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Contents

Foreword

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The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x   the first digit:

1   presented to TSG for information;

2   presented to TSG for approval;

3   or greater indicates TSG approved document under change control.

y   the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z   the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; as identified below:

32.690:   **Inventory Management (IM); Requirements**

32.691:   Inventory Management (IM) network resources Integration Reference Point (IRP); Requirements

32.692:   Inventory Management (IM) network resources Integration Reference Point (IRP); Network Resource Model (NRM)

32.696:   Inventory Management (IM) network resources Integration Reference Point (IRP); Solution Set (SS) definitions

Inventory Management (IM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. IM actions have the objective to control and monitor the actual equipment configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

IM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QoS). The IM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

1 Scope

The present document defines, in addition to the requirements defined in [1], [2] and [3], the requirements for the present IRP: Inventory Management IRP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "Telecommunication Management, Principles and high level requirements".

[2] 3GPP TS 32.102: "Telecommunication management; Architecture".

[3] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".

[4] 3GPP TS 32.692: "Telecommunication management; Inventory Management (IM) network resources Integration Reference Point (IRP): Network Resource Model (NRM)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

data: any information or set of information required to give software or equipment or combinations thereof a specific state of functionality

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.

- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

Field Replaceable Unit (FRU): An FRU is defined to be a spare part or component that can be substituted / supplanted or be used to substitute / supplant an existing part or component in order to rectify a fault or any other issue which is identified by the user or technician or a diagnostic program.

IRP: see 3GPP TS 32.101 [1].

IRP Information Model: see 3GPP TS 32.101 [1].

IRP Information Service: see 3GPP TS 32.101 [1].

IRP Solution Set: see 3GPP TS 32.101 [1].

Information Object Class (IOC): Within the context of all IRP IS specifications, IOC is the term used instead of MOC for a managed object class. MOC is used on the SS level. See also the definition of **Managed Object.**

Managed Element (ME): An instance of the Managed Object Class ManagedElement.

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. See also the def. of MO in TS 32.101 [1]. The MO is instance of a MO class (MOC) defined in a MIM/NRM. This class, within the context of this Information Service specification called **Information Object Class (IOC),** has <u>attributes</u> that provide information used to characterize the objects that belong to the class (the term "attribute" is taken from TMN and corresponds to a "property" according to CIM). Furthermore, an MO class can have <u>operations</u> that represent the behaviour relevant for that class (the term "operation" is taken from TMN and corresponds to a "method" according to CIM). An MO class may support <u>notifications</u> that provide information about an event occurrence within a network resource.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM - see the definition below. There is a slight difference between the meaning of MIM and NRM - the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
EM	Element Manager
FM	Fault Management
IOC	Information Object Class
IRP	Integration Reference Point
IS	Information Service (see [1])
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
OS	Operations System
TM	Telecom Management
TMN	Telecommunications Management Network
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Inventory Management (IM) concepts

The main task of the 3G network inventory management is to manage network inventory information about the various static resources of a 3G mobile telecommunication network. It provides support to network planning, to network operation and maintenance and to working craft management. Inventory management functions are distributed over different layers of a Telecommunications Management Network (TMN). The main task of the inventory management function at Itf-N is to provide an efficient access for network management systems to the static inventory data of all related managed network elements.

The basic tasks of the Inventory Management IRP of this release is:

- to provide an efficient mechanism enabling IRPManagers to upload inventory data as follows:

    o request an IRPAgent to prepare inventory data of a certain part of the current network for uploading;

    o to check the status of data preparation in the IRPAgent;

    o to request the IRPAgent to alert the IRPManager when the data preparation is completed; and to

    o upload the prepared inventory data;

- to provide a standard data format so that all IRPManagers and IRPAgents involved have a common understanding of the uploaded inventory data.

The inventory data:

- is static data about the hardware equipment and firmware units (e.g. line cards, processing units, power supplies) constructing the network elements managed by the concerned element manager. Static data is the data which:

    o is usually provided by vendors and is basically vendor-specific;

    o is basically independent of the operation status of the related equipment/units;

    o is not changed frequently during the normal operation;

    o cannot be changed through Itf-N interface; and is

    o basically independent of configuration management;

- may either be integrated in the related equipment/units or be assigned to the related equipment/units during the installation or during operation;

- may include data showing static physical relations between equipment or units, e.g. card A is in slot B.

5 Requirements

5.1 General requirements

The present document defines requirements for the IS for this IRP. As such, capabilities specified here as being required in the IS are not necessarily required in the product implementation. That which is required in the product implementation will be specified in the IS itself.

The following general and high-level requirements apply for the present IRP:

A. IRP-related requirements in 3GPP TS 32.101 [1];

B. IRP-related requirements in 3GPP TS 32.102 [2];

C. IRP-related requirements in 3GPP TS 32.600 [3].

5.2 Inventory Management (IM) requirements

The following requirements shall apply for Inventory Management over Itf-N.

1. Inventory data is defined as information pertaining to Field Replaceable Unit (FRU) hardware, firmware and optionally software units and license units of 3G Networks, and shall be manageable. The management of software unit information should be similar to the management of hardware and firmware information. Examples of inventory data and attributes are described in Annex A and Annex B and standardised inventory data for Itf-N is defined in 3GPP TS 32.692 [4]. Examples of inventory hardware units may be rack, shelf, slot, circuit pack and physical port, as long as they are FRUs.

2. The Inventory hardware information can be captured as a hierarchy or a flat model. In a hierarchical model, an inventory unit is contained by another inventory unit, thereby creating a containment relationship.

3. It shall be possible for the IRPManager to initiate the upload (IRPAgent to IRPManager) of inventory data over Itf-N.

4. It shall be possible to scope the inventory data to be uploaded from the IRPAgent, e.g. inventory data for a NodeB, an RNC, or all the NEs managed by the IRPAgent.

5. It shall be possible to filter the inventory data to be uploaded from the IRPAgent, e.g. HW units of a certain type in the network.

6. It shall be possible to check the status of an Inventory Management operation.

7. Interface-N shall support a file-based mechanism for transferring inventory data.

8. The file format used for transferring of bulk inventory data shall include a standard part and shall also allow for vendor specific representation of inventory data. The meaning, syntax, units, etc. of the standard part of inventory information will be specified, e.g. standard fields for HW board identity (including version number of HW/SW/FW), board type and serial number.

9. A Network Resource Model shall be defined for the standard part of inventory data.

10. As the files are transferred via a machine-machine interface, the file format shall be machine-readable using industry standard tools, e.g. XML or ASN.1 parsers.

11. The file format shall be specified by using a standardised language, e.g. the Extensible Mark-up Language (XML).

12. The file format shall be independent of the data transfer protocol used to carry the file from one system to another.

13. The file transfer facility shall be implemented using a file transfer protocol as defined in 3GPP TS 32.101 [1].

14. The identification of IOC instances shall be consistent with Alarm Reporting and the Network Resource Models used for Configuration Management.

15. All inventory units shall be uniquely identifiable.

16. The information on software versions in Software Management IRP and in Inventory NRM IRP shall be consistent.

Annex A (Informative):
Examples of Inventory Data

Examples of inventory data are described in the following table. The actual standardised inventory data for Itf-N is defined in 3GPP TS 32.692 [4].
A Managed Element is also referred to as a Network Element (NE).

Inventory data item	Description of item	Additional Information on what an operator will do with this item
Managed Element data		
Managed Element id	Corresponds to the Managed Element MOC in CM NRM.	
Managed Element type	Corresponds to the Managed Element MOC attribute in CM NRM.	
User label	Corresponds to the Managed Element MOC attribute in CM NRM.	
Vendor name	Corresponds to the Managed Element MOC attribute in CM NRM.	
SW Version	Corresponds to the Managed Element MOC attribute in CM NRM.	
Location name	Location of site containing Managed Element. Corresponds to the Managed Element MOC attribute in CM NRM.	Useful for maintenance activity, asset location.
HW Version Information	HW version information of all hardware supporting this Managed Element.	
Serial number	Serial number of all hardware supporting this Managed Element.	
HW unit data		
HW unit id	Uniquely identifies the HW unit (e.g. board).	The HW unit id shall be used for administering and locating a unit unambiguously in an operator's network
HW unit type	The type of the HW unit in descriptive form, e.g. mnemonic.	
Managed Element id	The Managed Element containing the HW unit. Corresponds to the Managed Element MOC in CM NRM.	
Managed Element type	Corresponds to the Managed Element MOC attribute in CM NRM.	
User label	Corresponds to the Managed Element MOC attribute in CM NRM.	
Vendor name	Manufacturer/Vendor of HW unit.	
Serial number	Serial number of HW unit.	
Version number	Version number of HW unit.	
Date of Manufacture	Date of manufacture of HW unit.	
Date of last service	Date of the last service by the vendor.	
Unit position	Position of HW unit with reference to rack, shelf and slot id.	Useful for maintenance activity, asset location.
FW information	Information related to FW in HW unit.	
Topology information	Remote unit connected to HW unit (e.g. port information).	Allows an operator to build up the physical topology (connection list) based on port information.
Corresponding MOCs in CM NRM	Mapping of HW unit to corresponding MOC(s) in CM NRM.	
Manufacturer specific data	Manufacturer specific proprietary information for HW unit.	
Vendor unit type number	Vendor or manufacturer specific number of the HW unit which uniquely identifies the unit type and version.	Shall be used for maintenance, repair and logistic purposes and identifies, for example, replacement units.
SW unit data		

SW unit id	Uniquely identifies the SW package	The SW unit id shall be used for administering the SW running in NEs.
Vendor name	Manufacturer/Vendor of SW unit.	
Version number	Version number of SW unit.	
Manufacturer specific data	Manufacturer specific proprietary information for SW unit.	

Annex B (Informative):
Examples of Inventory Information

Examples of inventory data, which represents hardware units, are described in figure B.1. The actual standardised inventory data for Itf-N is defined in 3GPP TS 32.692 [4].
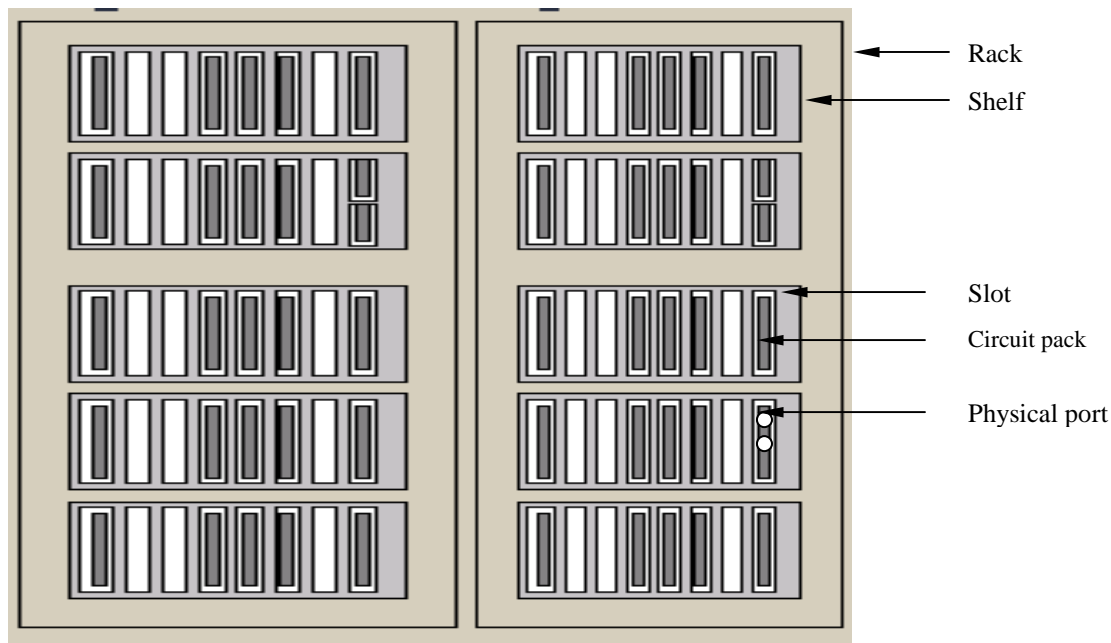

Figure B.1: Examples of inventory data that represents hardware unit(s)

NOTE: Whether hardware is modelled as an inventory unit or not is dependent on such hardware being field replaceable (FRU). For example, physical port and slots are hardware units that should be defined as Inventory Units if they are FRUs. If they are not FRUs, then these should be captured as attributes of inventory unit that is field replaceable.

Annex C (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Cat**	**Old**	**New**
Dec 2004	SA_26	SP-040815	--	--	Submitted to SA#26 for Approval Note: The content was submitted to SA#21 as 32.681-100 for Information. This new TS does not have the IRP part.	--	1.0.0	6.0.0
Sep 2005	SA_29	SP-050461	0001	--	Clarify the inventory data description	F	6.0.0	6.1.0
Jun 2007	SA_36	--	--	--	Automatic upgrade to Rel-7 (no CR) at freeze of Rel-7. Deleted reference to CMIP SS, discontinued from R7 onwards.	--	6.1.0	7.0.0
Dec 2008	SA_42	--	--	--	Upgrade to Release 8	--	7.0.0	8.0.0
Dec 2009	-	-	-	-	Update to Rel-9 version	--	8.0.0	9.0.0
2011-03	-	-	-	-	Update to Rel-10 version (MCC)		9.0.0	10.0.0
2012-09	SA_57	SP-120572	0002	1	Add missing requirements to Inventory Management	F	10.0.0	11.0.0
2014-10	-	-	-	-	- Update to Rel-12 version (MCC)		11.0.0	**12.0.0**
2016-01	-	-	-	-	Update to Rel-13 version (MCC)		12.0.0	**13.0.0**

History

Document history		
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