

3GPP TS 28.629 V11.2.0 (2013-09)

Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication management;
Self-Organizing Networks (SON) Policy
Network Resource Model (NRM)
Integration Reference Point (IRP);
Solution Set (SS) definitions
(Release 11)**



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Keywords

SON, Self-Optimization, Converged
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Contents

| | |
|--|-----------|
| Foreword | 4 |
| Introduction | 4 |
| 1 Scope | 5 |
| 2 References..... | 5 |
| 3 Definitions and abbreviations | 6 |
| 3.1 Definitions | 6 |
| 3.2 Abbreviations..... | 6 |
| 4 Solution Set definitions | 7 |
| Annex A (normative): CORBA Solution Set..... | 8 |
| A.1 Architectural Features | 8 |
| A.1.1 Syntax for Distinguished Names and Versions..... | 8 |
| A.2 Mapping..... | 8 |
| A.2.1 General mapping..... | 8 |
| A.2.2 Information Object Class (IOC) mapping | 8 |
| A.2.2.1 IOC SONTargets | 8 |
| A.2.2.2 IOC SONControl..... | 9 |
| A.2.2.3 IOC ESPolicies..... | 9 |
| A.2.2.4 IOC EUtranCellSON..... | 9 |
| A.2.2.5 IOC EnergySavingProperties..... | 9 |
| A.2.2.6 IOC SONFuncInfo | 9 |
| A.2.2.7 IOC SONCoordinationPolicies | 10 |
| A.2.2.8 IOC InterRatEsPolicies | 10 |
| A.3 Solution Set definitions | 10 |
| A.3.1 IDL definition structure..... | 10 |
| A.3.2 IDL specification “SONPolicyNetworkResourcesNRMDefs.idl” | 10 |
| Annex B (normative): XML definitions..... | 15 |
| B.1 Architectural features..... | 15 |
| B.1.1 Syntax for Distinguished Names | 15 |
| B.2 Mapping..... | 15 |
| B.2.1 General mapping..... | 15 |
| B.2.2 Information Object Class (IOC) mapping | 15 |
| B.3 Solution Set definitions | 16 |
| B.3.1 XML definition structure | 16 |
| B.3.2 XML Schema “sonPolicyNrm.xsd” | 16 |
| Annex C (informative): Change history..... | 22 |

Foreword

This Technical Specification has been produced by the 3rd 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.

Ready for Converged Management

This specification is part of a set that has been developed for converged management solutions.

Introduction

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

- 28.627: Self-Organizing Networks (SON) Policy Network Resource Model (NRM) Integration Reference Point (IRP); Requirements
- 28.628: Self-Organizing Networks (SON) Policy Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)
- 28.629: Self-Organizing Networks (SON) Policy Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions**

1 Scope

The present document specifies the Solution Set definitions for the IRP whose semantics is specified in 3GPP TS 28.628 [4] SON Policy Network Resource Model IRP: Information Service (IS).

This Solution Set definitions specification is related to 3GPP TS 28.628 V11.3.X [4].

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] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".
- [3] 3GPP TS 32.102: "Telecommunication management; Architecture".
- [4] 3GPP TS 28.628: "Telecommunication management; Self-Organizing Networks (SON) Policy Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)".
- [5] 3GPP TS 32.616: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP); Solution Set (SS) definitions".
- [6] 3GPP TS 32.606: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP); Solution Set (SS) definitions".
- [7] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".
- [8] 3GPP TS 28.623: "Generic network resources Integration Reference Point (IRP); Solution Set (SS) definition".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.101 [2], 3GPP TS 32.102 [3] and TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TS 28.628 [4], 3GPP TS 32.101 [2], 3GPP TS 32.102 [3] and TR 21.905 [1], in that order.

XML file: See definition of [8].

XML document: See definition of [8].

XML declaration: See definition of [8].

XML element: See definition of [8].

empty XML element: See definition of [8].

XML content (of an XML element): See definition of [8]. **XML start-tag:** See definition of [8].

XML end-tag: See definition of [8].

XML empty-element tag: See definition of [8].

XML attribute specification: See definition of [8].

DTD: See definition of [8].

XML schema: See definition of [8].

XML namespace: See definition of [8].

XML complex type: See definition of [8].

XML element type: See definition of [8].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], 3GPP TS 28.628 [4] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TS 28.628 [4], 3GPP TS 32.101 [2], 3GPP TS 32.102 [3] and TR 21.905 [1], in that order.

| | |
|--------|---|
| CM | Configuration Management |
| CORBA | Common Object Request Broker Architecture |
| DTD | Document Type Definition |
| eNodeB | evolved NodeB |
| IDL | Interface Definition Language (OMG) |
| IOC | Information Object Class |
| IRP | Integration Reference Point |
| IS | Information Service |
| MO | Managed Object |
| MOC | Managed Object Class |
| NRM | Network Resource Model |
| OMG | Object Management Group |
| SS | Solution Set |
| XML | eXtensible Markup Language |

4 Solution Set definitions

This specification defines the following 3GPP SON Policy NRM IRP Solution Set definitions:

- 3GPP SON Policy NRM IRP CORBA SS (see Annex A)
- 3GPP SON Policy NRM IRP XML definitions (see Annex B)

Annex A (normative): CORBA Solution Set

This annex contains the CORBA Solution Set for the IRP whose semantics is specified in SON Policy NRM IRP: Information Service (3GPP TS 28.628 [4]).

A.1 Architectural Features

The overall architectural feature of CS IRP is specified in 3GPP TS 28.628 [4].

This clause specifies features that are specific to the CORBA SS.

A.1.1 Syntax for Distinguished Names and Versions

See clause A.1.1 of [8]

A.2 Mapping

A.2.1 General mapping

See clause A.1.1 of [8]

A.2.2 Information Object Class (IOC) mapping

A.2.2.1 IOC SONTargets

| IS Attributes | SS Attributes | SS Type |
|---|---|---|
| id | id | string |
| hoFailureRate | hoFailureRate | GenericSONPolicyNRMAAttributeTypes::HooTarget |
| rrcConnectionEstablishmentFailureRateCharacteristic | rrcConnectionEstablishmentFailureRateCharacteristic | GenericSONPolicyNRMAAttributeTypes::CacTargetLink |
| rrcConnectionAbnormalReleaseRateCharacteristic | rrcConnectionAbnormalReleaseRateCharacteristic | GenericSONPolicyNRMAAttributeTypes::CacTargetLink |
| eRabSetupFailureRateCharacteristic | eRabSetupFailureRateCharacteristic | GenericSONPolicyNRMAAttributeTypes::CacTargetLink |
| eRabAbnormalReleaseRateCharacteristic | eRabAbnormalReleaseRateCharacteristic | GenericSONPolicyNRMAAttributeTypes::CacTargetLink |
| rachOptAccessProbability | rachOptAccessProbability | GenericSONPolicyNRMAAttributeTypes::AccessProbabilityROTargetSet |
| rachOptAccessDelayProbability | rachOptAccessDelayProbability | GenericSONPolicyNRMAAttributeTypes::AccessDelayProbabilityROTargetSet |
| *) NOTE 1: At least one of the attributes shall be supported. | | |
| **) NOTE 2: Only one of these attributes shall be present. | | |

A.2.2.2 IOC SONControl

| IS Attributes | SS Attributes | SS Type |
|---|---------------|---------|
| id | id | string |
| hooSwitch | hooSwitch | boolean |
| lboSwitch | lboSwitch | boolean |
| cocSwitch | cocSwitch | boolean |
| esSwitch | esSwitch | boolean |
| roSwitch | roSwitch | boolean |
| NOTE: For all conditional qualifiers, see attribute constraints in TS 28.628 [4]. | | |

A.2.2.3 IOC ESPolicies

| IS Attributes | SS Attributes | SS Type |
|--|--|------------------------|
| id | id | string |
| esActivationOriginalCellLoadParameters | esActivationOriginalCellLoadParameters | CellLoadParameters |
| esActivationCandidateCellsLoadParameters | esActivationCandidateCellsLoadParameters | CellLoadParameters |
| esDeactivationCandidateCellsLoadParameters | esDeactivationCandidateCellsLoadParameters | CellLoadParameters |
| esNotAllowedTimePeriod | esNotAllowedTimePeriod | ESNotAllowedTimePeriod |

A.2.2.4 IOC EUtranCellSON

| IS Attributes | SS Attributes | SS Type |
|-----------------------------------|-----------------------------------|---|
| id | id | string |
| maximumDeviationHoTrigger | maximumDeviationHoTrigger | GenericSONPolicyNRMAAttributeTypes::MaximumDeviationHoTriggerType |
| minimumTimeBetweenHoTriggerChange | minimumTimeBetweenHoTriggerChange | GenericSONPolicyNRMAAttributeTypes::MinimumTimeBetweenHoTriggerChangeType |

A.2.2.5 IOC EnergySavingProperties

| IS Attributes | SS Attributes | SS Type |
|---------------------|---------------------|---|
| id | id | string |
| energySavingState | energySavingState | GenericSONPolicyNRMAAttributeTypes::EnergySavingStateEnumType |
| energySavingControl | energySavingControl | GenericSONPolicyNRMAAttributeTypes::EnergySavingControlEnumType |
| isProbingCapable | isProbingCapable | Boolean |

A.2.2.6 IOC SONFuncInfo

| IS Attributes | SS Attributes | SS Type |
|----------------------------|----------------------------|---|
| id | id | string |
| sonFuncCapabilityBelowIffN | sonFuncCapabilityBelowIffN | GenericSONPolicyNRMAAttributeTypes: SonFuncNameListType |

A.2.2.7 IOC SONCoordinationPolicies

| Attributes | SS Attributes | SS Type |
|------------------------|------------------------|--|
| id | id | string |
| selectedSonCoordPolicy | selectedSonCoordPolicy | GenericSONPolicyNRMAAttributeTypes:: SonCoordPolicies Type |
| sonFuncPriorityOrder | sonFuncPriorityOrder | GenericSONPolicyNRMAAttributeTypes:: SonFuncNameListType |

A.2.2.8 IOC InterRatEsPolicies

| IS Attributes | SS Attributes | SS Type |
|---|---|----------------------------|
| id | id | string |
| interRatEsActivationOriginalCellParameters | interRatEsActivationOriginalCellParameters | RelativeCellLoadParameters |
| interRatEsActivationCandidateCellParameters | interRatEsActivationCandidateCellParameters | RelativeCellLoadParameters |
| interRatEsDeactivationCandidateCellParameters | interRatEsDeactivationCandidateCellParameters | RelativeCellLoadParameters |

A.3 Solution Set definitions

A.3.1 IDL definition structure

Clause A.3.2 defines the constants and types used by the SON Policy NRM IRP.

A.3.2 IDL specification "SONPolicyNetworkResourcesNRMDefs.idl"

```
//File:SONPolicyNetworkResourcesNRMDefs.idl
#ifndef _SONPOLICYNETWORKRESOURCESNRMDEFS_IDL_
#define _SONPOLICYNETWORKRESOURCESNRMDEFS_IDL_
#include "GenericNetworkResourcesNRMDefs.idl"
#include "TimeBase.idl"
#pragma prefix "3gppsa5.org"
/**
 * This module defines constants for each MO class name and
 * the attribute names for each defined MO class.
 */
module SONPolicyNetworkResourcesNRMDefs
{
    /*
     * Definitions for MO class SONTargets
     */
    interface SONTargets: GenericNetworkResourcesNRMDefs::Top
    {
        const string CLASS = "SONTargets";
        // Attribute Names
        //
        const string id = "id";
        const string hoFailureRate = "hoFailureRate";
        const string rrcConnectionEstablishmentFailureRateCharacteristic =
"rrcConnectionEstablishmentFailureRateCharacteristic";
        const string rrcConnectionAbnormalReleaseRateCharacteristic =
"rrcConnectionAbnormalReleaseRateCharacteristic";
        const string eRabSetupFailureRateCharacteristic = "eRabSetupFailureRateCharacteristic";
        const string eRabAbnormalReleaseRateCharacteristic = "eRabAbnormalReleaseRateCharacteristic";
        const string rachOptAccessProbability = "rachOptAccessProbability";
        const string rachOptAccessDelayProbability = "rachOptAccessDelayProbability";
    };
};
```

```

/*
 * Definitions for MO class SONControl
 */
interface SONControl: GenericNetworkResourcesNRMDefs::Top
{
    const string CLASS = "SONControl";
    // Attribute Names
    //
    const string id = "id";
    const string hooSwitch = "hooSwitch";
    const string lboSwitch = "lboSwitch";
    const string cocSwitch = "cocSwitch";
    const string esSwitch = "esSwitch";
    const string roSwitch = "roSwitch";
};

/*
 * Definitions for MO class ESPolicies
 */
interface ESPolicies: GenericNetworkResourcesNRMDefs::Top
{
    const string CLASS = "ESPolicies";
    // Attribute Names
    //
    const string id = "id";
    const string esActivationOriginalCellLoadParameters =
"esActivationOriginalCellLoadParameters";
    const string esActivationCandidateCellsLoadParameters =
"esActivationCandidateCellsLoadParameters";
    const string esDeactivationCandidateCellsLoadParameters =
"esDeactivationCandidateCellsLoadParameters";

    const string esNotAllowedTimePeriod = "esNotAllowedTimePeriod";
};

/*
 * Definitions for MO class InterRatEsPolicies
 */
interface ESPolicies: GenericNetworkResourcesNRMDefs::Top
{
    const string CLASS = "InterRatEsPolicies";
    // Attribute Names
    //
    const string id = "id";
    const string interRatEsActivationOriginalCellParameters =
"interRatEsCellActivationOriginalCellParameters";
    const string interRatEsActivationCandidateCellParameters =
"interRatEsActivationCandidateCellParameters";
    const string interRatEsDeactivationCandidateCellParameters =
"interRatEsDeactivationCandidateCellParameters";
};

/*
 * Definitions for MO class EUTRANCellSON
 */
interface EUTRANCellSON: GenericNetworkResourcesNRMDefs::Top
{
    const string CLASS = "EUTRANCellSON";
    // Attribute Names
    //
    const string id = "id";
    const string maximumDeviationHoTrigger = "maximumDeviationHoTrigger";
    const string minimumTimeBetweenHoTriggerChange = "minimumTimeBetweenHoTriggerChange";
};

/*
 * Definitions for MO class EnergySavingProperties
 */
interface EnergySavingProperties: GenericNetworkResourcesNRMDefs::Top
{
    const string CLASS = "EnergySavingProperties";
    // Attribute Names
    //
    const string id = "id";
    const string energySavingState= "energySavingState";
    const string energySavingControl= "energySavingControl";
};

```

```

    const string isProbingCapable = "isProbingCapable";

};

/*
 * Definitions for MO class SONFuncInfo
 */
interface SONFuncInfo: GenericNetworkResourcesNRMDefs::Top
{
    const string CLASS = "SONFuncInfo";
    // Attribute Names
    //
    const string id = "id";
    const string sonFuncCapabilityBelowItfn = "sonFuncCapabilityBelowItfn";
};

/*
 * Definitions for MO class SONCoordinationPolicies
 */
interface SONCoordinationPolicies: GenericNetworkResourcesNRMDefs::Top
{
    const string CLASS = "SONCoordinationPolicies";
    // Attribute Names
    //
    const string id = "id";
    const string selectedSonCoordPolicy = "selectedSonCoordPolicy";
    const string sonFuncPriorityOrder = "sonFuncPriorityOrder";
};

};

module GenericSONPolicyNRMAAttributeTypes
{
    /*
     * Composite Available Capacity (CAC)target type related to RRC/eRAB setup
     */
    struct CacTarget
    {
        unsigned short lower_end_of_cac_range;
        unsigned short upper_end_of_cac_range;
        unsigned short target_value;
        unsigned short target_weight;
    };
    typedef sequence<CacTarget> CacTargetList;

    struct CacTargetLink
    {
        CacTargetList uplink_cac_target;
        CacTargetList downlink_cac_target;
    };

    /*
     * HOO target type
     */
    struct HooTarget
    {
        unsigned short target_value;
        unsigned short target_priority;
    };
    typedef sequence<HooTarget> HooTargetList;

    /*
     * Cell load parameters type related to energy saving
     */
    struct CellLoadParameters
    {
        unsigned short load_threshold;
        unsigned short time_duration;
    };
    /*
     * Cell load parameters type related to energy saving
     */
    struct RelativeCellLoadParameters
    {
        unsigned short relative_load_threshold;
    };
};

```

```

    unsigned short time_duration;
};
/*

typedef TimeBase::UtcT UTCTime;
struct PeriodOfDay
{
    UTCTime start_time;
    UTCTime end_time;
};
enum WeekDayType
{
    MONDAY,
    TUESDAY,
    WEDNESDAY,
    THURSDAY,
    FRIDAY,
    SATURDAY,
    SUNDAY
};
typedef sequence <WeekDayType> DaysOfWeek;
struct TimePeriodElement
{
    DaysOfWeek days;
    PeriodOfDay period_of_day;
};

typedef sequence<TimePeriodElement> ESNotAllowedTimePeriod;

* Rach Optimization target type
*/
enum ROTargetType
{
    RO_ACCESS_PROBABILITY,
    RO_ACCESS_DELAY_PROBABILITY
};

enum ROProbability
{
    25percent,
    50percent,
    75percent,
    90percent
};

typedef unsigned short (10..560) AccessDelayRange;
typedef unsigned short (1..200) AccessNumberAttemptRange;

struct accessProbabilityROTarget
{
    ROProbability rOProbability;
    AccessNumberAttemptRange attemptNumber;
};

struct accessDelayProbabilityROTarget
{
    ROProbability rOProbability;
    AccessDelayRange accessDelay;
};

typedef sequence <accessProbabilityROTarget,4> AccessProbabilityROTargetSet;
typedef sequence <accessDelayProbabilityROTarget,4> AccessDelayProbabilityROTargetSet;

union RachOptTarget switch (ROTargetType)
{
    case RO_ACCESS_PROBABILITY: AccessProbabilityROTargetSet aPTargets;
    case RO_ACCESS_DELAY_PROBABILITY: AccessDelayProbabilityROTargetSet adPTargets;
};

typedef unsigned short (1..96) MaximumDeviationHoTriggerType;

typedef unsigned short (0..1440) MinimumTimeBetweenHoTriggerChangeType;

enum energySavingStateEnumType
{
    IS_ENERGYSAVING,
    IS_NOT_ENERGYSAVING
};

```

```
};

enum energySavingControlEnumType
{
    TO_BE_ENERGYSAVING,
    TO_BE_NOT_ENERGYSAVING
};

enum SonFuncNameType
{
    ANR,
    HOO,
    LBO,
    ES,
    COC,
    CCO
};

typedef sequence <SonFuncNameType> SonFuncNameListType;

enum SonCoordPoliciesType
{
    BASE_ON_PRIORITY,
    BASE_ON_STATE
};

};

#endif // _SONPOLICYNETWORKRESOURCESNRMDEFS_IDL_
```

Annex B (normative): XML definitions

The annex specifies the XML definitions for the SON Policy NRM IRP as it applies to Itf-N, in accordance with SON NRM IRP IS definitions [4].

An application of these XML definitions is to build a configuration file for transfer with the Bulk CM IRP using either CORBA Solution Set or the SOAP Solution Set of 3GPP TS 32.616 [5]. For this annex, the basic part of the XML file format definition is provided by 3GPP TS 32.616 [5].

Other applications of these XML definitions are the SOAP solution sets of other IRPs that perform operations on managed objects, for example the Basic CM IRP SOAP SS of 3GPP TS 32.606 [6].

B.1 Architectural features

The overall architectural feature of SON Policy Network Resource Model IRP is specified in 3GPP TS 28.628 [4]. This clause specifies features that are specific to the XML definitions.

The XML definitions of this document specify the schema for a configuration content.

When using the XML definitions for a configuration file transfer with the Bulk CM IRP, using either CORBA Solution Set or SOAP Solution Set of 3GPP TS 32.616 [5], the basic part of the XML file format definition is provided by 3GPP TS 32.616 [5]. The XML definitions of this document provide the schema for the configuration content to be included in such a configuration file.

When using the XML definitions with a SOAP solution set of any interface IRP that perform operations on managed objects, for example the Basic CM IRP SOAP SS of 3GPP TS 32.606 [6], the XML definitions of this document provides the schema for the configuration content operated on by the interface IRP. Such configuration content can be name of managed object and, if applicable, IOC attributes.

B.1.1 Syntax for Distinguished Names

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [7].

B.2 Mapping

B.2.1 General mapping

An IOC maps to an XML element of the same name as the IOC's name in the IS. An IOC attribute maps to a sub-element of the corresponding IOC's XML element, and the name of this sub-element is the same as the attribute's name in the IS.

B.2.2 Information Object Class (IOC) mapping

The overall description of the file format of configuration data XML files is provided by 3GPP TS 32.616 [5].

Annex A of the present document defines the NRM-specific XML schema `sonPolicyNrm.xsd` for the SON Policy NRM IRP IS defined in 3GPP TS 28.628 [4].

XML schema `sonPolicyNrm.xsd` explicitly declares NRM-specific XML element types for the related NRM.

The definition of those NRM-specific XML element types complies with the generic mapping rules defined in 3GPP TS 32.616 [5].

B.3 Solution Set definitions

B.3.1 XML definition structure

Clause B.3.2 provides XML definitions of SON Policy NRM IRP IOCs as defined in 3GPP TS 28.628 [4].

B.3.2 XML Schema “sonPolicyNrm.xsd”

The following XML schema sonPolicyNrm.xsd is the NRM-specific schema for the SON Policy Network Resource Model IRP NRM defined in 3GPP TS 28.628 [4]:

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
  3GPP TS 28.629 SON Policy Network Resource Model IRP
  XML schema definition
  sonPolicyNrm.xsd
-->

<schema
  targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.629#sonPolicyNrm"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
  xmlns:sp="http://www.3gpp.org/ftp/specs/archive/28_series/28.629#sonPolicyNrm"
>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"/>

  <!--SON Policy NRM IRP IS class associated XML elements -->

  <!-- CAC Range: 0~10000 -->
  <simpleType name="cacRange">
    <restriction base="unsignedShort">
      <maxInclusive value="10000"/>
    </restriction>
  </simpleType>

  <!-- Relative Cell Load Range: 0~10000 -->
  <simpleType name="relativeCellLoadRange">
    <restriction base="unsignedShort">
      <maxInclusive value="10000"/>
    </restriction>
  </simpleType>

  <!--time duration Range: 0-900 -->
  <simpleType name="timeDurationRange">
    <restriction base="unsignedShort">
      <maxInclusive value="900"/>
    </restriction>
  </simpleType>

  <!-- Rate: representing a percentage -->
  <simpleType name="rateRange">
    <restriction base="unsignedShort">
      <maxInclusive value="100"/>
    </restriction>
  </simpleType>

  <!-- RACH Optimization Probability -->
  <simpleType name="ROProbability">
    <restriction base="unsignedShort">
      <enumeration value="25"/>
      <enumeration value="50"/>
      <enumeration value="75"/>
      <enumeration value="90"/>
    </restriction>
  </simpleType>

  <simpleType name="WeekDay">
    <restriction base="string">
      <enumeration value="Monday"/>
      <enumeration value="Tuesday"/>
    </restriction>
  </simpleType>
</schema>
```



```

    <enumeration value="Wednesday"/>
    <enumeration value="Thursday"/>
    <enumeration value="Friday"/>
    <enumeration value="Saturday"/>
    <enumeration value="Sunday"/>
  </restriction>
</simpleType>

<complexType name="WeekDays">
  <sequence>
    <element name="day" type="sp:WeekDay" maxOccurs="7"/>
  </sequence>
</complexType>

<!-- Weight: 1~N. Higher the number, higher the weight -->
<complexType name="LBOTarget">
  <sequence>
    <element name="lowerEndOfCacRange" type="sp:cacRange" minOccurs="0"/>
    <element name="upperEndOfCacRange" type="sp:cacRange" minOccurs="0"/>
    <element name="Rate" type="sp:rateRange" minOccurs="0"/>
    <element name="Weight" type="unsignedShort" minOccurs="0"/>
  </sequence>
</complexType>

<complexType name="LBOLinkTarget">
  <sequence>
    <element name="UplinkTarget" type="sp:LBOTarget" minOccurs="0"/>
    <element name="DownlinkTarget" type="sp:LBOTarget" minOccurs="0"/>
  </sequence>
</complexType>

<complexType name="HooTarget">
  <sequence>
    <element name="Rate" type="sp:rateRange" minOccurs="0"/>
    <element name="Weight" type="unsignedShort" minOccurs="0"/>
  </sequence>
</complexType>

<complexType name="CellLoadParameters">
  <sequence>
    <element name="LoadThreshold" type="sp:rateRange" minOccurs="0"/>
    <element name="TimeDuration" type="unsignedShort" minOccurs="0"/>
  </sequence>
</complexType>

<complexType name="RelativeCellLoadParameters">
  <sequence>
    <element name="LoadThreshold" type="sp:relativeCellLoadRange"/>
    <element name="TimeDuration" type="sp:timeDurationRange"/>
  </sequence>
</complexType>

<!-- Time shall be specified in UTC format -->

<complexType name="DailyPeriod">
  <sequence>
    <element name="StartTime" type="time"/>
    <element name="EndTime" type="time"/>
  </sequence>
</complexType>

<complexType name="TimePeriod">
  <sequence>
    <element name="Day" type="sp:WeekDays"/>
    <element name="PeriodOfDay" type="sp:DailyPeriod"/>
  </sequence>
</complexType>

<!--Time period type in which energy saving is not allowed-->
<complexType name="ESNotAllowedTimePeriod">
  <sequence>
    <element name="TimePeriodList" type="sp:TimePeriod"/>
  </sequence>
</complexType>

```

```

<simpleType name="AccessDelayRange">
  <restriction base="unsignedShort">
    <minInclusive value="10"/>
    <maxInclusive value="560"/>
  </restriction>
</simpleType>

<complexType name="AccessDelayProbabilityROTarget">
  <sequence>
    <element name="Probability" type="sp:ROProbability"/>
    <element name="AccessDelay" type="sp:AccessDelayRange"/>
  </sequence>
</complexType>

<complexType name="AccessDelayProbabilityTargetSet">
  <sequence>
    <element name="AccessDelayProbabilityTarget" type="sp:AccessDelayProbabilityROTarget"
maxOccurs="4"/>
  </sequence>
</complexType>

<simpleType name="AccessNumberAttemptRange">
  <restriction base="unsignedShort">
    <minInclusive value="1"/>
    <maxInclusive value="200"/>
  </restriction>
</simpleType>

<complexType name="AccessProbabilityROTarget">
  <sequence>
    <element name="Probability" type="sp:ROProbability"/>
    <element name="AccessNumber" type="sp:AccessNumberAttemptRange"/>
  </sequence>
</complexType>

<complexType name="AccessProbabilityTargetSet">
  <sequence>
    <element name="AccessProbabilityTarget" type="sp:AccessProbabilityROTarget" maxOccurs="4"/>
  </sequence>
</complexType>

<complexType name="rachOptTarget">
  <choice maxOccurs="4">
    <element name="rachOptAccessProbability" type="sp:AccessProbabilityTargetSet"/>
    <element name="rachOptAccessDelayProbability" type="sp:AccessDelayProbabilityTargetSet"/>
  </choice>
</complexType>

<simpleType name="MaximumDeviationHoTriggerType">
  <restriction base="unsignedShort">
    <minInclusive value="1"/>
    <maxInclusive value="96"/>
  </restriction>
</simpleType>

<simpleType name="MinimumTimeBetweenHoTriggerChangeType">
  <restriction base="unsignedShort">
    <maxInclusive value="1440"/>
  </restriction>
</simpleType>

<simpleType name="energySavingStateEnumType">
  <restriction base="string">
    <enumeration value="isEnergySaving"/>
    <enumeration value="isNotEnergySaving"/>
  </restriction>
</simpleType>

<simpleType name="energySavingControlEnumType">
  <restriction base="string">
    <enumeration value="toBeEnergySaving"/>
    <enumeration value="toBeNotEnergySaving"/>
  </restriction>
</simpleType>

```

```

<simpleType name="SonFuncNameType">
  <restriction base="string">
    <enumeration value="anr"/>
    <enumeration value="hoo"/>
    <enumeration value="lbo"/>
    <enumeration value="es"/>
    <enumeration value="coc"/>
    <enumeration value="cco"/>
  </restriction>
</simpleType>

<simpleType name="SonCoordPoliciesType">
  <restriction base="string">
    <enumeration value="baseOnPriority"/>
    <enumeration value="baseOnState"/>
  </restriction>
</simpleType>

<complexType name="SonFuncNameListType">
  <sequence>
    <element name="SonFuncName" type="sp:SonFuncNameType" maxOccurs="unbounded"/>
  </sequence>
</complexType>

<element name="SONTarget">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element name="hoFailureRate" type="sp:HooTarget" minOccurs="0"/>
                <element name="rrcConnectionEstablishmentFailureRate" type="sp:LBOLinkTarget"
minOccurs="0"/>
                <element name="rrcConnectionAbnormalReleaseRate" type="sp:LBOLinkTarget"
minOccurs="0"/>
                <element name="eRabSetupFailureRate" type="sp:LBOLinkTarget" minOccurs="0"/>
                <element name="eRabAbnormalReleaseRate" type="sp:LBOLinkTarget" minOccurs="0"/>
                <element name="rachOpt" type="sp:rachOptTarget" minOccurs="0"/>
              </all>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="SONControl">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <!--Switch:ON/OFF-->
                <element name="hooSwitch" type="boolean" minOccurs="0"/>
                <element name="lboSwitch" type="boolean" minOccurs="0"/>
                <element name="cocSwitch" type="boolean" minOccurs="0"/>
                <element name="esSwitch" type="boolean" minOccurs="0"/>
                <element name="roSwitch" type="boolean" minOccurs="0"/>
              </all>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="ESPolicies">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>

```

```

        <element name="attributes" minOccurs="0">
          <complexType>
            <all>
              <element name="esActivationOriginalCellLoadParameters" type="sp:CellLoadParameters"
minOccurs="0"/>
              <element name="esActivationCandidateCellsLoadParameters" type="sp:CellLoadParameters"
minOccurs="0"/>
              <element name="esDeactivationCandidateCellsLoadParameters"
type="sp:CellLoadParameters" minOccurs="0"/>
              <element name="esNotAllowedTimePeriod" type="sp:ESNotAllowedTimePeriod"/>
            </all>
          </complexType>
        </element>
      </sequence>
    </extension>
  </complexContent>
</complexType>
</element>

<element name="InterRatEsPolicies">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes">
            <complexType>
              <all>
                <element name="interRatEsActivationOriginalCellParameters"
type="sp:RelativeCellLoadParameters" minOccurs="0"/>
                <element name="interRatEsActivationCandidateCellParameters"
type="sp:RelativeCellLoadParameters" minOccurs="0"/>
                <element name="interRatEsDeactivationCandidateCellParameters"
type="sp:RelativeCellLoadParameters" minOccurs="0"/>
              </all>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="EUtranCellSON">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes">
            <complexType>
              <all>
                <element name="maximumDeviationHoTrigger"
type="sp:MaximumDeviationHoTriggerType" minOccurs="0"/>
                <element name="minimumTimeBetweenHoTriggerChange"
type="sp:MinimumTimeBetweenHoTriggerChangeType" minOccurs="0"/>
              </all>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="EnergySavingProperties">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element name="energySavingState" type="sp:energySavingStateEnumType"/>
                <element name="energySavingControl" type="sp:energySavingControlEnumType"
minOccurs="0"/>
                <element name="isProbingCapable" type="boolean" minOccurs="0"/>
              </all>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

```

```
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="SONFuncInfo">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element name="sonFuncCapabilityBelowItfN" type="sp:SonFuncNameListType"/>
              </all>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="SONCoordinationPolicies">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element name="selectedSonCoordPolicy" type="sp:SonCoordPoliciesType" minOccurs="0"/>
                <element name="sonFuncPriorityOrder" type="sp:SonFuncNameListType" minOccurs="0"/>
              </all>
            </complexType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

</schema>
```

Annex C (informative): Change history

| Change history | | | | | | | | |
|----------------|-------|-----------|-----|-----|--|-----|--------|--------|
| Date | TSG # | TSG Doc. | CR | Rev | Subject/Comment | Cat | Old | New |
| 2012-11 | | | | | First draft | | | 0.1.0 |
| 2012-12 | SA#58 | | | | Presented for information and approval | | 0.1.0 | 1.0.0 |
| 2012-12 | | | | | New version after approval | | 1.0.0 | 11.0.0 |
| 2013-06 | SA#60 | SP-130304 | 001 | 1 | SON coordination synchronization with 32.526 | F | 11.0.0 | 11.1.0 |
| | | | 002 | 1 | Energy saving synchronization with 32.526 | | | |
| 2013-09 | SA#61 | SP-130441 | 003 | 1 | Add missing Object class id for SONPolicy IOCs | F | 11.1.0 | 11.2.0 |