

NGMN RECOMMENDATION FOR IRP ENSEMBLES

A POSITION PAPER by NGMN Alliance

Version:	1.1
Date:	09-December-2013
Document Type:	Final Deliverable (approved)
Confidentiality Class:	P - Public
Authorised Recipients: (for CR documents only)	
Working Group:	OPE: OPerational Efficiency
Project:	Cluster 1: Open OA&M
Editor / Submitter:	Jean-Michel Cornily (Orange)
Contributors:	Tayeb Ben Meriem, Jamil Chawki (Orange), Andrea Buldorini, Simone Bizzarri (Telecom Italia), Istvan Aba, Klaus Martiny (T-Mobile), Javan Erfanian (Bell)
Approved by / Date:	NGMN Board / 3rd January 2014

For all Confidential documents (CN, CL, CR):

© 2014 Next Generation Mobile Networks Ltd. This document contains information that is confidential and proprietary to NGMN Ltd. The information may not be used, disclosed or reproduced without the prior written authorisation of NGMN Ltd., and those so authorised may only use this information for the purpose consistent with the authorisation.

For Public documents (P):

© 2014 Next Generation Mobile Networks Ltd. All rights reserved. No part of this document may be reproduced or transmitted in any form or by any means without prior written permission from NGMN Ltd.

The information contained in this document represents the current view held by NGMN Ltd. on the issues discussed as of the date of publication. This document is provided "as is" with no warranties whatsoever including any warranty of merchantability, non-infringement, or fitness for any particular purpose. All liability (including liability for infringement of any property rights) relating to the use of information in this document is disclaimed. No license, express or implied, to any intellectual property rights are granted herein. This document is distributed for informational purposes only and is subject to change without notice. Readers should not design products based on this document.

Commercial Address:

ngmn ltd.

Friedrich-Ebert-Anlage 58 • 60325 Frankfurt • Germany
Phone +49 69 / 9 07 49 98-0 • Fax +49 69 / 9 07 49 98-41
office@ngmn.org • www.ngmn.org

Registered Office:

ngmn ltd.

42-44 Portman Road • Reading • Berkshire • RG30 1EA • UK
Company registered in England and Wales n. 5932387
VAT Number GB 918713901

Content

1	Introduction	3
2	Rationale for defining IRP Ensembles	4
2.1	Overview of currently standardized IRPs	4
2.2	Concrete examples.....	5
2.3	Focusing on two sample IRP Ensembles	6
2.3.1	Ensemble “Basic CM for E-UTRAN”	6
2.3.2	Ensemble “FM for EPC”	6
3	Candidate IRP Ensembles.....	8
4	Conclusion	9
5	References.....	10
6	Abbreviations	11

1 INTRODUCTION

From their Release 99 onwards, 3GPP / SA5 adopted a new methodology to specify OA&M interfaces between Element Management System (EMS) and Network Element System (NMS). In their Management Reference Architecture, this interface is known as the Itf-N Interface.

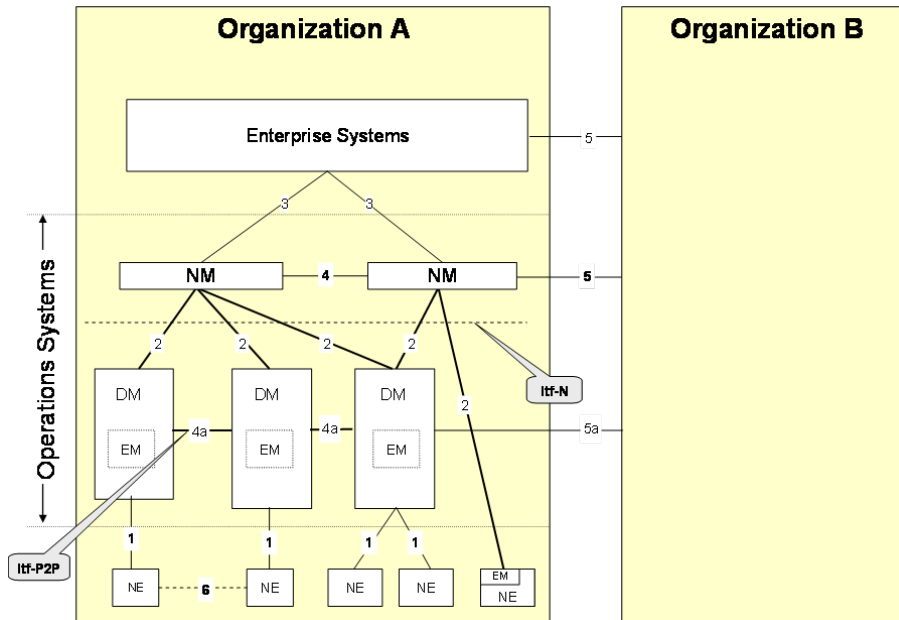


Figure 1. 3GPP Management Reference Architecture

Up to Release 7 included, most of the effort in 3GPP / SA5 has been focused on defining Integration Reference Points (IRPs) for traditional OA&M, i.e. corresponding to the five Functional Areas defined by ITU-T Recommendation M3400. From Release 8, with the arrival of LTE/SAE, a lot of effort has been put on defining self-organizing functionalities for these networks. The concept of SON (Self-Organizing Networks) was born. In Release 8, first SON functions such as Automatic Neighbour Relation (ANR) Management, Automatic PCI configuration have been defined.

Consequently, the number of IRPs which have been yet defined is quite important and, due to the continuous arrival of new SON functions (e.g. Capacity and Coverage Optimization, Energy Savings Management, etc.), either their number is about to increase dramatically or their complexity will get very large. Knowing which subset of these IRPs shall be present at the Itf-N between a given EMS and a given NMS is reserved to gurus.

There is a need to define « Ensembles » / « Profiles » / « Packages », i.e. some grouping of IRPs to determine which IRPs are needed in a given network management application profile. It is obvious that the subset of IRPs needed for Bulk Configuration Management of an LTE network will be different from the subset of IRPs needed for Fault Management of an EPC network.

The objective of this document is to present the IRP Ensemble concept, i.e. what it is and why it is important for MNOs but also for Telecom Equipment Manufacturers and 3rd-party tool vendors.

2 RATIONALE FOR DEFINING IRP ENSEMBLES

This section aims at describing why IRP Ensembles are necessary in order to get a clearer picture of the already existing IRPs as defined by 3GPP / SA5, and their inter-relationships.

2.1 Overview of currently standardized IRPs

As of December 2013, the IRPs which have been standardized within 3GPP / SA5 and are applicable to LTE/SAE can be split up mainly into two categories, Network Resource Model IRPs (NRM IRPs) on the one hand and Interface IRPs on the other hand. Moreover, SON functions have been also introduced as either extensions of existing NRM IRPs or new IRPs. Here below is a (non-exhaustive) list of IRPs defined by 3GPP/SA5:

- Network Resource Model IRPs:
 - Generic NRM IRP
 - E-UTRAN NRM IRP
 - EPC NRM IRP
- Interface IRPs:
 - Basic Configuration Management IRP
 - Bulk Configuration Management IRP
 - Kernel Configuration Management IRP
 - Notification IRP
 - Alarm IRP
 - Advanced Alarm IRP
 - Subscription Management IRP
 - Generic IRP Management
 - Test management IRP
 - Notification Log IRP
 - File Transfer IRP
 - Communication Surveillance IRP
 - Entry Point IRP
 - Partial Suspension of Itf-N IRP
 - Delta Synchronization IRP
 - Performance Management IRP
 - Trace Management IRP
 - Self-Configuration of Network Elements IRP
 - Software management IRP
 - State Management IRP
 - Inventory Management IRP
- SON functions:
 - ANR Management is using both E-UTRAN NRM IRP and Basic / Bulk Configuration Management
 - Automatic PCI Configuration: same.

It shall be noted that the aforementioned IRPs:

1. Are defined according to 3GPP / SA5 3-tier top down modelling approach, according to which all IRP definitions require several Technical Specifications:
 - a. Stage 1 : Requirements
 - b. Stage 2: Information Service
 - c. Stage 3: Solution Sets (CORBA IDL or XML for NRM IRPs, CORBA IDL or SOAP+XML for Interface IRPs, CORBA IDL or XML for Data Definition IRPs)
2. Have inter-IRP dependency relationships, i.e. some IRPs cannot exist without some other IRPs. These relationships are not expressly specified in the Technical Specifications.

This profusion of IRPs leads to huge complexity. However, it is important to note that not all the aforementioned IRPs are to be supported at any ltf-N interface. Instead, a subset of these IRPs is required for a given ltf-N interface.

2.2 Concrete examples

This section aims at providing examples to illustrate that, at a given ltf-N, only a subset of 3GPP defined IRPs is required. Figure 2 shows two different Network Management Application Profiles:

- Network Management Application Profile #1: the MNO network-level Configuration Management application is connected to the EMS offered by the vendor for the OA&M of E-UTRAN. The minimum set of IRPs that are part of their common management knowledge is made up of:
 - Basic CM IRP
 - E-UTRAN NRM IRP
 - Plus additional IRPs, from which the aforementioned IRPs depend.
- Network Management Application Profile #2: the MNO network-level Fault Management application is connected to the EMS offered by the vendor for the OA&M of EPC. The minimum set of IRPs that are part of their common management knowledge is made up of:
 - Alarm IRP
 - EPC NRM IRP
 - Plus additional IRPs, from which the aforementioned IRPs depend.

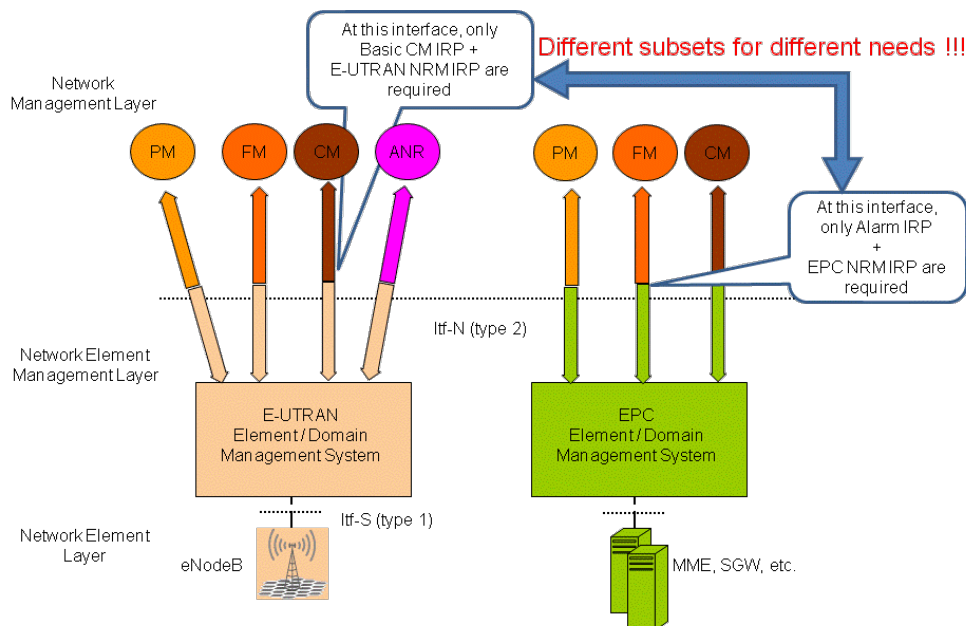


Figure 2. Two sample Network Management Application Profiles

At a first glance, it seems that these two subset of IRPs (let's call them **Ensembles** from now on) are disjoint. In reality, they are not for at least the two following reasons:

1. All NRM IRPs are built on Generic NRM IRP;
2. Most (not all) Interface IRPs are built on Generic IRP Management, itself built in turn on Generic NRM IRP.

2.3 Focusing on two sample IRP Ensembles

2.3.1 Ensemble “Basic CM for E-UTRAN”

As said earlier, this Ensemble will contain:

- E-UTRAN NRM IRP, which is built on Generic NRM IRP. Hence, the latter one is needed as well;
- Basic CM IRP, which:
 - Is built on Generic IRP Management
 - Makes use of notification capabilities defined in Kernel CM IRP to inform NMS about latest changes in the E-UTRAN network configuration. In turn, Kernel CM IRP makes use of support functions defined in Notification IRP, etc.

Figure 3 provides the draft list of IRPs (i.e. a subset of IRPs listed in Section 2.1) required as common management knowledge for Network Management Application Profile #1 identified in Section 2.2 as well as a inter-IRP dependency graph.

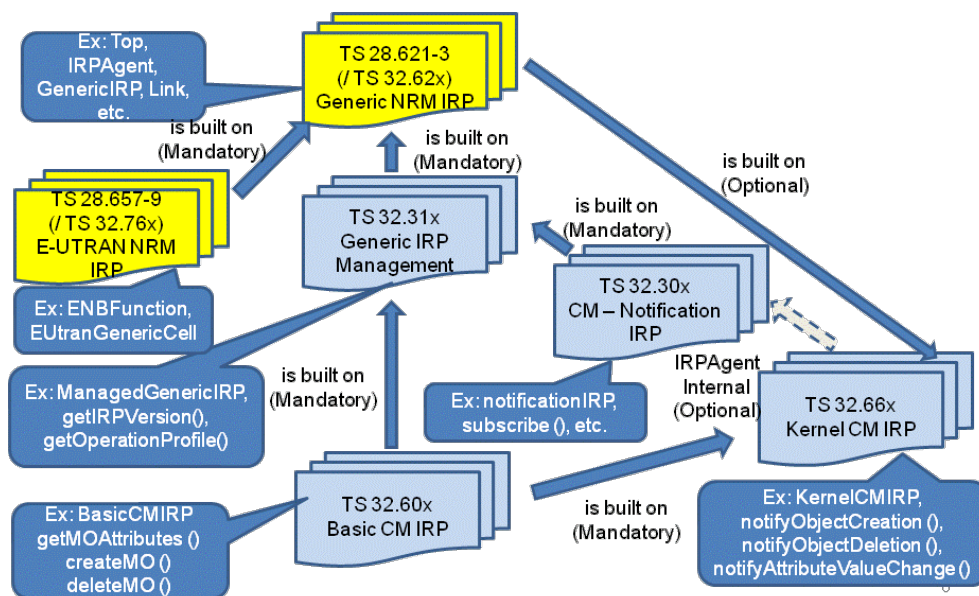


Figure 3. Dependency graph within Ensemble “Basic CM for E-UTRAN”

2.3.2 Ensemble “FM for EPC”

Figure 4 provides the draft list of IRPs (i.e. a subset of IRPs listed in Section 2.1) required as common management knowledge for Network Management Application Profile #2 identified in Section 2.2.

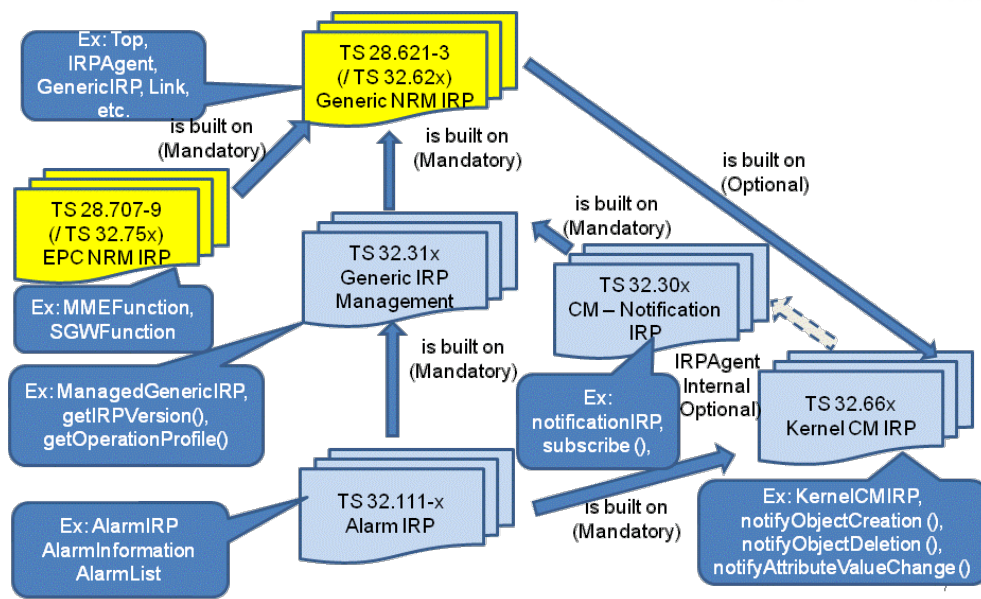


Figure 4. Dependency graph within Ensemble "FM for EPC"

3 CANDIDATE IRP ENSEMBLES

As of December 2013, most significant Network Management Application Profiles are listed (not exhaustively) here below:

- Basic Configuration Management for E-UTRAN
- Bulk Configuration Management for E-UTRAN
- Self-Configuration of Network Elements for E-UTRAN
- Software Management
- Automatic Neighbor Relation (ANR) Management
- Automatic Physical Cell Identity (PCI) Configuration
- Fault Management for E-UTRAN
- Performance Management for E-UTRAN

- Basic Configuration Management for EPC
- Fault Management for EPC
- Performance Management for EPC

To each of the aforementioned Network Management Application Profiles, a corresponding IRP Ensemble shall be defined, identifying:

- Which IRPs are part of the Ensemble, and
- Which conditional / optional parts of those IRPs shall be present in the Ensemble.

The attached Excel matrix provides a first draft of expected material.



Open_OAM-IRP_Ensembles_Recommenda

4 CONCLUSION

In this document, we identified the need for MNOs to have a tool enabling them to understand precisely what a given Itf-N interface should be made up of, i.e. instead of the whole bunch of 3GPP IRPs, it appears that only some subset is required for a given Network Management Application Profile. We identified a list of most relevant profiles for MNOs and provided some first elements about which IRPs should be part of the corresponding IRP Ensembles.

Further investigation is needed on the following aspects:

- Should IRP Ensembles be normative or informative? This will highly depend on whether network operators and telecom equipment manufacturers can agree on some Network Management Application Profiles;
- Which formalism would be the most appropriate to specify IRP Ensembles?

5 REFERENCES

- [1] ITU-T M.3400: TMN Management Functions

6 ABBREVIATIONS

3GPP	3rd Generation Partnership Project
ANR	Automatic Neighbor Relation
CM	Configuration Management
eNB	LTE Base Station
FM	Fault Management
LTE	Long Term Evolution
NE	Network Elements (unspecific, depends on context: in most cases eNB)
NEM	Network Element Manager
NGMN	Next Generation Mobile Networks
NMS	Network Management System
O&M	Operation and Maintenance
OSS	Operation Support System
PM	Performance Management
SON	Self Organizing Network