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**ITU-T**

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OF ITU

**M.3120**

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SERIES M: TMN AND NETWORK MAINTENANCE:  
INTERNATIONAL TRANSMISSION SYSTEMS,  
TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE  
AND LEASED CIRCUITS

Telecommunications management network

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**CORBA generic network and network element  
level information model**

ITU-T Recommendation M.3120

(Formerly CCITT Recommendation)

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## ITU-T M-SERIES RECOMMENDATIONS

### TMN AND NETWORK MAINTENANCE: INTERNATIONAL TRANSMISSION SYSTEMS, TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE AND LEASED CIRCUITS

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**CORBA generic network and network element level information model**

**Summary**

This Recommendation defines a generic network information model to be used in telecommunications network management based on CORBA. It defines in Interface Definition Language (IDL) a set of generic interfaces and constants. The intent of this Recommendation is to define a generic CORBA/IDL model similar to that defined in ITU-T X.721 and M.3100 using CMISE. These generic IDL interfaces could be extended by various industries for managing specific network technologies, such as ATM and SONET/SDH.

This Recommendation includes an electronic attachment containing IDL descriptions.

**Source**

ITU-T Recommendation M.3120 was revised by ITU-T Study Group 4 (2001-2004) and approved under the WTSA Resolution 1 procedure on 7 October 2001.

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**Table of CORBA Interfaces**

<b>Fine-Grained Interface</b>	<b>Clause</b>	<b>Facade Interface</b>	<b>Clause</b>
AbstractLink	6.5.1	AbstractLink_F	6.6.1
AbstractLinkEnd	6.5.2	AbstractLinkEnd_F	6.6.2
AccessGroup	6.5.3	AccessGroup_F	6.6.3
AlarmSeverityAssignmentProfile	6.5.4	AlarmSeverityAssignmentProfile_F	6.6.4
ArcIntervalProfile	6.5.5	ArcIntervalProfile_F	6.6.5
BasicLayerND	6.5.15.1.1	BasicLayerND_F	6.6.15.1.1
BasicSubnetwork	6.5.19.1	BasicSubnetwork_F	6.6.19.1
CircuitEndPointSubgroup	6.5.6	CircuitEndPointSubgroup_F	6.6.6
CircuitPack	6.5.8.1	CircuitPack_F	6.6.8.1
CTPAbstract	6.5.20.1	CTPAbstract_F	6.6.20.1
CTPBid	6.5.20.1.2.1	CTPBid_F	6.6.20.1.2.1
CTPSink	6.5.20.1.1	CTPSink_F	6.6.20.1.1
CTPSource	6.5.20.1.2	CTPSource_F	6.6.20.1.2
ControlPoint	6.5.9.1	ControlPoint_F	6.6.9.1
CrossConnection	6.5.7	CrossConnection_F	6.6.7
Equipment	6.5.8	Equipment_F	6.6.8
EquipmentHolder	6.5.8.2	EquipmentHolder_F	6.6.8.2
ExternalPoint	6.5.9	ExternalPoint_F	6.6.9
Fabric	6.5.10	Fabric_F	6.6.10
GTP	6.5.11	GTP_F	6.6.11
LayerND	6.5.15.1	LayerND_F	6.6.15.1
LinkConnection	6.5.16.1	LinkConnection_F	6.6.16.1
LogicalLink	6.5.1.1	LogicalLink_F	6.6.1.1
LogicalLinkEnd	6.5.2.1	LogicalLinkEnd_F	6.6.2.1
ManagedElement	6.5.12	ManagedElement_F	6.6.12
ManagedElementComplex	6.5.13	ManagedElementComplex_F	6.6.13
MPCrossConnection	6.5.14	MPCrossConnection_F	6.6.14
Network	6.5.15	Network_F	6.6.15
NetworkCTPAbstract	6.5.20.3.1	NetworkCTPAbstract_F	6.6.20.3.1
NetworkCTPBid	6.5.20.3.1.2.1	NetworkCTPBid_F	6.6.20.3.1.2.1
NetworkCTPSink	6.5.20.3.1.1	NetworkCTPSink_F	6.6.20.3.1.1
NetworkCTPSource	6.5.20.3.1.2	NetworkCTPSource_F	6.6.20.3.1.2
NetworkTP	6.5.20.3	NetworkTP_F	6.6.20.3
NetworkTTPAbstract	6.5.20.3.2	NetworkTTPAbstract_F	6.6.20.3.2
NetworkTTPBid	6.5.20.3.2.2.1	NetworkTTPBid_F	6.6.20.3.2.2.1
NetworkTTPSink	6.5.20.3.2.1	NetworkTTPSink_F	6.6.20.3.2.1
NetworkTTPSource	6.5.20.3.2.2	NetworkTTPSource_F	6.6.20.3.2.2
Pipe	6.5.16	Pipe_F	6.6.16
ScanPoint	6.5.9.2	ScanPoint_F	6.6.9.2
Software	6.5.18	Software_F	6.6.18
Subnetwork	6.5.19	Subnetwork_F	6.6.19

**Table of CORBA Interfaces**

<b>Fine-Grained Interface</b>	<b>Clause</b>	<b>Facade Interface</b>	<b>Clause</b>
SNC	6.5.16.2	SNC_F	6.6.16.2
TP	6.5.20	TP_F	6.6.20
TopLink	6.5.1.2	TopLink_F	6.6.1.2
TopLinkEnd	6.5.2.2	TopLinkEnd_F	6.6.2.2
TPPool	6.5.21	TPPool_F	6.6.21
Trail	6.5.16.3	Trail_F	6.6.16.3
Trail95	6.5.17	Trail95_F	6.6.17
TTPAbstract	6.5.20.2	TTPAbstract_F	6.6.20.2
TTPBid	6.5.20.2.2.1	TTPBid_F	6.6.20.2.2.1
TTPSink	6.5.20.2.1	TTPSink_F	6.6.20.2.1
TTPSource	6.5.20.2.2	TTPSource_F	6.6.20.2.2





## ITU-T Recommendation M.3120

### CORBA generic network and network element level information model<sup>1</sup>

#### 1 Scope

This Recommendation defines a generic network information model to be used in telecommunications network management based on CORBA. It defines in Interface Definition Language (IDL) a set of generic interfaces and constants. The intent of this Recommendation is to define a generic CORBA/IDL model similar to that defined in ITU-T X.721 and M.3100 using CMISE. These generic IDL interfaces could be extended by various industries for managing specific network technologies, such as ATM and SONET/SDH.

#### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Q.816 (2001), *CORBA-Based TMN Services*.
- [2] ITU-T Q.816.1 (2001), *CORBA-based TMN services: Extensions to support coarse-grained interfaces*.
- [3] ITU-T X.780 (2001), *TMN guidelines for defining CORBA managed objects*.
- [4] ITU-T X.780.1 (2001), *TMN guidelines for defining coarse-grained CORBA managed objects interfaces*.
- [5] ITU-T M.3100 (1995) plus Amendment 1 (1999), *Generic Network Information Model*.
- [6] ITU-T G.855.1 (1999), *GDMO engineering viewpoint for the generic network level model*.
- [7] ITU-T G.854.1 (1996), *Management of the transport network – Computational interfaces for basic transport network model*.
- [8] ITU-T G.854.3 (1999), *Computational viewpoint for topology management*.
- [9] ITU-T G.854.6 (1999), *Computational viewpoint for trail management*.
- [10] ITU-T G.854.8 (1999), *Computational viewpoint for pre-provisioned adaptation management*.
- [11] ITU-T G.854.10 (1999), *Computational viewpoint for pre-provisioned link connection management*.
- [12] ITU-T G.854.12 (1999), *Computational viewpoint for pre-provisioned link management*.

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<sup>1</sup> This Recommendation includes an electronic attachment containing IDL descriptions.

### **3 Terms and Definitions**

This Recommendation uses the following abbreviations defined in ITU-T Q.816:

- Event channel

### **4 Abbreviations and acronyms**

This Recommendation uses the following abbreviations defined in ITU-T M.3100:

ARC	Alarm Reporting Control
CTP	Connection Termination Point
GTP	Group Termination Point
MOO	Multiple Object Operation
MP	Multi-Point
QI	Qualified Inhibit
TP	Termination Point
TTP	Trail Termination Point

## **5 Overview of the Generic Information Model**

### **5.1 Background of the IDL models**

Clause 6 defines a set of CORBA interfaces for the CORBA generic information model. These interfaces are translated manually from a set of M.3100 GDMO managed object classes following the TMN CORBA framework and guidelines given in ITU-T Q.816 and X.780 for fine-grained CORBA interface.

In addition to the fine-grained interfaces in 6.5, an accompanying set of Facade interfaces are defined in 6.6. These facade interfaces are defined according to the coarse-grained extension framework and guidelines given in ITU-T Q.816.1 and X.780.1 for supporting coarse-grained CORBA interface. The name of these facade interface are the name of the corresponding fine-grained interface appended with "\_F" (an underscore followed by a capital "F").

In clauses 6.5 and 6.6, the IDL signature of the interfaces are specified in inheritant order, instead of in alphabetical order. The reason of listed in inheritant order is to overcome the limitation of certain "one-pass" IDL compilers.

To facilitate the readability of this Recommendation, an alphabetical listing of the CORBA interfaces, along with pointers to the clauses and pages at there the interfaces are defined, is provided upfront right after the Table of Contents.

The source GDMO definitions used, from which the CORBA interfaces are translated are defined in ITU-T M.3100 and its amendments, except BasicLayerNetworkDomain and BasicSubnetwork, which are defined in ITU-T G.855.1. In most cases, the latest versions of the GDMO managed object classes were used. For example, the Network interface is based on the NetworkR1 GDMO specification. Since in ITU-T M.3100, trailR2 is not a replacement of trailR1, the Trail interface is translated from trailR2 while Trail95 is translated from trailR1. Future alignment between the IDL version and M.3100 GDMO is expected to be maintained as they evolve based on contributions.

The behaviour and descriptive text in the comment fields of the IDL interfaces are taking directly from the source GDMO definition. For the exceptions raised in the operations of the network level resource interfaces, reading of the G.854 series GDMO behaviour statements may be required to understand the semantics of the exceptions.

The IDL in this Recommendation has been compiled successfully without syntax error. The compiler used claims CORBA 2.3 compliance, which includes value type and M4 macro capabilities.

It should be noted that additional interfaces, although required, are not listed above nor shown in the tables and figures of 5.2. Examples are the factory classes. In addition, other classes are defined in ITU-T Q.816.1, such as factory finder, channel finder, terminator, heartbeat and the MOO service.

## 5.2 Interface Inheritance and Containment Relationship

This clause illustrates the inheritance and containment relationship of the CORBA interfaces defined in this Recommendation. The inheritance hierarchy is shown in Table 1, Table 2 and Figure 1. In Table 1, first level subclasses are listed in alphabetical order, while in Table 2, the object classes are grouped according to the fragments similar to those used in ITU-T M.3100. Note that facade interfaces follow the same inheritance hierarchy relationship as the corresponding fine-grained interfaces.

**Table 1/M.3120 – CORBA interface inheritance hierarchy (alphabetical order)**

Top Level Class	1st Level Subclass	2nd Level Subclass	3rd Level Subclass	4th Level Subclass	5th Level Subclass
<i>Managed Object</i>	<i>AbstractLink</i>	LogicalLink			
		TopLink			
	<i>AbstractLinkEnd</i>	LogicalLinkEnd			
		TopLinkEnd			
	AccessGroup				
	AlarmSeverity AssignmentProfile				
	ArcIntervalProfile				
	CircuitEndPoint Subgroup				
	CrossConnection				
	Equipment	CircuitPack			
		EquipmentHolder			
	<i>ExternalPoint</i>	ControlPoint			
		ScanPoint			
	Fabric				
	GTP				
	ManagedElement				
	ManagedElement Complex				

**Table 1/M.3120 – CORBA interface inheritance hierarchy (alphabetical order)**

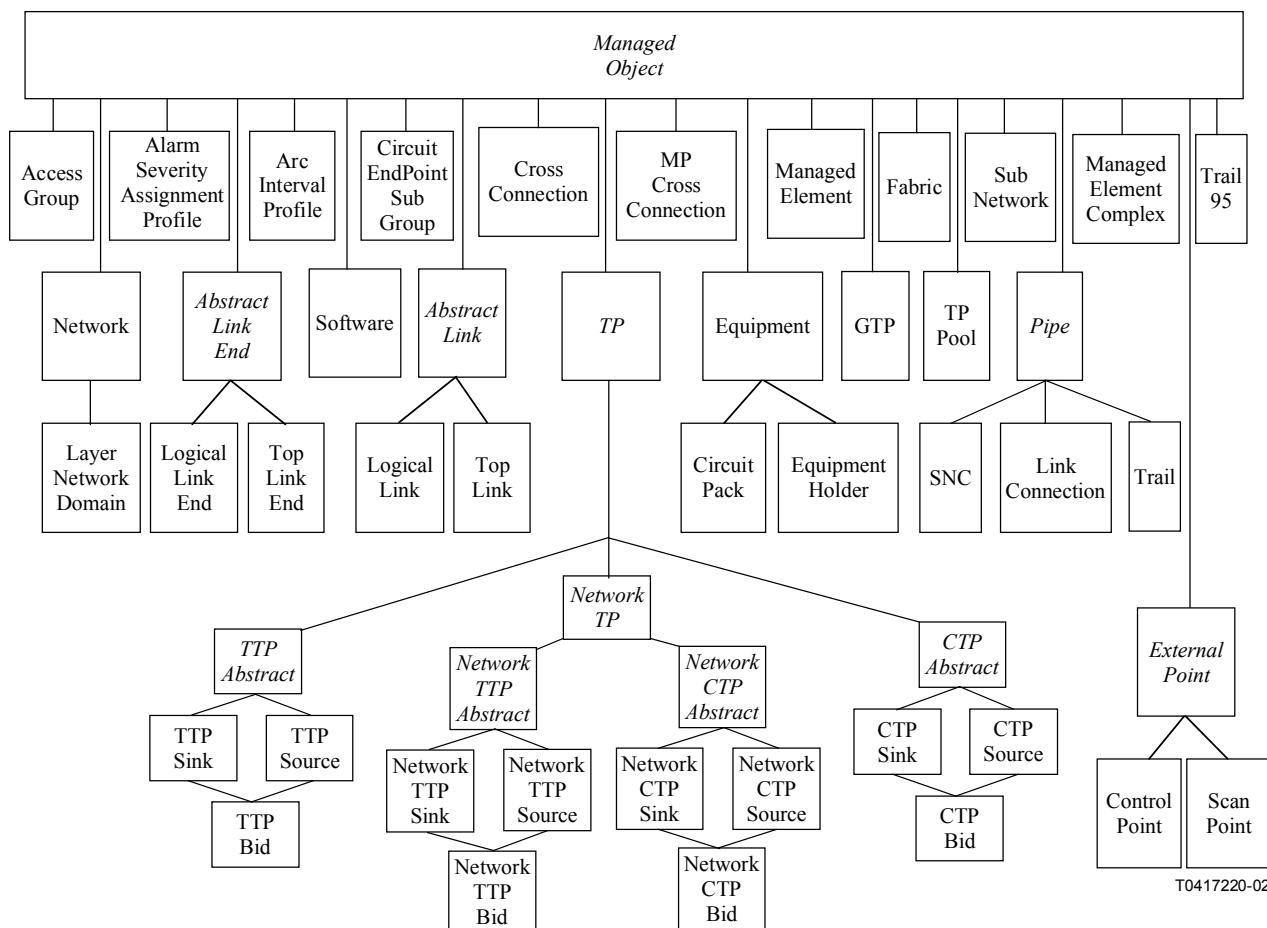
Top Level Class	1st Level Subclass	2nd Level Subclass	3rd Level Subclass	4th Level Subclass	5th Level Subclass
<i>Managed Object</i>	MPCross Connection				
	Network	LayerND	BasicLayerND		
	<i>Pipe</i>	LinkConnection			
		SNC			
		Trail			
	Trail95				
	Software				
	Subnetwork	BasicSubnetwork			
	<i>TP</i>	<i>CTPAbstract</i>	CTPSink	CTPBid	
			CTPSource		
		<i>TTPAbstract</i>	TTPSink	TTPBid	
			TTPSource		
		<i>NetworkTP</i>	<i>NetworkCTPAbstract</i>	NetworkCTPSink	Network CTPBid
				NetworkCTP Source	
			<i>NetworkTTPAbstract</i>	NetworkTTPSink	Network TTPBid
				NetworkTTP Source	
	TPPool				
NOTE 1 – Non-instantiable classes are shown in italics.					
NOTE 2 – All the interfaces are defined in the itut_m3120 module of this Recommendation, except the top level interface ManagedObject, which is defined in the itut_x780 module of ITU-T X.780.					

**Table 2/M.3120 – CORBA interface inheritance hierarchy (by fragment)**

Fragment	1st Level Subclass of ManagedObject	2nd Level Subclass	3rd Level Subclass	4th Level Subclass	5th Level Subclass
<b>Domain Entity</b>	Network	LayerND	BasicLayerND		
	Subnetwork	BasicSubnetwork			
<b>Binary Transport Entity</b>	<i>Pipe</i>	LinkConnection			
		SNC			
		Trail			
	Trail95				
	AbstractLink	LogicalLink			
		TopLink			

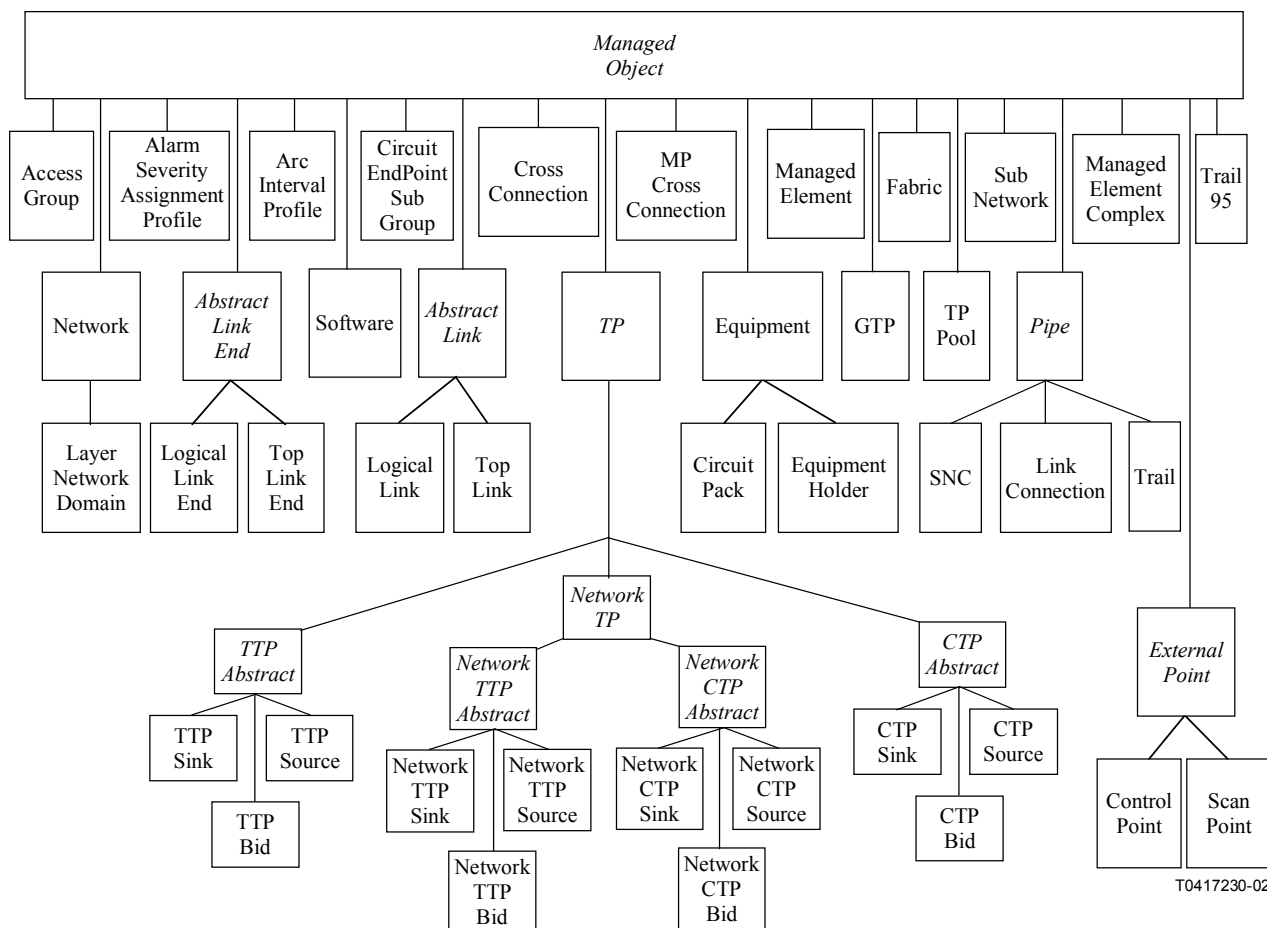
**Table 2/M.3120 – CORBA interface inheritance hierarchy (by fragment)**

Fragment	1st Level Subclass of ManagedObject	2nd Level Subclass	3rd Level Subclass	4th Level Subclass	5th Level Subclass
Unary Transport Entity	GTP				
	TPPool				
	AccessGroup				
	CircuitEndPointSubgroup				
	TP	CTPAbstract	CTPSink	CTPBid	
			CTPSource		
		TTPAbstract	TTPSink	TTPBid	
			TTPSource		
		NetworkTP	NetworkCTP Abstract	NetworkCTPSink	NetworkCTPBid
				NetworkCTP Source	
			NetworkTTP Abstract	NetworkTTPSink	NetworkTTPBid
		NetworkTTP Source			
	AbstractLinkEnd	LogicallLinkEnd			
		TopLinkEnd			
NE	ManagedElement				
	ManagedElement Complex				
Hardware	Equipment	CircuitPack			
		EquipmentHolder			
Software	Software				
Cross connect	Fabric				
	CrossConnection				
	MPCross Connection				
Fault mgmt	AlarmSeverity AssignmentProfile				
	ArcIntervalProfile				
Telemetry	ExternalPoint	ControlPoint			
		ScanPoint			
NOTE – Non-instantiable classes are shown in italics.					



*Non-instantiable classes are shown in italics.*

**Figure 1/M.3120 – Interface inheritance hierarchy**



*Non-instantiable classes are shown in italics.*

**Figure 2/M.3120 – Value Type inheritance hierarchy**

Note that all the object classes are defined in the *itut\_m3120* module of this Recommendation, except the *ManagedObject* object class, which is defined in the *itut\_x780* module of the framework Recommendation, ITU-T X.780.

Table 3 below shows the name binding relationship in the form of subordinate-superior pairs. It also shows the deletion policy and the creation restriction for each of the relationship pairs. Unless explicitly noted, the creation of the subordinate object is the result of the system management protocol (i.e. by the create operation from the managing system on an factory interface).

**Table 3/M.3120 – CORBA interface containment relationship**

Subordinate Class	Superior Class	Creation	Deletion Policy
AccessGroup	LayerND	No auto naming	Only if no contained
AlarmSeverityAssignmentProfile	ManagedElement	–	Only if no contained
ArcIntervalProfile	ManagedElement	Auto created, 0 or 1	Not deletable
	ManagedElementComplex	Auto created, 0 or 1	Not deletable
	Network	Auto created, 0 or 1	Not deletable
CircuitPack	CircuitPack	Auto created (by Insertion)	Delete contained object
	EquipmentHolder	Auto created (by Insertion)	Only if no contained
	EquipmentHolder	–	Only if no contained
	EquipmentHolder	–	Delete contained object
CircuitEndPointSubgroup	Not in this document		
CTPBid	TTPBid	–	Only if no contained
CTPSink	TTPBid	–	Only if no contained
	TTPSink	–	Only if no contained
CTPSource	TTPBid	–	Only if no contained
	TTPSource	–	Only if no contained
ControlPoint	Equipment	–	–
	ManagedElement	–	–
CrossConnection	Fabric	Auto created (by Connect)	Only if no contained
	MPCrossConnection	Auto created (by Connect)	Only if no contained
Equipment	Equipment	–	Only if no contained
	ManagedElement	–	Only if no contained
EquipmentHolder	Equipment	–	Only if no contained
	EquipmentHolder	–	Only if no contained
Fabric	ManagedElement	–	Only if no contained
GTP	Fabric	Auto created (by addTPsToGTP)	Not deletable (By removeTPsFromGTP)
LayerND	Network	No auto-naming	Only if no contained
LinkConnection	LayerND	Auto created	Not deletable
	TopLink	Auto created	Not deletable
LogicalLink	LayerND	Auto created	Not deletable
LogicalLinkEnd	LayerND	Auto created	Not deletable
	Subnetwork	Auto created	Not deletable
ManagedElement	Network	Auto created (at initialization)	Not deletable
ManagedElementComplex	Network	Auto created (at initialization)	Not deletable
MPCrossConnection	Fabric	Connect	Not deletable (By the disconnect operation)



**Table 3/M.3120 – CORBA interface containment relationship**

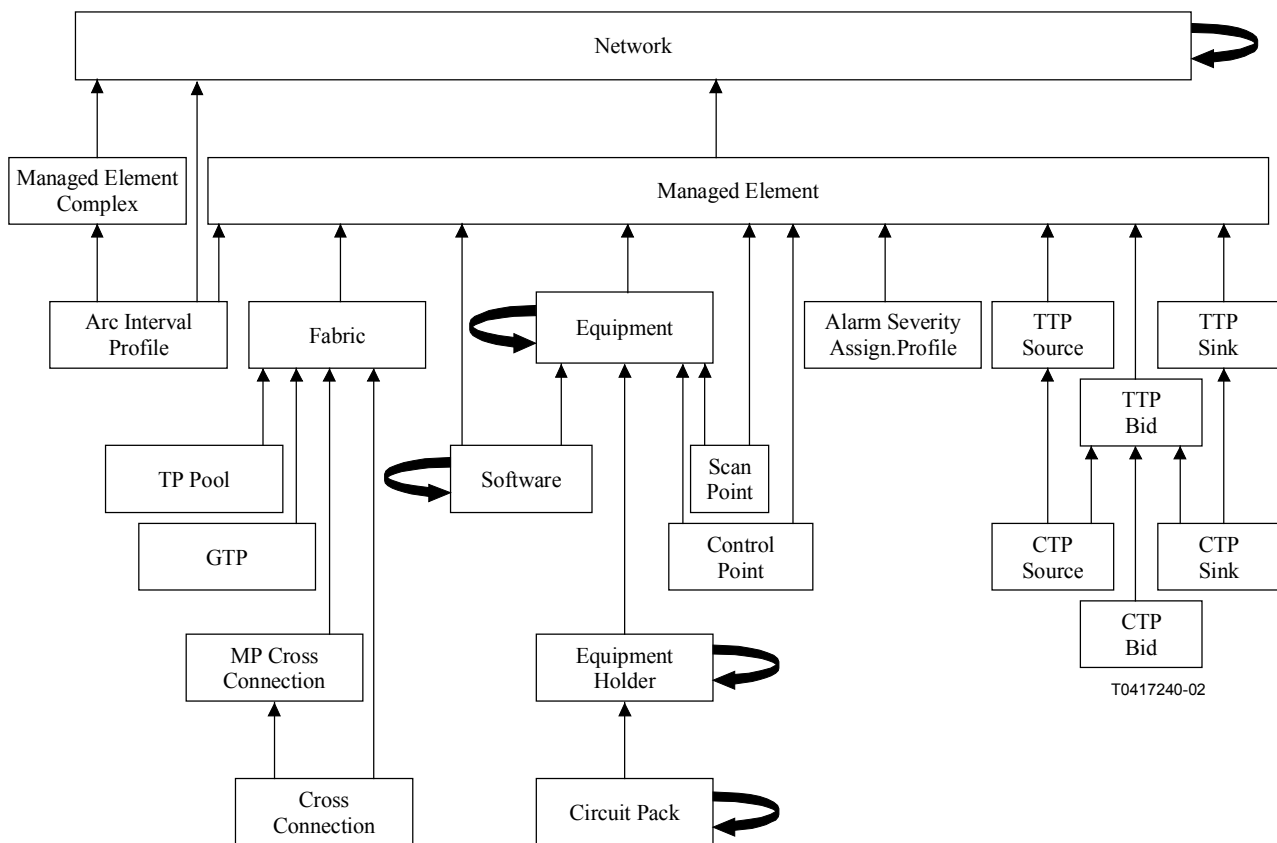
Subordinate Class	Superior Class	Creation	Deletion Policy
Network	Root	Auto created (at initialization)	Not deletable
NetworkCTPBid	LayerND	Auto created	Not deletable
	Subnetwork	Auto created	Not deletable
NetworkCTPSink	LayerND	Auto created	Not deletable
	Subnetwork	Auto created	Not deletable
NetworkCTPSource	LayerND	Auto created	Not deletable
	Subnetwork	Auto created	Not deletable
NetworkTTPBid	LayerND	–	Only if no contained
	Subnetwork	–	Only if no contained
NetworkTTPSink	LayerND	–	Only if no contained
	Subnetwork	–	Only if no contained
NetworkTTPSource	LayerND	–	Only if no contained
	Subnetwork	–	Only if no contained
ScanPoint	Equipment	–	–
	ManagedElement	–	–
Software	Equipment	–	Only if no contained
	ManagedElement	–	Only if no contained
	Software	–	Only if no contained
Subnetwork	LayerND		Only if no contained
SNC	Subnetwork	Auto created	Not deletable
TopLink	LayerND	Auto created	Not deletable
TopLinkEnd	LayerND	Auto created	Not deletable
	Subnetwork	Auto created	Not deletable
TPPool	Fabric	Auto created (by addTPsToTPPool)	Not deletable (By removeTPsFromTPPool)
Trail	LayerND	Auto created	Not deletable
Trail95	LayerND	Auto created	Not deletable
TTPBid	ManagedElement	–	Only if no contained
TTPSink	ManagedElement	–	Only if no contained
TTPSource	ManagedElement	–	Only if no contained

**Table 3/M.3120 – CORBA interface containment relationship**

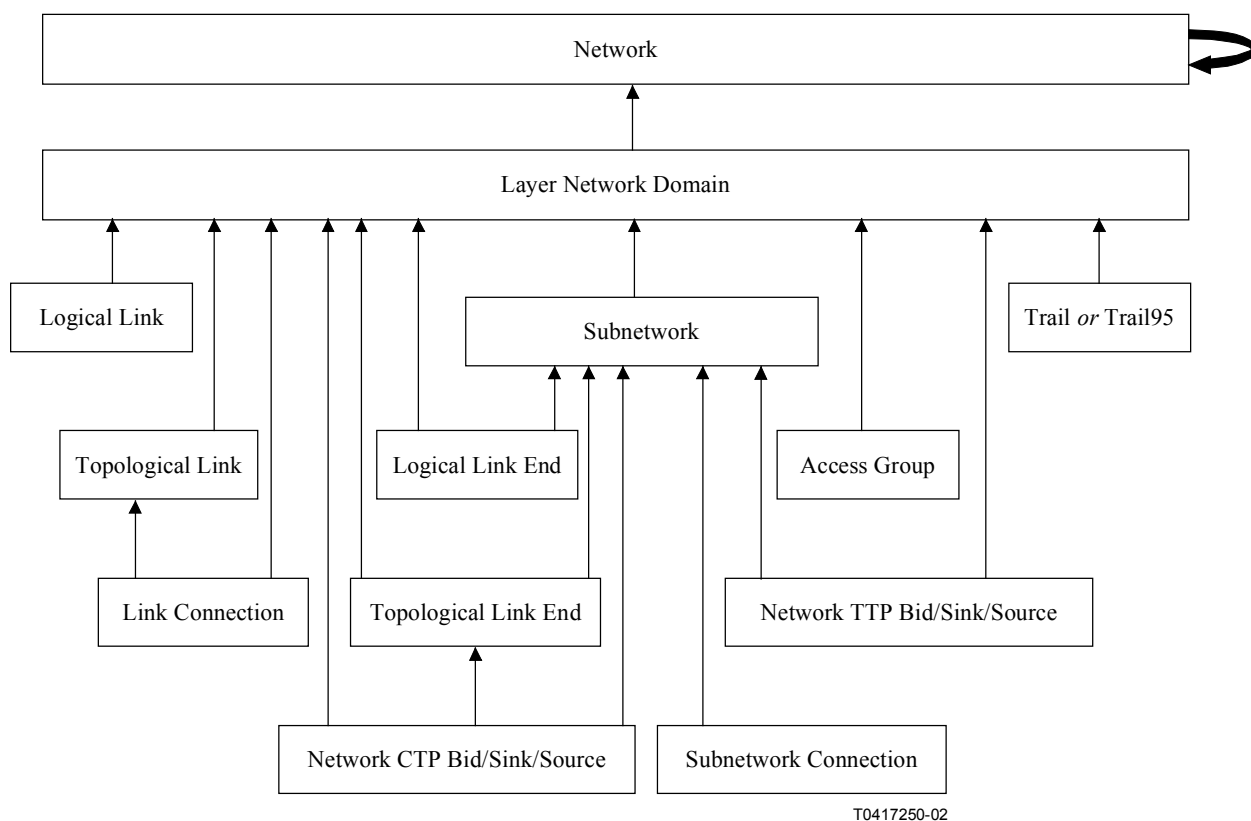
NOTE –

- *Creation Restriction*
  - "No auto naming" means that the RDN of the subordinate object is required in the creation request.
  - "Auto created" means that the subordinate object is automatically created, e.g. at the creation of the superior object or as a consequence of event occurrence in the managed system. "Auto created" will be indicated by assigning the boolean to be false for the parameter "creation permitted" in the name binding module.
  - "0 or 1" means that at most one instance of the subordinate object can exist under the superior object.
  - "Insertion" means that the subordinate object is automatically created at the insertion of the circuit board representing the subordinate object.
  - "Connect" means that the subordinate object is created as the result of the "connect" operation on the Fabric object.
  - For classes that are the top of the naming tree, a local root naming context is to be defined and named by local procedures. The superior name parameter is left blank in the name binding module for the classes used as the top of the naming tree.
- *Deletion Policy*
  - "Only if no contained" means that the subordinate object can be deleted only if it (i.e. the subordinate object) has no contained objects.
  - "Not deletable" means that the subordinate object cannot be directly deleted by management protocol.
  - "Delete contained object" means that the contained objects, if any, of the subordinate object will also be automatically deleted at the deletion of the subordinate object.

The interface containment relationship is also illustrated below in Figures 3 and 4. Network Element level object classes are shown in Figure 3, while the network level object classes are shown in Figure 4. In the figures, arrows are used for pointing from the subordinate (contained) objects to the superior (containing) objects. Back arrow indicates self containment relationship, i.e. an instance of the object class may contain other instance(s) of the same object class. Note that cardinality is not shown in the containment figures.



**Figure 3/M.3120 – Containment relationship of Network Element level object classes**



**Figure 4/M.3120 – Containment relationship of network level object classes**

### **5.3 IDL File Storing and Documentation Convention of the Model**

The IDL specification of the generic information model is defined in an IDL module "itut\_m3120" and documented in clauses 6 and 7.

Clause 6 contains the IDL code for the imported types, forward declarations, structures, typedefs, exceptions, the fine-grained interfaces, and the facade interfaces. The IDL code in clause 6 is intended to be stored in a primary file named "itut\_m3120.idl" located in the search path used by IDL compilers on a system.

Clause 6.6 contains the IDL code for the facade interfaces. If a management system only supports the fine-grained interface, 6.6 can be omitted from IDL.

Clause 7 contains the IDL code for the constants. The IDL code in clause 7 is intended to be stored in a secondary file named "itut\_m3120const.idl" and located in the same directory as the primary file itut\_m3120.idl. This secondary file and other IDL files, such as itut\_x780.idl are *included* by the primary IDL file itut\_m3120.idl.

A documentation convention has been used for these clauses to improve (1) readability and (2) easy implementation of the Recommendation. For readability purpose, subclause numbers and headings are used for the IDL codes, such as imported types, forward declarations, structures and typedefs, exceptions, and the individual interfaces and constant types. For the purpose of easy implementation, subclause numbers and headings of level 2 and lower are encapsulated in IDL comments. In this way, these subclause numbers and headings need not be removed when extracting the machine processable IDL files from the Recommendation.

## **6 Information Model IDL**

This clause is available as an electronic file attached to this Recommendation.

## **7 Information Model IDL: Constants**

This clause is available as an electronic file attached to this Recommendation.

## **8 Information Model IDL: Alarm reporting control**

This clause is available as an electronic file attached to this Recommendation.



## SERIES OF ITU-T RECOMMENDATIONS

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Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
<b>Series M</b>	<b>TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits</b>
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems