary ATTRIBUTE
   WITH ATTRIBUTE SYNTAX
      TS32-111-4TypeModule.AlarmsCountSummary;
   MATCHES FOR
      EQUALITY;
   BEHAVIOUR
      alarmsCountSummaryBehaviour;
REGISTERED AS {ts32-111AlarmAttribute 2};

alarmsCountSummaryBehaviour BEHAVIOUR
DEFINED AS
   "This attribute indicates a summary of number of alarms managed in the Agent's alarm list sorted
   according to the perceived severity (including the number of cleared but not yet acknowledged
   alarms). Additionally the number of all currently active alarms is provided.";
```

5.5.3 supportedAlarmIRPVersions

```
supportedAlarmIRPVersions ATTRIBUTE
   WITH ATTRIBUTE SYNTAX
      TS32-111-4TypeModule.SupportedAlarmIRPVersions;
   MATCHES FOR
      EQUALITY;
   BEHAVIOUR
      supportedAlarmIRPVersionsBehaviour;
REGISTERED AS {ts32-111AlarmAttribute 3};

supportedAlarmIRPVersionsBehaviour BEHAVIOUR
DEFINED AS
   "This attribute provides the information concerning the Alarm IRP versions currently supported by
   the Agent.";
```

5.6 Parameters

5.6.1 ackStateParameter

```
ackStateParameter PARAMETER
   CONTEXT
      TS32-111-4TypeModule.AlarmInfo.additionalInformation;
   WITH SYNTAX
      TS32-111-4TypeModule.AckState;
   BEHAVIOUR
      ackStateParameterBehaviour;
REGISTERED AS {ts32-111AlarmParameter 1};

ackStateParameterBehaviour BEHAVIOUR
DEFINED AS
   "This parameter models the optional additionalInformation field of the alarm notification. If
   present, it informs the NM about the current acknowledgement state of the present alarm.";
```

5.6.2 ackSystemIdParameter

```
ackSystemIdParameter PARAMETER
   CONTEXT
      TS32-111-4TypeModule.AlarmInfo.additionalInformation;
   WITH SYNTAX
      TS32-111-4TypeModule.SystemId;
   BEHAVIOUR
      ackSystemIdParameterBehaviour;
REGISTERED AS {ts32-111AlarmParameter 2};

ackSystemIdParameterBehaviour BEHAVIOUR
DEFINED AS
   "This parameter models the optional additionalInformation field of the alarm notification. If
   present, it informs the NM about the identifier of the management system where the present alarm
   has been acknowledged.";
```

5.6.3 ackTimeParameter

```
ackTimeParameter PARAMETER
   CONTEXT
      TS32-111-4TypeModule.AlarmInfo.additionalInformation;
   WITH SYNTAX
      TS32-111-4TypeModule.AckTime;
   BEHAVIOUR
      ackTimeParameterBehaviour;
REGISTERED AS {ts32-111AlarmParameter 3};

ackTimeParameterBehaviour BEHAVIOUR
DEFINED AS
   "This parameter models the optional additionalInformation field of the alarm notification. If
   present, it informs the NM about the time the present alarm has been acknowledged by the Agent.";
```

5.6.4 ackUserIdParameter

```
ackUserIdParameter PARAMETER
   CONTEXT
      TS32-111-4TypeModule .AlarmInfo.additionalInformation;
   WITH SYNTAX
      TS32-111-4TypeModule.UserId;
   BEHAVIOUR
      ackUserIdParameterBehaviour;
REGISTERED AS {ts32-111AlarmParameter 4};

ackUserIdParameterBehaviour BEHAVIOUR
DEFINED AS
   "This parameter models the optional additionalInformation field of the alarm notification. If
   present, it informs the NM about the identifier of the user who acknowledged the present alarm.";
```

5.6.5 clearUserIdParameter

```
clearUserIdParameter PARAMETER
```

```
   CONTEXT
      TS32-111-4TypeModule .AlarmInfo.additionalInformation;
   WITH SYNTAX
      TS32-111-4TypeModule.UserId;
   BEHAVIOUR
      clearUserIdParameterBehaviour;
REGISTERED AS {ts32-111AlarmParameter 5};

clearUserIdParameterBehaviour BEHAVIOUR
DEFINED AS
   "This parameter is carried by additionalInformation in the notification reporting the clearance
   of an alarm. It identifies the user that has invoked the clearAlarms operation, that has led to
   the clearance of the reported alarm clearance.";
```

5.6.6 clearSystemIdParameter

```
clearSystemIdParameter PARAMETER
   CONTEXT
      TS32-111-4TypeModule.AlarmInfo.additionalInformation;
   WITH SYNTAX
      TS32-111-4TypeModule.UserId;
   BEHAVIOUR
      clearSystemIdParameterBehaviour;
REGISTERED AS {ts32-111AlarmParameter 6};

clearSystemIdParameterBehaviour BEHAVIOUR
DEFINED AS
   "This parameter is carried by additionalInformation in the notification reporting the clearance
   of an alarm. It identifies the system on which the IRPManager, where the clearAlarms operation
   that has led to the clearance of the reported alarm, is running";
```

5.6.7 commentsParameter

```
commentsParameter PARAMETER
   CONTEXT
      TS32-111-4TypeModule.AlarmInfo.additionalInformation;
   WITH SYNTAX
      TS32-111-4TypeModule.AlarmComments;
   BEHAVIOUR
      commentsParameterBehaviour;
REGISTERED AS   {ts32-111AlarmParameter 7};

commentsParameterBehaviour BEHAVIOUR
DEFINED AS
   "This parameter is carried by the attribute additionalInformation in alarm notifications. If
   present, it informs the IRPManager about the comments assigned to an alarm. Every single comment
   includes the following data: commentText, commentTime, commentUserId and (optionally)
   commentSystemId.";
```

6 ASN.1 definitions for Alarm IRP

```
TS32-111-4TypeModule {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-Operation-
Maintenance(3) ts-32-111(111) part4(4) informationModel(0) asn1Module(2) version1(1)}

DEFINITIONS IMPLICIT TAGS ::=
BEGIN

--EXPORTS everything

IMPORTS

NotificationIdentifier, Destination, EventTime, ProbableCause, PerceivedSeverity
   FROM Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module(2) 1}

AlarmInfo
   FROM Notification-ASN1Module {joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module(2) 2}

CMISFilter, ObjectInstance, ObjectClass, EventTypeId
   FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)};

baseNodeUMTS                 OBJECT IDENTIFIER ::= {itu-t (0) identified-organization (4)
                                                     etsi (0) mobileDomain (0)
                                                     umts-Operation-Maintenance (3)}

ts32-111Prefix               OBJECT IDENTIFIER ::= {baseNodeUMTS ts-32-111(111)}
ts32-111Part4                OBJECT IDENTIFIER ::= {ts32-111Prefix part4(4)}
ts32-111-4InfoModel          OBJECT IDENTIFIER ::= {ts32-111Part4 informationModel(0)}

ts32-111AlarmObjectClass     OBJECT IDENTIFIER ::= {ts32-111-4InfoModel managedObjectClass(3)}
ts32-111AlarmPackage         OBJECT IDENTIFIER ::= {ts32-111-4InfoModel package(4)}
ts32-111AlarmParameter       OBJECT IDENTIFIER ::= {ts32-111-4InfoModel parameter(5)}
ts32-111AlarmAttribute       OBJECT IDENTIFIER ::= {ts32-111-4InfoModel attribute(7)}
ts32-111AlarmAction          OBJECT IDENTIFIER ::= {ts32-111-4InfoModel action(9)}
ts32-111AlarmNotification    OBJECT IDENTIFIER ::= {ts32-111-4InfoModel notification(10)}


-- Start of 3GPP SA5 own definitions


AbortGetAlarmListInfo ::= SEQUENCE
   {
   alignmentIdReferenceList      SET OF INTEGER
   }

AbortGetAlarmListReply ::= SEQUENCE
   {
   errorAlignmentIdReferenceList      SET OF ErrorInfoAbortGetAlarmList,
   status                             ErrorCauses
   }

AckErrorList ::= SET OF ErrorInfo

AlarmReference ::= SEQUENCE
   {
   moi                           ObjectInstance OPTIONAL, -- absent if scope of uniquness of
                                                          -- notificationId is across IRPAgent
   notificationIdentifier        NotificationIdentifier
   }

AckOrUnackAlarmsInfo ::= SEQUENCE
   {
   alarmReferenceList            SET OF AlarmReference,
   ackUserId                     UserId,
   ackSystemId                   SystemId OPTIONAL
   }

AckOrUnackAlarmsReply ::= SEQUENCE
   {
   status                        ErrorCauses,
   errorAlarmReferenceList       AckErrorList
   }
```

```
AckState ::= ENUMERATED
   {
   acknowledged    (0),
   unacknowledged  (1)
   }

AckTime ::= GeneralizedTime

AlarmChoice ::= ENUMERATED
   {
   allAlarms                  (0),
   allActiveAlarms            (1),
   allActiveAndAckAlarms      (2),
   allActiveAndUnackAlarms    (3),
   allClearedAndUnackAlarms   (4),
   allUnackAlarms             (5)
   }

AlarmComments ::= SET OF SingleAlarmComment

AlarmsCountSummary ::= SEQUENCE
   {
   activeAlarmsCount       INTEGER,   -- this is the sum of criticalCount, majorCount,
                                      -- minorCount, warningCount and indeterminateCount
   criticalCount           INTEGER,
   majorCount              INTEGER,
   minorCount              INTEGER,
   warningCount            INTEGER,
   indeterminateCount      INTEGER,
   clearedCount            INTEGER
   }

AlarmListAlignmentRequirement ::= ENUMERATED
   {
   alignmentRequired      (0),   -- An alarm alignment is required.
   alignmentNotRequired   (1)    -- An alarm alignment is not required.
   }

ClearAlarmsInfo ::= SEQUENCE
   {
   alarmReferenceList      SET OF AlarmReference,
   clearUserId             UserId,
   clearSystemId           SystemId OPTIONAL
   }

ClearAlarmsReply ::= SEQUENCE
   {
   status                       ErrorCauses,
   errorAlarmReferenceList      ClearErrorList
   }

ClearErrorList ::= SET OF ErrorInfo

CommentText ::= GraphicString

CommentTime ::= GeneralizedTime

ErrorCauses ::= ENUMERATED
   {
   noError                         (0), -- operation / notification successfully performed
   wrongFilter                     (1), -- the value of the filter parameter is not valid
   wrongAlarmAckState              (2), -- the value of the alarmAckState parameter (e.g.
                                        -- getAlarmCount) is not valid
   ackPartlySuccessful             (3), -- acknowledgment request partly successful
   unackPartlySuccessful           (4), -- unacknowledgment request partly successful
   wrongAlarmReference             (5), -- alarm identifier used in the alarm reference list not
                                        -- found (e.g. in case of acknowledgement request)
   wrongAlarmReferenceList         (6), -- the alarm reference list (e.g. in case of
                                        -- acknowledgement request) is empty or completely wrong
   alarmAlreadyAck                 (7), -- alarm to be acknowledged is already in this state
   alarmAlreadyUnack               (8), -- alarm to be acknowledged is already in this state
   wrongUserId                     (9), -- the user identifier in the unacknowledgement operation
                                        -- is not the same as in the previous
                                        -- acknowledgementAlarms request
   wrongSystemId                  (10), -- the system identifier in the unacknowledgement
                                        -- operation is not the same as in the previous
                                        -- acknowledgementAlarms request
   alarmAckNotAllowed             (11), -- current management system not allowed to acknowledge the
```

```
                                          -- alarm (e.g. due to acknowledgement competence rules)
   setCommentPartlySuccessful      (12), -- the setComment action partly successful (e.g. some
                                          -- alarmId are not in the alarmList)
   clearAlarmsPartlySuccessful     (13), -- only some alarms to be cleared could be cleared
   clearAlarmsNotAllowed           (14), -- current management system not allowed to clear the alarm
   clearAlarmsAlarmAlreadyCleared  (15), -- alarm to be cleared is already cleared
   abortGetAlarmListPartlySuccessful     (16), -- only some alarm alignment processes to be aborted
                                                -- could be aborted
   abortGetAlarmListNotAllowed           (17), -- current management system not allowed to abort
                                                -- alarm alignment processes
   abortGetAlarmListProcessNotExist      (18), -- alarm alignment process to be aborted does
                                                -- not exist
   unspecifiedErrorReason         (255)  -- operation failed, specific error unknown
   }

ErrorInfo ::= SEQUENCE
   {
   moi                          ObjectInstance OPTIONAL,   -- absent if uniqueness of
                                                           -- notificationIdentifier is across
                                                           -- IRPAgent
   notificationIdentifier       NotificationIdentifier,    -- ITU-T X.721
   reason                       ErrorCauses
   }

ErrorInfoAbortGetAlarmList ::= SEQUENCE
   {
   alignmentId        INTEGER,
   reason             ErrorCauses
   }

GeneralObjectId ::= INTEGER

GetAlarmCountInfo ::= SEQUENCE
   {
   alarmAckState        AlarmChoice OPTIONAL,
   filter               CMISFilter OPTIONAL     -- ITU-T X.711
   }

GetAlarmCountReply ::= SEQUENCE
   {
   criticalCount             INTEGER,
   majorCount                INTEGER,
   minorCount                INTEGER,
   warningCount              INTEGER,
   indeterminateCount        INTEGER,
   clearedCount              INTEGER,
   status                    ErrorCauses
   }

GetAlarmIRPVersionReply ::= SEQUENCE
   {
   versionNumberList        SupportedAlarmIRPVersions,
   status                   ErrorCauses
  }

GetAlarmListInfo ::= SEQUENCE
   {
   alarmAckState             AlarmChoice OPTIONAL,
   baseObjectClass           ObjectClass OPTIONAL,       -- ITU-T X.711
   baseObjectInstance        ObjectInstance OPTIONAL,    -- ITU-T X.711
   destination               Destination,                -- ITU-T X.721
   filter                    CMISFilter OPTIONAL         -- ITU-T X.711
   }

GetAlarmListReply ::= SEQUENCE
   {
   alignmentId        INTEGER,
   status             ErrorCauses
   }

GetNotificationProfileReply ::= SEQUENCE
   {
   notificationNameProfile           NotificationList,
   notificationParameterProfile      ParameterListOfList,
   status                            ErrorCauses
   }

GetOperationProfileReply ::= SEQUENCE
```

```
   {
   operationNameProfile           OperationList,
   operationParameterProfile      ParameterListOfList,
   status                         ErrorCauses
   }

IRPVersionNumber ::= GraphicString

NotificationList ::= SET OF NotificationName

NotificationName ::= GraphicString

NotifyAlarmAlignmentEndInfo ::= SEQUENCE
   {
   notificationIdentifier      NotificationIdentifier,        -- ITU-T X.721
   alignmentId                 INTEGER
   }

NotifyAlarmListRebuiltInfo ::= SEQUENCE
   {
   notificationIdentifier             NotificationIdentifier,         -- ITU-T X.721
   rebuiltObjectClass                 ObjectClass,                    -- ITU-T X.721
   rebuiltObjectInstance              ObjectInstance,                 -- ITU-T X.721
   reason                             ReasonAlarmListRebuilt,
   alarmListAlignmentRequirement      AlarmListAlignmentRequirement OPTIONAL
   }

NotifyPotentialFaultyAlarmListInfo ::= SEQUENCE
   {
   potentialFaultyObjectClass         ObjectClass,                     -- ITU-T X.711
   potentialFaultyObjectInstance      ObjectInstance,                  -- ITU-T X.711
   notificationIdentifier             NotificationIdentifier,          -- ITU-T X.721
   reason                             ReasonPotentialFaultyAlarmList
   }

OperationList ::= SET OF OperationName

OperationName ::= GraphicString

ParameterList ::= SET OF ParameterName

ParameterListOfList ::= SET OF ParameterList

ParameterName ::= GraphicString

ReasonAlarmListRebuilt ::= ENUMERATED
   {
   agentNetworkEntityCommunicationError   (0),
   agentRestart                           (1),
   indeterminate                          (2)
   }

ReasonPotentialFaultyAlarmList ::= ENUMERATED
   {
   communicationErrorNEAgent   (0), -- A communication error between a NE and the agent has occured.
   agentRestart                (1), -- The agent has restarted and not yet updated its alarm list.
   indeterminate               (2)  -- The reasn could not be determined.
   }

SetCommentInfo ::= SEQUENCE
   {
   alarmReferenceList      SET OF AlarmReference,
   commentUserId           UserId,
   commentSystemId         [2] SystemId OPTIONAL,
   commentText             CommentText
   }

SetCommentReply ::= SEQUENCE
   {
   errorAlarmReferenceList      SET OF ErrorInfo,
   status                       ErrorCauses
   }

SingleAlarmComment ::= SEQUENCE
   {
   commentText          CommentText,
   commentTime          CommentTime,
   commentUserId        UserId,
   commentSystemId      SystemId OPTIONAL
   }

SystemId ::= GraphicString

SupportedAlarmIRPVersions ::= SET OF IRPVersionNumber

UserId ::= GraphicString

END -- of module TS32-111-4TypeModule
```

End of Change in Clause 5 & 6

End of Document