

# 3GPP TR 32.838 V0.3.0 (2013-09)

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*Technical Report*

## **3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Compliance of 3GPP SA5 specifications to the NGMN Top OPE Recommendations (Release 12)**



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## Foreword

This Technical Report has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

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.

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## Introduction

Introductory text to be inserted.

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## 1 Scope

The present document provides a gap analysis between NGMN Top OPE Recommendations and OA&M capabilities offered by 3GPP SA 5 IRPs. Based on this gap analysis, it provides a detailed compliance statement of SA5 specifications against NGMN Top OPE Recommendations.

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## 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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] NGMN Top OPE Recommendations V1.0  
[http://www.ngmn.org/uploads/media/NGMN\\_Top\\_OPE\\_Recommendations\\_1.0.pdf](http://www.ngmn.org/uploads/media/NGMN_Top_OPE_Recommendations_1.0.pdf)

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## 3 Definitions, symbols and abbreviations

*Delete from the above heading those words which are not applicable.*

*Clause numbering depends on applicability and should be renumbered accordingly.*

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [x] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [x].

*Definition format (Normal)*

*<defined term>: <definition>.*

### 3.2 Symbols

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

<symbol>      <Explanation>

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [x] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [x].

<ACRONYM>   <Explanation>

## 4 Quality and Quantity of Alarms

### 4.1 Overall alarming concept

<b>Top OPE Recommendations Clause 1.3.1: Overall alarming concept</b>				
<b>"The supplier and their R&amp;D departments are the owner of the detailed system know-how and are responsible for the overall alarming concept. Today the supplier's development departments for network elements and OSS are working often autonomously in that area. The basis to design an overall alarm concept needs to be established between the different vendor's product lines before the start of development phase."</b>				
Relevant 3GPP specifications: <b>TSs 32.111-1, 32.111-2, 32.111-6</b>			Compliance statement <b>Supported</b>	
Item	Description	Action	Related CR(s)	Status
1	It is an important concept but it does not impact Itf-N standardized interfaces. More product coordination may be needed within vendors but the SA5 standards already define clear rules for alarm semantics.	N/A	N/A	Closed

### 4.2 Alarm Quantity

#### 4.2.1 General

<b>Top OPE Recommendations Clause 1.3.2: "Only alarms that fulfil the quality recommendations and which have an additional benefit to solve abnormal conditions should be forwarded by the NE. Meaningless events must be avoided."</b>				
Relevant 3GPP specifications: <b>TSs 32.121 (clauses 4.1, 4.2), 32.122, 32.126</b>			Compliance statement <b>Supported</b>	
Item	Description	Action	Related CR(s)	Status
1	It is a requirement on the NE and the EMS, not directly on the Itf-N standardized protocols. Nevertheless on the principle aspect of "Alarm Quantity", the Advanced Alarm Management (AAM) IRP is providing some related capabilities on this	N/A	N/A	Closed

	topic.			
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### 4.2.2 Alarm correlation

<p><b>Top OPE Recommendations Clause 1.3.2: Alarm correlation</b></p> <p><b>"To fulfil the quality requirements and to reduce the event number correlation must be implemented on all levels (network element &amp; element manager). Correlation rules which cover the whole product including all composed components must be part of the product solution and should not be project specific. FM agents on NE level (e.g. IT-systems) should be used to reduce the number of unwanted events.</b></p> <p><b>A further correlation of these alarm data in combination with KPI/PM data is needed to give a clear overview of the service related to the whole system environment."</b></p>				
<p>Relevant 3GPP specifications: <b>TSs 32.111-1, 32.111-2, 32.111-6</b></p>			<p>Compliance statement <b>Supported</b></p>	
Item	Description	Action	Related CR(s)	Status
1	NE and EMS have to support correlation. Requirement are already defined in the Alarm IRP, but the product may take it as far as they want to. SA5 has created a Rel-10 SI and a Rel-10 WI to add alarm correlation and root cause analysis in TS 32.111-x ( 480045 Study on Alarm Correlation and Alarm Root Cause Analysis and 510041 Alarm Correlation and Root Cause Analysis).	Add concepts for Alarm Correlation and Root Cause Analysis in TS 32.111-1. Make corresponding CRs on TSs 32.111-2 and 32.111-6.	TS 32.111-1 CR007  TS 32.111-2 CR0066R1, CR0067R1, CR0068, CR0069  TS 32.111-6 CR0003R1, CR0004R1, CR0005R1	Closed
2	Alarm on counter threshold crossing is already supported by SA5 specifications.	None	None	Closed

### 4.2.3 Number of alarms

<p><b>Top OPE Recommendations Clause 1.3.2: Number of alarms</b></p> <p><b>"In general per incident there should not be more than 10 alarms on the instance which caused the failure. Alarm floods of instances which did not cause the failure need to be blocked in any case."</b></p>	
<p>Relevant 3GPP specifications: <b>TSs 32.111-1, 32.111-2, 32.111-6</b></p>	<p>Compliance statement: <b>Supported</b></p>



Item	Description	Action	Related CR(s)	Status
1	<p>EMSs should have built in control for alarm flood. Iterators can be used to control the alarms sent.</p> <p>In addition SA5 has created a Rel-10 WI to add alarm correlation and root cause analysis concepts in TS 32.111-1.</p>	Add concepts for Alarm Correlation and Root Cause Analysis in TS 32.111-1	TS 32.111-1 CR007	Closed

## 4.3 Alarm Quality

### 4.3.1 Focus on customer and service impact

Top OPE Recommendations Clause 1.3.3: Focus on customer and service impact				
<p>"In incident situations the following question need to be answered by the system alarms, without the need for any additional optional tooling:</p> <p>"What does this incident mean for the customer and the service at all?""</p>				
Relevant 3GPP specifications: TSs 32.111-1, 32.111-2, 32.111-6			Compliance statement: <b>TBD</b>	
Item	Description	Action	Related CR(s)	Status
1	At DM or NM level, need to identify what is the alarmed entity's capability in terms of providing service.	<p>Option 1: NM internal function.</p> <p>Option 2: service impact sent on Itf-N and then included in alarm by DM.</p>	TBD	Open
2	Impact on customer could imply more SA5 work. More generally, SA5 has to look at customer experience management, not necessarily FM only. Potential SI.	Customer experience is in the scope of SA5 but there is currently no NM layer activity in SA5.	TBD	Open

### 4.3.2 Prioritization of alarms

Top OPE Recommendations Clause 1.3.3: Prioritization of alarms				
<p>"Criteria for Critical alarms:</p> <ul style="list-style-type: none"> <li>• Total disturbance of the system or significant service impact for customers</li> <li>• Performance, capacity, throughput restrictions</li> <li>• Accounting disturbed</li> </ul> <p>Criteria for Major alarms:</p> <ul style="list-style-type: none"> <li>• Outage of a redundant component (e.g. outage of a redundant power supply)</li> <li>• Introduction of retaliatory actions required, to ensure the service availability"</li> </ul>				

Relevant 3GPP specifications: <b>TSs 32.111-1, 32.111-2, 32.111-6</b>			Compliance statement: <b>TBD</b>	
Item	Description	Action	Related CR(s)	Status
1	Alarm Severity defined in Alarm IRP 32.111-2 follows the ITU-T alarm severity.  The severity is currently focused on NE level. A customer level severity could be considered.	Write a CR to add criteria in TS 32.111-1.	TBD	Open
2	The severity is currently focused on NE level. A customer level severity could be considered. This is linked to clause 4.3.1 item 2.	TBD		Open

### 4.3.3 Alarm maintenance manuals

<b>Top OPE Recommendations Clause 1.3.3: Alarm maintenance manuals</b>				
<b>"Alarm maintenance manuals must contain a clear repair action for the dedicated malfunction.</b>				
<b>Wherever possible event-based automated repair actions to solve standard error situations without manual interaction should be implemented, if not already implemented on the Network Element level."</b>				
Relevant 3GPP specifications: <b>TSs 32.111-1, 32.111-2, 32.111-6</b>  <b>TS 32.541</b>			Compliance statement: <b>TBD</b>	
Item	Description	Action	Related CR(s)	Status
1	This is a documentation requirement. Repair action already in alarm definition ("proposedRepairActions"), vendors have to populate this alarm field.	Write a CR on TS 32.111-1 to include the requirement.	TBD	Open
2	This is a product requirement.	Write a CR on TS 32.111-1 to include the requirement.	TBD	Open

### 4.3.4 Alarm text

<b>Top OPE Recommendations Clause 1.3.3: Alarm text</b>	
<b>"Alarm text should contain description of abnormal condition, probable cause, service impact, root cause and a clear short repair action or reference to online maintenance manual. Meaningless events have to be avoided."</b>	
	Compliance statement:

Relevant 3GPP specifications: TSs 32.111-1, 32.111-2, 32.111-6			Supported	
Item	Description	Action	Related CR(s)	Status
1	<p>Additional text, additional info, specific problem, probable cause can be used to determine the root cause of the alarm. Maintenance manuals are provided.</p> <p>These fields are already in alarm definition, vendors have to populate those alarm fields.</p>	<p>LS to NGMN on FM-REQ 7 clarification sent from SA5#84 to NGMN NGCOR (S5-122111)</p>	N/A	Closed

## 4.4 Interfaces

See chapter 11 “OSS Standard Itf-N”.

## 5 Automatic Software Management

### 5.1 Short term recommendations

#### 5.1.1 NE health-check

Top OPE Recommendations Clause 2.3: NE health-check				
"OSS system has to be able to verify automatically that network elements are ready for software upgrade. The health-check (e.g. faulty HW Modules, critical alarms, free disk space) has to be executed during the dayshift to ensure the correct behavior and preconditions of the NE itself."				
Relevant 3GPP specifications: <b>TS 32.531/32.532/32.536</b>			Compliance statement <b>Supported</b>	
Item	Initial situation	Action	Related CR(s)	Status
1	This was not explicitly mentioned in TS 32.53x, but could be easily introduced. Possible solutions could be an additional step/stop point and an extension / addition of a notification.	Provide a CR against TS 32.532 to add a stop point for NE health check.	TS 32.532 CR0027R1 (Rel-10)  TS 32.536 CR0033R1 (Rel-10)	Closed

#### 5.1.2 Automated software download

Top OPE Recommendations Clause 2.3: Automated software download				
"The software download to the NEs should work in <u>parallel</u> with a minimum of unavoidable manual steps. A result over view list must be provided."				
Relevant 3GPP specifications: <b>TS 32.531/32.532/32.536</b>			Compliance statement <b>Supported</b>	
Item	Initial situation	Action	Related CR(s)	Status
1	The profile configuration in TS 32.53x allows multiple network elements to download the software in parallel. For the network elements which meet the profile condition, they will initiate the software change accordingly.  The availability of new software in NE can be monitored by the notification notifyNewSwAvailability (TS 32.532). The result list can be built by NM based on those notifications.  Manual operations (downloadNESw, installNESw, ActivateNESw are also supported	None	None	Closed

	(TS 32.532).			
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### 5.1.3 One-click NE software activation

<b>Top OPE Recommendations Clause 2.3: One-click NE software activation</b>				
<b>"Software activation should also work in parallel with a minimum of unavoidable manual steps. The NE health-check should support also the wrap-up activities for urgent issues."</b>				
Relevant 3GPP specifications: <b>TS 32.531/32.532/32.536</b>			Compliance statement <b>Supported</b>	
Item	Initial situation	Action	Related CR(s)	Status
1	<p>The profile configuration in TS 32.53x allows multiple network elements to activate the software in parallel automatically.</p> <p>The resumeSwMProcess operation can work for one-click NE software activation when a stop point has been configured in the profile.</p> <p>Manual operations (downLoadNESw,installNESw,ActivateNESw) can be used for urgent issues on individual NE (TS 32.532).</p>	None	None	Closed

### 5.1.4 Automatic rollback

<b>Top OPE Recommendations Clause 2.3: Automatic rollback</b>				
<b>"Only if the software activations fail completely an automatic rollback should be initiated."</b>				
Relevant 3GPP specifications: <b>TS 32.531/32.532/32.536</b>			Compliance statement <b>TBD</b>	
Item	Initial situation	Action	Related CR(s)	Status
1	<p>No automatic rollback supported.</p> <p>Manual operation (swFallback) has been designed for individual NE (TS 32.532).</p>	Study automatic rollback scenarios and recommend appropriate solutions.	TBD	Open

## 5.2 Long term recommendations

<b>Top OPE Recommendations Clause 2.3: Long term recommendations</b>
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<p><b>"SW package is made available on OSS, and NEs are tagged on OMC for upgrade. Policies for software activation are set.</b>  <b>All necessary activities (NE-health check, SW download, SW activation, corrective actions) are carried out policy controlled by the software management application.</b>  <b>A final upgrade report is provided that will be used as basis for the final wrap up phase.</b>  <b>It is understood that with the long term approach the operator loses detailed control of each single step necessary for a software upgrade. A policy controlled bulk software upgrade is expected to be less error prone than today's solutions."</b></p>				
<p>Relevant 3GPP specifications:  <b>TS 32.531/32.532/32.536</b></p>			<p>Compliance statement  <b>Supported</b></p>	
Item	Initial situation	Action	Related CR(s)	Status
1	The profile configuration in TS 32.53x allows operators configured software management policies.	None	None	Closed
2	The availability of new software in NE can be monitored by the notification notifyNewSwAvailability (TS 32.532). The result list can be built by NM based on those notifications.	None	None	Closed

## 6 Energy Saving

### 6.1 Recommendations on NE / X2 interface

Top OPE Recommendations Clause 3.3.1: Recommendations on NE / X2 interface				
<b>"The network element shall provide an energy saving mode with minimum power consumption allowing a restart of the network element in less than 5 min triggered via the O&amp;M or X2 interface."</b>				
Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/32.762/28.628/28.629</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	The IOC EnergySavingProperties defined in TS 32.522 allows to control via O&M the energy saving state of a network element supporting the Energy Saving Management functionality.	Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)	See clause 6.3.	Closed
2	X2 is not under SA5 responsibility	N/A	N/A	Closed

Top OPE Recommendations Clause 3.3.1: Recommendations on NE / X2 interface				
<b>"In case of loss of connection of the X2 or O&amp;M interface is detected, the node shall restart without any further trigger."</b>				
Relevant 3GPP specifications: <b>N/A</b>			Compliance statement <b>Not applicable</b>	
Item	Functionality	Action	Related CR(s)	Status
1	NE implementation related, not applicable to O&M standard interface.	None	N/A	Closed

Top OPE Recommendations Clause 3.3.1: Recommendations on NE / X2 interface				
<b>"The network elements shall be informed about the status of neighbor sites. If additional capacity is needed, neighbour sites in energy saving mode shall be restarted via X2 interface immediately (less than 5 min)."</b>				
Relevant 3GPP specifications: <b>N/A</b>			Compliance statement <b>Not applicable</b>	
Item	Functionality	Action	Related CR(s)	Status
1	X2 is not under SA5 responsibility	None	N/A	Closed

Top OPE Recommendations Clause 3.3.1: Recommendations on NE / X2 interface				
<b>"Energy saving features shall be considered in other SON use cases (load balancing, cell/service outage detection &amp; compensation, mitigation of unit outage)."</b>				

Relevant 3GPP specifications: <b>TS 32.551/32.522/32.526/28.628/28.629</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	Coordination among Cell Outage Compensation, Capacity and Coverage Optimization, and Energy Saving Management is described in TS 32.522. See clause 4.7 about SON coordination.	Rel-11 WI LTE Self-Organizing Networks (SON) coordination management (UID 530051)	See clause 6.3.	Closed

<b>Top OPE Recommendations Clause 3.3.1: Recommendations on NE / X2 interface</b>				
<b>"Sites in energy saving mode shall be considered in automatic HO adjustment (via X2)."</b>				
Relevant 3GPP specifications: <b>N/A</b>			Compliance statement <b>Not applicable</b>	
Item	Functionality	Action	Related CR(s)	Status
1	X2 is not under SA5 responsibility	None	N/A	Closed

<b>Top OPE Recommendations Clause 3.3.1: Recommendations on NE / X2 interface</b>				
<b>"Non-availability of sites due to energy saving mode (node itself and associated NEs) should not be alarmed by the NE."</b>				
Relevant 3GPP specifications: <b>TS 32.551</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	REQ-32.551-CON-09: When a NE is in energySaving state the IRPAgents shall not consider the NE as a fault, and no alarms shall be raised to the IRPManager for any condition that is a consequence of an energySaving NE (TS 32.551).	None	None	Closed

<b>Top OPE Recommendations Clause 3.3.1: Recommendations on NE / X2 interface</b>				
<b>"The energy saving functionality shall be adequately expandable to 2G / 3G technologies."</b>				
Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	Energy Saving use cases and solution allow to switch on/off E-UTRAN cells. GERAN and UTRAN networks may only be used for compensation.  The IOC interRatEsPolicies defined in TS 32.522 allows to control via O&M inter-	Rel-11 WI Inter-RAT Energy Saving Management (UID 540031)	See clause 6.3.	Closed



	RAT energy saving functionality.			
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## 6.2 OSS/EMS recommendations

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<b>"The energy saving functionality shall be controlled by the element manager. A GUI shall be available to de-activate a static / dynamic energy saving mode of single or groups of nodes incl. definition of time frames when the feature shall be active."</b>				
Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/28.628/28.629</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>REQ-32.551-CON-08: The IRPAgent shall support a capability allowing the IRPManager to initiate energy saving activation/deactivation on one or multiple cells or network elements in the network (TS 32.551).</p> <p>REQ-DIES-FUN-09: The IRPManager shall be able to switch on (= enable) and switch off (= disable) energy saving for a selected part of the network. Switch off energy saving by the IRPManager shall be possible at any time, even if the selected NEs are in energySaving state.</p> <p>REQ-DIES-FUN-10: The IRPAgent should support a capability allowing the IRPManager to configure the time period during which energy saving is allowed.</p> <p>The IOC EnergySavingProperties defined in TS 32.522 allows to control via O&amp;M the energy saving state of a network element supporting Energy Saving Management functionality.</p>	Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)	See clause 6.3.	Closed

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<b>"The system supports automatic detection of low-load periods as basis for operator or automatic decisions on definition of time frames when the feature shall be active."</b>				
Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	REQ-32.551-CON-14: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes into energySaving state (TS 32.551).	Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)	See clause 6.3.	Closed

	<p>REQ-32.551-CON-15: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes out of energySaving state (TS 32.551).</p> <p>This IOC ES Policies from TS 32.522 represents the energy saving policies information. This object class is valid in a distributed ES architecture or in an EM-centralized ES architecture.</p>			
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<p><b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b></p>				
<p><b>"The energy saving functionality shall be supported completely on the Itf-N (BulkCM and/ or CLI)."</b></p>				
<p>Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b></p>			<p>Compliance statement <b>Supported</b></p>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>The following IOCs defined in TS 32.522 provide a complete solution for energy saving management on Itf-N: SONControl, ESPolicies, EnergySavingProperties, and interRatEsPolicies.</p>	<p>Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)</p> <p>Rel-11 WI Inter-RAT Energy Saving Management (UID 540031)</p>	See clause 6.3.	Closed

<p><b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b></p>				
<p><b>"It shall be possible to configure thresholds and rules of conditions to “switch-on/off” a site automatically."</b></p>				
<p>Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b></p>			<p>Compliance statement <b>Supported</b></p>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>REQ-32.551-CON-14: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes into energySaving state (TS 32.551).</p> <p>REQ-32.551-CON-15: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes out of energySaving</p>	<p>Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)</p>	See clause 6.3.	Closed

	<p>state (TS 32.551).</p> <p>This IOC ES Policies from TS 32.522 represents the energy saving policies information. This object class is valid in a distributed ES architecture or in an EM-centralized ES architecture</p>			
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<p><b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b></p> <p><b>"The element management system shall have the actual status of the network element at all time."</b></p>				
<p>Relevant 3GPP specifications:</p> <p><b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b></p>			<p>Compliance statement</p> <p><b>Supported</b></p>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>REQ-32.551-CON-11: The IRPAgent shall allow the IRPManager to query which cells in the network under its domain are in the energySaving state (TS 32.551).</p> <p>REQ-32.551-CON-12: The IRPAgent shall support a capability to notify the IRPManager when a cell goes into or out of energySaving state (TS 32.551).</p> <p>REQ-32.551-CON-13: The IRPAgent shall notify the IRPManager when a cell fails to re-start as a result of going out of energySaving state (TS 32.551).</p> <p>The IOC EnergySavingProperties defined in TS 32.522 allows querying or be notified of the status of a network element supporting Energy Saving Management functionality.</p>	<p>Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)</p>	<p>See clause 6.3.</p>	<p>Closed</p>

<p><b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b></p> <p><b>"The de-/activation of other SON features associated with automatic “switch-off” shall be configurable (automatic HOadjustment of neighbor sites, load balancing, cell/service outage detection &amp; compensation, mitigation of unit outage)."</b></p>				
<p>Relevant 3GPP specifications:</p> <p><b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b></p>			<p>Compliance statement</p> <p><b>Supported</b></p>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>Coordination among Cell Outage Compensation, Capacity and Coverage Optimization, and Energy Saving Management is described in TS 32.522. See clause 4.7 about SON coordination.</p>	<p>Rel-11 WI LTE Self-Organizing Networks (SON) coordination management (UID 530051)</p>	<p>See clause 6.3.</p>	<p>Closed</p>

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<b>"A failed re-start of a network element shall be alarmed."</b>				
Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	REQ-32.551-CON-13: The IRP Agent shall notify the IRP Manager when a cell fails to re-start as a result of going out of energySaving state (TS 32.551).	Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)	See clause 6.3.	Closed

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<b>"Non-availability alarms of sites due to energy saving mode shall be suppressed. This applies not only for alarms of the NE in energy saving mode itself but also alarms of connected NEs shall be avoided (e.g. neighbor-nodes, switches, etc., preferably at NE level)."</b>				
Relevant 3GPP specifications: <b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425, 32.111-1</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	REQ-CoMES-FUN-05: When a NE is in energySaving state the IRP Agents shall not consider the NE as a fault, and no alarms shall be raised to the IRP Manager for any condition that is a consequence of an energySaving NE (TS 32.551).	None	None	Closed

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<b>"It shall be possible to identify the designated energy saving mode in performance data (preferably at NE level) in order to consider this in KPI calculations (e.g. cell availability)."</b>				
Relevant 3GPP specifications: <b>TSs 32.425</b>			Compliance statement <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	A specific sub-cause has been introduced for the definition of performance measurements to differentiate if the cell unavailability or the failure of the RRC connection establishment happens because of Energy Saving.  Since Energy Saving Management feature is done by the Operator on purpose, such failures should be distinguishable from other network failures and should be counted	Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)	See clause 6.3.	Closed

	<p>separately.</p> <p>With the separate cell unavailability counter due to Energy Saving it is possible to deduct the cell downtime due to Energy Savings from the total cell outage.</p>			
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<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<p><b>"Under the assumption that the "switch off" of cells is only done if a redundant coverage is given by other cells (of e.g. eventually other collocated RAT) the system supports the import and export of traffic indicators from cells to understand the traffic situation in the cells doing the backup. If the traffic is exceeding a certain operator defined load the system ensures that cells in energy saving mode are activated at once to ensure best customer experience with respect to performance and quality."</b></p>				
<p>Relevant 3GPP specifications:</p> <p><b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b></p>			<p>Compliance statement</p> <p><b>Supported</b></p>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>REQ-32.551-CON-14: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes into energySaving state (TS 32.551).</p> <p>REQ-32.551-CON-15: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes out of energySaving state (TS 32.551).</p> <p>REQ-NCES-FUN-04: The IRPAgent shall provide a capability allowing the IRPManager to monitor the network load (TS 32.551).</p> <p>There are related Use Cases defined in TS 32.551: eNB overlaid use case, Capacity-limited network use case.</p> <p>For NM centralized architecture, collection of traffic indicators is done using PM IRP.</p> <p>For distributed or EM centralized architecture, corresponding traffic threshold attributes are defined in 32.522.</p>	<p>Rel-10 WI OAM aspects of Energy Saving in Radio Networks (UID 470037)</p>	<p>See clause 6.3.</p>	<p>Closed</p>

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>	
<p><b>"The delivery of these traffic indicators shall be in more real-time than PM to ensure a quick reaction on changed traffic situation in the backing cells."</b></p>	
<p>Relevant 3GPP specifications:</p> <p><b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b></p>	<p>Compliance statement</p>

Item	Functionality	Action	Related CR(s)	Status
1	<p>Support for PM in real time needs to be discussed in the other requirement. Probably it is more efficient to not transport these traffic indicators via Itf-N, but only define policies base on their values.</p> <p>REQ-32.551-CON-14: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes into energySaving state.</p> <p>REQ-32.551-CON-15: The IRPAgent should support a capability allowing the IRPManager to configure a cell traffic load threshold to be used for the decision if a network element goes out of energySaving state.</p>	TBD	TBD	Open

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<b>"Provision of capability indicators indicating which RAT active UE in a cell is capable to support. Idea behind is to identify if upcoming traffic in backing layer is dedicated to a UE which can benefit by switcing on the LTE cell once again."</b>				
Relevant 3GPP specifications:			Compliance statement	
<b>TBD</b>			<b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	There is no cell switch off if the UE cannot handover. See ES probing procedure in TS 32.551.	None	None	Closed

<b>Top OPE Recommendations Clause 3.3.2: OSS/EMS recommendations</b>				
<b>"Energy saving features shall be considered in other SON use cases (Load Balancing, cell/service outage detection &amp; compensation, mitigation of unit outage)"</b>				
Relevant 3GPP specifications:			Compliance statement	
<b>TSs 32.551/32.522/32.526/28.628/28.629/32.642/32.652/32.762/32.425</b>			<b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	Coordination among Cell Outage Compensation, Capacity and Coverage Optimization, and Energy Saving Management is described in TS 32.522. See clause 4.7 about SON coordination.	Rel-11 WI LTE Self-Organizing Networks (SON) coordination management (UID 530051)	See clause 6.3.	Closed

## 6.3 Changes Requests related to Energy Saving Work Items

WID	TS	CR	Rev	Release	Title
470037	32.425	0026	-	Rel-10	Modifying RRC establishment failure and Cellunavailability measurements due to Energy Saving
470037	32.522	0004	3	Rel-10	Adding NRM for Energy Saving Management policies and ESM switch
470037	32.522	0013	3	Rel-10	Use ESPolicies also for EM centralized architecture
470037	32.522	0014	-	Rel-10	Correct cardinality of ESPolicies
470037	32.526	0002	1	Rel-10	Network Resource Model (NRM) for Energy Saving Management (ESM) Policies and Switch - Align with 32.522 SON NRM IRP Information Service
470037	32.551	0001	1	Rel-10	Modify the energy saving compensation related use cases
470037	32.551	0002	1	Rel-10	Add energy saving compensation deactivation requirement
470037	32.551	0003	1	Rel-10	Modify the requirements about traffic threshold and time duration for Energy Saving Management (ESM)
470037	32.551	0004	-	Rel-10	Modify errors in state name and in section title
470037	32.551	0005	1	Rel-10	Clarify the description of energy saving compensation activation and deactivation over Itf-N
470037	32.551	0006	-	Rel-10	Correct requirements for EM-centralized Energy Saving Architecture
470037	32.626	0002	-	Rel-10	Add containment for object class ESPolicies - Align with 32.522 SON NRM IRP Information Service
470037	32.762	0038	1	Rel-10	Introduction of attributes to reflect the status of Energy Saving
470037	32.762	0042	2	Rel-10	Adding IOC for energy saving properties
470037	32.762	0044	-	Rel-10	Adding NRM for "candidate cells" in Energy Saving Management (ESM)
470037	32.762	0050	3	Rel-10	Add a new attribute into EUTRAN GenericCell object class to define a cell as not changeable by Energy Saving Management - Align with 32.551 ESM Concepts and requirements
470037	32.762	0054	1	Rel-10	Correct ambiguous value usage on energySavingState
470037	32.766	0013	4	Rel-10	Add Energy Saving Management (ESM) items for Itf-N - Align with 32.762, 32.551

WID	TS	CR	Rev	Release	Title
540031	32.405	0069	1	Rel-11	Add energy saving cause to UTRAN measurements
540031	32.551	0008	5	Rel-11	Relocate misplaced text for energy saving management concept
540031	32.551	0009	2	Rel-11	Add Inter-RAT Energy Saving Management requirements from 32.834
540031	32.551	0010	1	Rel-11	Add Inter-RAT Energy Saving Management concepts from TR

					32.834
540031	32.551	0011	1	Rel-11	Add Inter-RAT Energy Saving Management use cases
540031	32.522	0092	1	Rel-11	CR R11 32.522 Add time period configuration to allow inter-RAT energy saving
540031	32.526	0016	3	Rel-11	CR R11 32.526 Add time period configuration to allow inter-RAT energy saving -Align with 32.522
540031	32.551	0019	3	Rel-11	Rel-11 CR 32.511 Clarify Inter-RAT Energy Saving Management requirement
540031	32.522	0103	-	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.526	0023	-	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.551	0025	2	Rel-11	eNB overlaid use case
540031	32.642	0078	1	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.646	0045	1	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.652	0038	1	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.656	0007	1	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.762	0081	-	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.766	0039	-	Rel-11	Add support for Inter-RAT Energy Saving Management
540031	32.522	0120	5	Rel-11	Add load threshold parameters to Inter-RAT energy saving policy
540031	32.522	0131	-	Rel-11	Enhance description of esNotAllowedTimePeriod
540031	32.526	0020	5	Rel-11	Add missing load thresholds for Inter-RAT ES
540031	32.551	0028	-	Rel-11	Cleanup of energy saving management requirements
540031	32.551	0029	-	Rel-11	Correction of references related to inter-RAT energy saving management
540031	32.626	0003	1	Rel-11	Add containment for Inter-RAT ES policies
540031	32.646	0047	1	Rel-11	Add containment for Inter-RAT ES policies
540031	32.656	0008	1	Rel-11	Add containment for Inter-RAT ES policies
540031	32.762	0084	1	Rel-11	Remove eNB partial overlay constraint
540031	32.766	0042	1	Rel-11	Add containment for Inter-RAT ES policies

WID	TS	CR	Rev	Release	Title
530051	32.522	0078	1	Rel-11	CR R11 TS 32.522 Adding coordination use case among CCO, COC and ESM
530051	32.522	0107	1	Rel-11	Coordination between ES and cell compensation



# 7 Self Organizing Networks

## 7.1 O&M Support for SON

### Abstract of Top OPE Recommendations Clause 4.1: O&M Support for SON:

"SON and related benefits are seen as an essential economical characteristic of LTE strongly asked for by all operators. As a consequence it has to be ensured that operator keep the control on all new SON functionality by implementation of appropriate policy control functions.  
An effective O&M support provides operator with network control in SON trust building and learning phase. It allows in all situations that a very good network quality can be assured."

"SON functionality / capability shall have controlled implementation in order to build trust and confidence in automation and avoid massive operational impact."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System should provide a general SON Monitoring & Control Application covering policy control, history log and switch on/off functionality per site and cell."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"SON centralized and distributed approach must be supported (depending on the SON use case)."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System should provide possibility to configure certain break points for SON Operations, allowing the operator for manual intervention to proceed with the logic, or to halt / abort it."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System shall be synchronized in real time with SON initiated network changes. Notifications shall also be available real-time via the CM Northbound Interfaces to NMS."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System should provide a valuable Reporting Suite for SON activities."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System shall fully support SON as defined in 3GPP standards, inclusive CM Northbound Interface 3GPP BulkCM IRP (CORBA or SOAP based)."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Provide an open Northbound Interface for all SON related parameters for interoperability with 3rd party tools."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System should be able to request or report the SON related changes for statistical analysis and historical view."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"It shall be possible to customize SON policies. On the one hand, there shall be flexibility to adjust the SON functionality to the Operator's recommendations. On the other hand, customization shall be a simple process to minimize the manual effort required"				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

## 7.2 Generic Optimization

### Abstract of Top OPE Recommendations Clause 4.2: Generic Optimization:

"In current 2G / 3G Networks parameter optimization is done manually by analysing drive-test data and performance measurements. An automated parameter optimization has the possibility to reduce the effort for Network optimization and operations significantly.

Network quality and customer satisfaction will be enhanced. Network planning and optimizations efforts can be reduced significantly."

"SON should support the automatic parameter optimization for the following use case: Automatic optimization of coverage and capacity related parameters in dependency of related KPIs and thresholds."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"SON should support the automatic parameter optimization for the following use case: Automatic optimization of QoS and GoS related parameters (i.e. adaption of scheduling and / or RACH parameters) in dependency of related KPIs and thresholds"				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"SON should support the automatic parameter optimization for the following use case: Automatic optimization of mobility and handover related parameters (i.e. cell individual offsets, down tilts, Event A related parameters) in dependency of related KPIs."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"SON should support the automatic parameter optimization for the following use case: Automatic optimization of cells or services in outage based on an unambiguous detection of this outage."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Optimization for identified parameters can be done within a value range, defined by the operator.  
Note: operator and supplier providing a SON solution have to consider that the configuration of a value range eventually could restrict SON functionality leading to less benefits of such a solution. On the other hand without such a definition of a value range SON functionality could lead to negative impacts. It is in interest of supplier and operator to find for every use case the appropriate compromise in form of a well balanced implementation to meet the targets of a specific SON functionality and to avoid side effects. For field solutions the best fitting value range has to be found and to be set as vendor and operator specific parameter(s) if the definition of such a range is applicable for the dedicated use case."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Optimization shall be done with respect to KPIs and parameters not directly related to the use case KPI (i.e. other KPIs shall not become worse than defined thresholds (e.g. handover optimization shall be done with respect to capacity related parameters resp. KPIs)."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Dependency between KPIs resp. definition which KPIs shall be considered in addition to use case KPI(s) shall be configurable by the operator."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Thresholds for start and end point of parameter optimization shall be configurable by the operator."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Optimization cycle should be configurable (periodically, event-based)."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Support of centralized / decentralized solution."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Degree of automation configurable by the operator. o Optimization cycle completely automated: yes / no o Automated import of optimized settings: yes / no"				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"Import / export function of network status with history and fallback solution."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"OSS should provide standardized interfaces to planning tools / processes."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

## 7.3 ANR

### Abstract of Top OPE Recommendations Clause 4.3: ANR

"The SON use case Automatic Neighbor Cell Configuration and X2 Setup is defined in the 3GPP Release 8 standards inspired strongly by NGMN recommendations (see [1]). Based on UE Measurements the eNodeB adapts the NR Table.

ANR Algorithm and decision making is located in eNodeB. ANR has the potential to reduce the effort in network planning and configuration changes related to adaptation of adjacent cells that represents one of the most common operations in planning and optimization processes."

"Operator expect from ANR within Intra-LTE, Inter-LTE and Inter-RAT for all handover types: <ul style="list-style-type: none"> <li>As ideal target: Full substitution of initial planning of relationships based on planning tools;"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Operator expect from ANR within Intra-LTE, Inter-LTE and Inter-RAT for all handover types: <ul style="list-style-type: none"> <li>Integration with pre-planning of neighbour relationships based on planning tools;"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Operator expect from ANR within Intra-LTE, Inter-LTE and Inter-RAT for all handover types: <ul style="list-style-type: none"> <li>Automatic configuration of neighbor relationships inclusive setup of related X2 interfaces;"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Operator expect from ANR within Intra-LTE, Inter-LTE and Inter-RAT for all handover types: <ul style="list-style-type: none"> <li>Automatic optimization of neighbor relationships"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	

Item	Description	Action	Related CR(s)	Status
1				

"There shall be fast initial ANR data handling and conditional list implementation, where it is possible to set up a scheme of neighboring cells over multiple Sites with a minimum of UE initiated traffic and customer impact. To face the risks on issues (like lengthy measurement gaps due to ANR or HO failures and call drops due to missing neighbors) several optional features are asked for. It is underlined that these related recommendations shall not put into question that the above SON characteristics of ANR shall be fulfilled.

- EMS and OSS should provide a general ANR monitoring & control application covering policy control, history log and switch on/off functionality per site."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"There shall be fast initial ANR data handling and conditional list implementation, where it is possible to set up a scheme of neighboring cells over multiple Sites with a minimum of UE initiated traffic and customer impact. To face the risks on issues (like lengthy measurement gaps due to ANR or HO failures and call drops due to missing neighbors) several optional features are asked for. It is underlined that these related recommendations shall not put into question that the above SON characteristics of ANR shall be fulfilled.

- Conditional lists in form of white and black lists as defined by 3GPP shall be stored and configurable within the configuration application / EMS and OSS platform. These lists can be read and configured via the northbound interface in operator's network management level. The ANR functionality in forms directly new identified neighbors to the EMS and the OSS."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"There shall be fast initial ANR data handling and conditional list implementation, where it is possible to set up a scheme of neighboring cells over multiple Sites with a minimum of UE initiated traffic and customer impact. To face the risks on issues (like lengthy measurement gaps due to ANR or HO failures and call drops due to missing neighbors) several optional features are asked for. It is underlined that these related recommendations shall not put into question that the above SON characteristics of ANR shall be fulfilled.

- Neighbor cell lists shall be autonomously configured and optimized by the system based on UE measurements according to 3GPP's ANR, with user setting options like: which UE measurements to use for cell list optimization, forbidden adjacency relations, no handover & no remove attributes, etc."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				



"There shall be fast initial ANR data handling and conditional list implementation, where it is possible to set up a scheme of neighboring cells over multiple Sites with a minimum of UE initiated traffic and customer impact. To face the risks on issues (like lengthy measurement gaps due to ANR or HO failures and call drops due to missing neighbors) several optional features are asked for. It is underlined that these related recommendations shall not put into question that the above SON characteristics of ANR shall be fulfilled.

- ANR functionality is expected in a way that following handover procedure can be done directly after or "on the fly". This means that the time for relationship identification and configuration inclusive setup of X2 is minimized on less than 2 seconds."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

"There shall be fast initial ANR data handling and conditional list implementation, where it is possible to set up a scheme of neighboring cells over multiple Sites with a minimum of UE initiated traffic and customer impact. To face the risks on issues (like lengthy measurement gaps due to ANR or HO failures and call drops due to missing neighbors) several optional features are asked for. It is underlined that these related recommendations shall not put into question that the above SON characteristics of ANR shall be fulfilled.

- The system shall support specific ANR measurements and its configuration separated from specific HO measurements to enable early relationship identification. Target of this is to ensure that the relationship configuration time does not endanger the successful following handover."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"There shall be fast initial ANR data handling and conditional list implementation, where it is possible to set up a scheme of neighboring cells over multiple Sites with a minimum of UE initiated traffic and customer impact. To face the risks on issues (like lengthy measurement gaps due to ANR or HO failures and call drops due to missing neighbors) several optional features are asked for. It is underlined that these related recommendations shall not put into question that the above SON characteristics of ANR shall be fulfilled.

- For LTE->3G and LTE->2G neighbor relation configuration some pre-planned information via northbound interface or available information in a Multi-RAT system (like given relations of collocated cells, scrambling codes or ARFCN of likely neighbors) can be used to mitigate side-effects of time consuming UE measurements in an efficient way."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System support for Automatic X2-Setup based on handover-relations."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Network and Management System to be able to configure / manage "no X2 flag", "no remove flag" and "no HO flag" (as opposed to eNodeB only per 3GPP.)"				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Due to missing standardized ANR functionality for the direction from 3G or 2G to LTE the system shall support neighbor relation planning for these directions. Future standardization to cover multi vendor scenarios is asked for. The exchange of neighbor relation lists from planning tools or other EMS via northbound interface shall be supported. Within the Multi-RAT system of one supplier the different RAT neighbor relation information shall be considered to achieve automatic neighbor relations also for 3G->LTE and 2G->LTE directions."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

## 7.4 Minimisation of Drive Tests

### Abstract of Top OPE Recommendations Clause 4.4: Minimisation of Drive Tests:

"Network operators strongly rely on manual drive-tests to collect the field measurements that are needed to monitor and optimize the performance of their networks. Drive-tests require a huge effort in terms of resources and time. Moreover, drive test can be usually only be done in specific areas (e.g. roads), whereas users and traffic are also distributed on areas not accessible for drive-tests (e.g. indoor). Therefore, it will be highly beneficial to automate the collection of field measurements and to minimize the need for operators to rely on manual drive-tests.

Drive-tests require a huge effort in terms of resources and time so huge potential is given if typical information can be provided by other methods than by today's cost driving drive tests."

<p>"According to the overall technical analysis performed, solutions in support for SDT are feasible and expected in the short term evolution of LTE.</p> <p>It is recommended that NGMN solutions for SDT shall:</p> <ul style="list-style-type: none"> <li>• be able to support both user-plane and control plane architectures, depending on the operator's deployment strategy."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"According to the overall technical analysis performed, solutions in support for SDT are feasible and expected in the short term evolution of LTE.</p> <ul style="list-style-type: none"> <li>• It is recommended that NGMN solutions for SDT shall:rely on UE involvement for performing, collecting and reporting measurements to the O&amp;M, for both real-time and non real time-reporting, also providing Location and Time information"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"According to the overall technical analysis performed, solutions in support for SDT are feasible and expected in the short term evolution of LTE.</p> <p>It is recommended that NGMN solutions for SDT shall:</p> <ul style="list-style-type: none"> <li>• provide efficient handling of a significant number of UEs and the selection of UE based on capability or user profile"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"According to the overall technical analysis performed, solutions in support for SDT are feasible and expected in the short term evolution of LTE.</p> <p>It is recommended that NGMN solutions for SDT shall:</p> <ul style="list-style-type: none"> <li>• effectively support multi-RAT and multivendor scenarios "</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	

Item	Description	Action	Related CR(s)	Status
1				

<p>"In particular the relevant standardization bodies shall address the following aspects according to the recommendation above:</p> <p>3GPP</p> <p>RAN: protocol extensions for the control-plane architecture (RRC to configure the UE measurements and events and reporting, both for real time and non-real time; network interfaces in order to support measurement collection and reporting in mobility)</p> <p>SA5: Itf-N enhancements to support SDT management and to retrieve UE measurements, both for a control plane and for a user-plane architecture."</p>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

## 7.5 HO Optimization

### Abstract from Top OPE Recommendations Clause 4.5: HO Optimization:

"The HO optimization considers the self-optimization of the handover parameters like handover neighbor list, neighbour specific thresholds and hysteresis parameters. Therefore, this use case aims to reduce the occurrence of undesirable effects following handovers, such as Too Early HO, Too Late HO, HO to wrong cell, call drops and ping-pong handovers between two cells.

In today's networks cell individual setting of HO related parameter often done only in an reactive way: based on customer complaints, triggered by bad KPI and performance measurements or experiences based on drive tests. Beside the fact that all these activities cost resources and time these indicators ring the alarm bell at first at a certain level of problems. With functionality detecting and mitigating the problems very early better quality can be achieved and optimization resources can be used for more complex optimization problems in the network."

<p>"SON should support the automatic parameter Optimization for the following use cases:</p> <ul style="list-style-type: none"> <li>Automatic Optimization of mobility and handover related parameters in dependency of related KPIs."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

1				
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<p>"SON should support the automatic parameter Optimization for the following use cases:</p> <ul style="list-style-type: none"> <li>The HOO related functionality have to be harmonised with other SON functionality like Load Balancing, QoS Optimization, Cell Outage Compensation and others."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"The implementation of appropriate features and algorithms based on detection features in 6.1.1 is needed. In the following some guidance is given on these vendor specific solutions:</p> <ul style="list-style-type: none"> <li>The HO algorithm considers certain parameters with specific values to decide on HO triggers and start execution of HO.</li> <li>For these parameter used in algorithm on MRO or MLB some default settings are defined based on field experiences. The HOO algorithm can set these parameters such that the interaction between MRO and MLB will not degrade the RATs performance.</li> <li>Cell individual characteristics like topology or coverage scenarios may lead to problems with given default settings and would lead to cell individual adaptations. These adaptations can be done manually by operator or automatically by SON features which are in focus of this document and related project. The optimization needs to consider the objectives of exceeding a HO failure rate target and minimizing the number of handovers.</li> <li>It must be underlined that optimization actions can be also undertaken as a result of statistical elaboration of detected HO failure events."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In order to avoid multi-vendor inconsistence, it is necessary to specify the evaluation principles of HO optimization</p> <ul style="list-style-type: none"> <li>The evaluation metrics and trigger criteria can be defined and customized in OAM interface."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

1				
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"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization <ul style="list-style-type: none"> <li>• If the performance does not meet the trigger criteria, stops action; otherwise continues."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization <ul style="list-style-type: none"> <li>• If the performance got worse, reverse action be needed."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization <ul style="list-style-type: none"> <li>• While evaluating, all related performance metrics should be monitored, other performance metrics should not be deteriorated greatly to improve one performance metric"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization <ul style="list-style-type: none"> <li>• If the desired metric got better after optimization action, while others become worse but not enough to trigger action, i.e., it is still in acceptable range, this action should be accepted. Otherwise should be reversed in case the metrics scope within 3GPP are not optimal."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

1				
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<p>"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization</p> <ul style="list-style-type: none"> <li>• Some KPIs (defined per neighbour relationship) to be considered for HO optimization performance evaluation could be:             <ul style="list-style-type: none"> <li>○ Rate of failures related to handover"</li> </ul> </li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization</p> <ul style="list-style-type: none"> <li>• Some KPIs (defined per neighbour relationship) to be considered for HO optimization performance evaluation could be:             <ul style="list-style-type: none"> <li>○ Rate of failures related to handover without RRC state transition "</li> </ul> </li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization</p> <ul style="list-style-type: none"> <li>• Some KPIs (defined per neighbour relationship) to be considered for HO optimization performance evaluation could be:             <ul style="list-style-type: none"> <li>○ Rate of failures related to handover with RRC state transition "</li> </ul> </li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In order to avoid multi-vendor inconsistency, it is necessary to specify the evaluation principles of HO optimization</p> <ul style="list-style-type: none"> <li>• Some KPIs (defined per neighbour relationship) to be considered for HO optimization performance evaluation could be:                             <ul style="list-style-type: none"> <li>○ Statistics of RRC Connection Re-establishment"</li> </ul> </li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"Optimization for identified parameters can be done within a value range, defined by the operator. (see also note in chapter 4.2.3)."</p>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"Optimization shall be done with respect to KPIs and parameters not directly related to the use-case KPI (i.e. other KPIs shall not become worse than defined thresholds (e.g. Handover-Optimization shall be done with respect to capacity related parameters resp. KPIs)."</p>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"Dependency between KPIs resp. definition which KPIs shall be considered in addition to HOO KPI(s) (as e.g. HO Success Rate, Call Drop Rate, Cell individual HO failure rates) shall be configurable by the operator."</p>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status



1				
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"Thresholds for start and end point of parameter optimization shall be configurable by the operator."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Optimization cycle should be configurable (periodically, event-based)."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Support of centralized / decentralized solution."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Degree of automation configurable by the operator."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

1				
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"Import / Export function of network status with history and fallback solution."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"OSS should provide standardized interfaces to planning tools/processes."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

## 7.6 Load Balancing

### Abstract of Top OPE Recommendations Clause 4.6: Load Balancing

"Load balancing promises the usage of given redundancy in the network to move load from the capacity restricted resource to these ones which have free capacity by sharing load information and appropriate reaction on this.

Using the given redundancy in overlapping cell areas peak load situation can be handled by load balancing functionality delivering a better customer experience and higher revenue of deployed resources. Secondly necessary capacity based on identified overload can be timely shifted or even avoided."

"In addition to load indicators already defined in 3GPP, for the inter-RAT Load Balancing use cases, NGMN recommends the introduction of new load indicators or the refinement of the existing ones so that:				
<ul style="list-style-type: none"> <li>• Load indicators shall take into account the specificities of source and target RATs so that the load or the available capacity is commonly understood in both RATs "</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

1				
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<p>"In addition to load indicators already defined in 3GPP, for the inter-RAT Load Balancing use cases, NGMN recommends the introduction of new load indicators or the refinement of the existing ones so that:</p> <ul style="list-style-type: none"> <li>• Load indicators shall accurately reflect the load and be unambiguously interpreted in a multi vendor environment."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In addition to load indicators already defined in 3GPP, for the inter-RAT Load Balancing use cases, NGMN recommends the introduction of new load indicators or the refinement of the existing ones so that:</p> <ul style="list-style-type: none"> <li>• For load indicators report over the north bound interface, load indicators shall be defined such as understandable by 3rd parties SON servers."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In addition to load indicators, reliable protocols and procedures for load information exchange between RATs shall be defined. The protocols shall be defined such as:</p> <ul style="list-style-type: none"> <li>• Load information can be exchanged on demand, periodically or based on events. Operators shall be able to configure the type of load reporting to be used based on its own policies."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In addition to load indicators, reliable protocols and procedures for load information exchange between RATs shall be defined. The protocols shall be defined such as:</p> <ul style="list-style-type: none"> <li>• Operators shall be able to control the extra signaling generated by the load balancing related information exchange."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In addition, it is recommended that the load balancing solution include the following functionality:</p> <ul style="list-style-type: none"> <li>• Load balancing shall have minimal impact on mobility performance while attempting to use a minimum number of handovers or cell re-selections needed to achieve the load balancing."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In addition, it is recommended that the load balancing solution include the following functionality:</p> <ul style="list-style-type: none"> <li>• Load balancing in mobility scenarios should be coupled with algorithm that automatically adjusts cell individual offset parameter (as per SOCRATES study results)"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In addition, it is recommended that the load balancing solution include the following functionality:</p> <ul style="list-style-type: none"> <li>• Load balancing algorithm in mobility scenarios shall also relay on awareness of type of basestation to decide whether to enforce handover to macro or to pico cells (as per SOCRATES study results)"</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

1				
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<p>"In addition, it is recommended that the load balancing solution include the following functionality:</p> <ul style="list-style-type: none"> <li>• Load balancing shall be designed in such way as to increase overall resource utilization in overlaid heterogeneous networks and reduce investment in capacity."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In terms of load balancing management and interoperability, NGMN recommends the following:</p> <ul style="list-style-type: none"> <li>• It shall be possible to customize load balancing policies. On the one hand, there shall be flexibility to adjust the load balancing related SON functionality to the Operator's recommendations. On the other hand, customization shall be a simple process to minimize the manual effort required."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In terms of load balancing management and interoperability, NGMN recommends the following:</p> <ul style="list-style-type: none"> <li>• A multi-vendor interface between eNB and O&amp;M needs to be supported to allow for seamless operation in multivendor scenarios."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In terms of load balancing management and interoperability, NGMN recommends the following:</p> <ul style="list-style-type: none"> <li>• Provide an open Northbound Interface for all load balancing related parameters within SON for Interoperability with 3rd party Tools."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"In terms of load balancing management and interoperability, NGMN recommends the following:</p> <ul style="list-style-type: none"> <li>• It would be desirable to extend the SON functionality to use E2E approach, such that traffic management selection is based not only on load balancing indicators, but also on network topology as to avoid for example MME or SGW relocation in case of intra LTE balancing."</li> </ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"Based on the long term traffic behaviour, it should be possible to direct the traffic in advance by a centralized entity (e.g. periodic events such as sports, fairs, etc)."</p>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

<p>"Cell reselection for idle users should take into account current active user conditions so that if QoS demands increase in a cell it is possible to force cell edge users to camp on strongest neighbour, or to the one that has more resources available."</p>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status

1			
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<p>"It is recommended that 3GPP include the following in the standardization effort:</p> <ul style="list-style-type: none"> <li>• Complete the standardization work on load indicators to enable multi-vendor and multi RAT support for load balancing</li> <li>• Complete the standardization work on load indicators to enable reliable load information exchange in a multi-RAT, multi vendor network configuration</li> <li>• Extend automatic neighbour relationship capability to include awareness of type of basestation (macro/pico/femto) so that: <ul style="list-style-type: none"> <li>○ handovers to macro cells are enforced when UE speed exceeds certain threshold</li> <li>○ handovers to pico happen when UE speed is low and when there is spare pico capacity</li> </ul> </li> <li>• Add capability to selectively offload individual users between 3G/4G RATs based on the decision policy.</li> <li>• Standardize network management to/from PCRF interface so that operator policy can operate seamlessly in multivendor environment" </li></ul>				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

## 7.7 Cell Outage Compensation

### Abstract of Top OPE Recommendations Clause 4.7: Cell Outage Compensation:

"It has to be separated between detection and mitigation.

Cell Outage Detection: Cell outage is detected by statistical analysis, alarm or customer complains. Often, it may not be detected for several hours /days (sleeping cell). This may also only refer to some service in a cell (e.g. sleeping HSDPA, sleeping GPRS). The Goal is that automatic system functionality detects sleeping or poor performing cells.

Cell Outage Compensation: The network is being reconfigured to compensate the loss of service in the respective area. It is ensured that in surrounding area of cell in outage the cells which are not directly involved in COC activities significant quality indicators like call drop rate and average throughputs are not negatively affected. When the failure has been removed an autonomous reconfiguration shall take place. The Goal is:

HW failure of eNodeB unit causes complete outage of a cell. Loss shall be compensated by the network as much as possible until the failure is removed using redundancy in the network.

Revenue loss of cells or services is avoided. Further customer impact is minimized in case of losses. Maintenance activities can / maybe shifted to planned maintenance time periods with following cost savings."

<p>"The network element can, at the lowest layer, consolidate all available information (alarms, measurements, traces, UE information neighbour cell information, etc) and create a meaningful alarm that indicates a service affecting problem."</p>	
Relevant 3GPP specifications:	Compliance statement

Item	Description	Action	Related CR(s)	Status
1				

"Data is provided to a centralized entity that gathers all necessary information from the networks (e.g. alarms, measurements, traces, PM data, probes, neighbour cells, UEs, eNB heartbeat) and consolidates this information to generate structured information on the service state in each individual cell."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"The centralized entity is multi-vendor capable in that it is possible to connect elements from different suppliers to this entity with no consequent restriction in functionality."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Service related problems in the network are detected and alarmed."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"It is possible to automatically initiate consequent policy-controlled actions such as automated power down and/or traffic blocking of a sleeping cell, Alarm to Operator. It must be possible for the operator to create related policies."				
Relevant 3GPP specifications:			Compliance statement	



Item	Description	Action	Related CR(s)	Status
1				

"The System autonomously compensates for network problems resulting in cell failures. The failure consequences are minimized and the reaction time for the operator can be relaxed."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"In compensating for these failures, the System interfaces to 2G and 3G network for automatic Inter-RAT (I-RAT) neighbour configuration. Handovers in affected cells of 2G, 3G and LTE technology shall be prevented. New handover relations in both, 2G, 3G and LTE, are configured to mitigate the failure consequences."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Additional parameters such as transmission power and antenna settings are also automatically adjusted."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"In the event of a higher level network element (on which low level elements such as the eNodeB are dependent) failing or becoming unavailable, service outages can be avoided by an appropriate automatic re-parenting of the lower level nodes to other available higher level network elements."				
Relevant 3GPP specifications:			Compliance statement	

Item	Description	Action	Related CR(s)	Status
1				

"In doing so, QoS analysis is applied to manage pooling and load sharing activities "				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Automatic healing or mitigation mechanisms for several failure classes are in place, decreasing operational effort and mitigating the consequences of unit failures. Node resources are re-configured autonomously and optimised."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Fault management and correction is simple and to a significant extent automated, supported, for example, by a correlation function. Parameters such as correlation rule data must be configurable by the operator. Consequent automated actions must also be configurable by the operator."				
Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"During operation of the System, it may be required to add or remove hardware to or from individual entities or groups of entities (for example, an eNodeB or group of eNodeBs) comprising the system, and it may also be required to increase or decrease the capacity of these entities."				
Relevant 3GPP specifications:			Compliance statement	

Item	Description	Action	Related CR(s)	Status
1				

"It is required to carry out these changes with:

- As few site visits as possible
- As little human intervention as possible
- o Where human intervention is required, only minimum technical skills shall be used"

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Automatic Optimization of mobility and handover related parameters (i.e. cell individual offsets, down tilts, Event A related parameters) in dependency of related KPIs."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"Automatic Optimization of cells or services in outage based on a unambiguous detection of this outage. Implementation of rule based switch towards planned configuration sets for defined outage scenarios shall be supported by the system"

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"The inventory related instances in network management level "NetworkInventory" (reflecting HW and configuration status) and "ServiceInventory" (reflecting service level) provide standard interface to an instance "CellOutageCompensation" so it can retrieve comprehensive (multi-vendor) network view and information about services to be able to calculate the service impact of reconfiguration processes."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

"NEMs should provide interface which would enable an instance "CellOutageCompensation" to orchestrate the reconfiguration process. This in particular should enable the instance "CellOutageCompensation" to define conditions/limits for reconfigurations which can be performed by NEM."

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				

## 7.8 Common Channel Optimization

**Top OPE Recommendations Clause 4.8: Common Channel Optimization**

Relevant 3GPP specifications:			Compliance statement	
Item	Description	Action	Related CR(s)	Status
1				
2				
3				
4				
5				

6				
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## 7.9 Interactions between Home and Macro BTS

<b>Top OPE Recommendations Clause 4.9: Interactions between Home and Macro BTS</b>				
Relevant 3GPP specifications:				Compliance statement
Item	Description	Action	Related CR(s)	Status
1				
2				
3				
4				
5				
6				

## 7.10 SON in CN

<b>Top OPE Recommendations Clause 4.10: SON in CN</b>				
Relevant 3GPP specifications:				Compliance statement
Item	Description	Action	Related CR(s)	Status
1				
2				
3				

4				
5				
6				

## 7.11 QoS Optimization

Top OPE Recommendations Clause 4.11: QoS Optimization				
Relevant 3GPP specifications:				Compliance statement
Item	Description	Action	Related CR(s)	Status
1				
2				
3				
4				
5				
6				

## 8 Performance Management Enhancements

### 8.1 Free configurable measurement and delivery periods

Top OPE Recommendations Clause 5.3: "Free configurable measurement and delivery periods for each counter or counter group."				
Relevant 3GPP specifications: 32.411, 32.412, 32.416			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>TS 32.412 defines the operation createMeasurementJob with available granularity period of 5, 15, 30 minutes, 1, 12 or 24 hours. The granularity period specifies the period between two successive measurements.</p> <p>The measurement job also defines the reporting period which is the period between two successive notifications announcing the availability of the measurement file.</p>	None	None	Closed

### 8.2 Efficient data transfer mechanism

Top OPE Recommendations Clause 5.3: "Efficient data transfer mechanism, e.g. simply structured and compact raw data format with a maximum net data rate, e.g. csv (current XML-based 3GPP standard has large overhead; might be improved using e.g. appropriate compression methods; subject for standardization)"				
Relevant 3GPP specifications: 32.431, 32.432, 32.435, 32.436, 32.341, 32.342, 32.346			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	<p>TS 32.435 defines XML file format definition. Compression of XML is an available option of SA5 standards (File transfer IRP - TS 32.432).</p> <p>TS 32.436 defines Abstract Syntax Notation 1 (ASN.1) file format definition, which is more compact than the XML format. For ASN.1, BER encoding rules are used.</p>	None	None	Closed

### 8.3 EMS internal post-processing

Top OPE Recommendations Clause 5.3: "EMS internal post-processing of raw data without significant delay (near real-time)."
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Relevant 3GPP specifications: N/A			Compliance statement: <b>Not applicable</b>	
Item	Functionality	Action	Related CR(s)	Status
1	Product related. Out of scope of SA5 standards.	None	None	Closed

## 8.4 Automated counter or counter group administration

<b>Top OPE Recommendations Clause 5.3: "Automated counter or counter group administration (incl. activation)."</b>				
Relevant 3GPP specifications: 32.411, 32.412, 32.416			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	TS 32.412 defines the management of counter or counter group via the operation createMeasurementJob.	None	None	Closed

## 8.5 Automated performance data quality management

<b>Top OPE Recommendations Clause 5.3: "Automated performance data quality management, e.g. automatic counter restart after outage."</b>				
Relevant 3GPP specifications: 32.431, 32.432, 32.435, 32.436			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	TSs 32,432, 32.435 and 32.436 specify a suspect flag to be used to indicate whether the data is reliable or not.  TS 32.401 contains descriptions of system events that can interrupt measurement collection periods.	None	None	Closed

## 8.6 Function for simple threshold based on counters and KPIs

<b>Top OPE Recommendations Clause 5.3: "Function for simple threshold based on counters and KPIs."</b>				
Relevant 3GPP specifications: 32.411, 32.412, 32.416			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	PM IRP defines Threshold Management functionality.	None	None	Closed



	See operations in TS 32.412: createThresholdMonitor, deleteThresholdMonitor, listThresholdMonitors, suspendThresholdMonitor, resumeThresholdMonitor.			
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## 8.7 Function for simple KPI calculation based on counters

<b>Top OPE Recommendations Clause 5.3: "Function for simple KPI calculation based on counters."</b>				
Relevant 3GPP specifications: 32.410, 32.450, 32.451, 32.454, 32.455			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	TSs 32.410, 32.450, 32.451, 32.454, 32.455 defines GERAN, UTRAN, EPC, IMS, E-UTRAN KPIs based on measurements specified in other SA5 TSs.	None	None	Closed

## 8.8 Automatic identification of network problems and error correction

<b>Top OPE Recommendations Clause 5.3: "Automatic identification of network problems and error correction."</b>				
Relevant 3GPP specifications: 32.111-1, 32.111-2, 32.111-6			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	32.111-2 defines a correlatedNotification parameter allowing EM to assemble various alarms into an assembly indicating that the alarms in the assembly probably be caused by one network problem.	None	None	Closed

## 8.9 Standardisation of PM

<b>Top OPE Recommendations Clause 5.3: "Standardisation of PM is key to support seamless PM integration in multi vendor scenarios."</b>				
Relevant 3GPP specifications: 32.411, 32.412, 32.416, 32.431, 32.432, 32.435, 32.436, 32.401, 32.403, 32.404, 32.405, 32.406, 32.407, 32.408, 32.409, 32.410, 32.425, 32.450, 32.451, 32.454, 32.455			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	3GPP SA5 provides a full set of PM	None	None	Closed

	standards to support multi-vendor scenarios.			
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## 8.10 Real time behaviour of PM

<b>Top OPE Recommendations Clause 5.3: "There is a clear tendency to enable real time behaviour of PM delivery to understand more quickly situation in the network."</b>				
Relevant 3GPP specifications: 32.412			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	The 5 min granularity period is deemed to be sufficient and is supported by SA5 standards.	None	None	Closed

## 8.11 UE-based measurements

<b>Top OPE Recommendations Clause 5.3: "UE-based measurements (as for MDT) are seen as part of significant information covered by the topic PM."</b>				
Relevant 3GPP specifications: 32.421, 32.422, 32.423, 32.441, 32.442, 32.446			Compliance statement: <b>Supported</b>	
Item	Functionality	Action	Related CR(s)	Status
1	MDT has been introduced based on Trace functionality in Rel-10 and Rel-11:  470142 SA5 aspects of Management of UE based network performance measurements (OAM-PM-UE),  510058 Enhanced Management of UE based network performance measurements (OAM-ePM-UE).	None	<a href="#">OAM-PM-UE</a> <a href="#">OAM-ePM-UE</a>	Closed

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# 9 Enhancement of Trace Functionality

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# 10 eNodeB Plug & Play - Self Commissioning

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# 11 OSS Standard Itf-N

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# 12 OSS Tool Support for Optimization & Operation

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# 13 Automatic Inventory

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## 14 Conclusion

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### Annex <X>: Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2012-10					First version with document structure and initial contents		0.0.0
2012-10					Update following SA5#85: update of compliance template	0.0.0	0.0.1
2013-02					Update following SA5#87: introduction of pCR S5-130315	0.0.1	0.1.0
2013-04					Update following SA5#88: introduction of pCR S5-130761	0.1.0	0.2.0
2013-09					Update following SA5#90: introduction of pCRs S5-131284, S5-131407, S5-131408	0.2.0	0.3.0