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Telecommunications Management Network (TMN); Scheduling function; Support object classes

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN).

| National transposition dates | |
|--|------------------|
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1 Scope

For some management applications, activities and/or operations have to be scheduled. This scheduling can be dependent of various factors (e.g. time of day, type of day) and it can be repeated (e.g. daily, weekly, bi-weekly). Scheduling activities can also require more information than a simple on/off scheduling, if e.g. the scheduling can select one out of three or more alternatives.

To manage this type of scheduling a generic solution needs to be applied. This solution shall be useful for a number of different management applications.

The scope of the present document is to model the support functions for this generic solution at the NE/OS interface.

Requirements for temporary override and automatic/manual fall-back to a previous management schema are outside the scope of the present document.

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, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- SIST EN 301 098 V1.1.1:2003*
- <https://standards.iteh.ai/catalog/standards/sist/763a2029-818-42a1-b092-b85a36baec0a/sist-en-301-098-v1-1-1-2003>*
- iTeh STANDARD PREVIEW*
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- [1] ITU-T Recommendation M.3100 (1995): "Generic network information model".
- [2] ITU-T Recommendation X.208 (1993): "Specification of Abstract Syntax Notation One (ASN.1)".
- [3] ITU-T Recommendation X.721 (1992): "Information technology - Open Systems Interconnection - Structure of management information: definition of management information".
- [4] ITU-T Recommendation X.746 (1995): " Information technology - Open Systems Interconnection - Systems management: scheduling function".
- [5] ITU-T Recommendation X.720 (1992): "Information technology - Open Systems Interconnection - Structure of management information: management information model".
-

3 Abbreviations

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

| | |
|-------|------------------------------|
| ASN.1 | Abstract Syntax Notation One |
| NE | Network Element |
| OC | Object Class |
| OS | Operations System |
| SMO | Scheduled Managed Object |
| SO | Scheduler Object |

4 Scheduling function

4.1 Functional requirements

Some management applications (e.g. charging or routing) need time/type of day dependent scheduling function. To manage these dependencies, the functional requirements are the following:

- R.1 Scheduling information that is communicated to the scheduled object shall be independent of the action the scheduled object performs. The scheduler has no knowledge about this action.
- R.2 Several independent schedulers can co-exist.
- R.3 A scheduler can schedule several objects.
- R.4 One SMO can be scheduled by several SO.
- R.5 Scheduler shall be able to handle trigger points.
- R.6 Scheduler shall be able to handle intervals.
- R.7 Scheduler shall be able to schedule activities that have more than two states.
- R.8 Scheduling shall be possible on base of type of day (e.g. weekend, Christmas, bank holiday).
- R.9 At least daily and weekly periodicity shall be possible for the periodicity of trigger points and intervals.
- R.10 It shall be possible to limit the duration of periodical repetitions.
- R.11 Overlapping intervals shall be allowed. Precedence rules are therefore needed in order to decide which interval is active.
- R.12 It shall be possible to retrieve from the scheduler all the objects it is scheduling.

Besides these requirements, it is assumed that the relations between the scheduler, the scheduling information and the corresponding actions to be performed are existing in the scheduled object.

4.2 References analysis

The scheduling function described in ITU-T Recommendation X.746 [4] provides a function that can schedule a number of activities within multiple managed objects by a single scheduler and is able to specify the time duration that the schedule is active.

This scheduler covers only a part of the functional requirement given in the subclause 4.1 and it is designed for starting and stopping of activities.

It could be possible to use it by straining the modelling to the maximum extent. It is not used for the following reasons:

- it is not possible to define, for every point in time, different activities for each SMO;
- the scheduler schedules activities between two states;
- the type of day dependency is not covered;
- overlapping intervals are not supported.

5 Conformance

In order to claim conformance to this specification, a system needs to support the management functions for all managed object classes defined in clauses 7 and 8 of the present document. Therefore the clauses 7 and 8 form the mandatory part of the present document.

6 Information model

6.1 Introduction to the object model

The scheduling function is realised by two entities, the *multiScheduler* and the *typeOfDayController*.

The OC *multiScheduler* extends the functionality of the interval scheduling and aperiodic scheduling as described in ITU-T Recommendation X.746 [4]. For information, refer to model description in clause 7 of that document.

For interval scheduling, the ITU-T scheduler allows the transition of one activity in a SMO between the active and inactive state. The *multiScheduler* allows the transition of an activity between several (two or more) states. Each such state is associated with an index value. The OC *multiScheduler* also allows overlapping intervals.

For aperiodic scheduling, the OC *multiScheduler* allows the triggering of (possibly different) activities depending on an index value. Aperiodic scheduling in the OC *multiScheduler* can also be used for operation scheduling, as described in ITU-T Recommendation X.746 [4].

For both types of scheduling, the possibility exists to schedule activities depending on the type of day, e.g. holidays, weekdays.

The OC *typeOfDayController* is used to group days into categories according to their type, e.g. 1st January can be classified as *specialDay1*.

6.2 Functional model

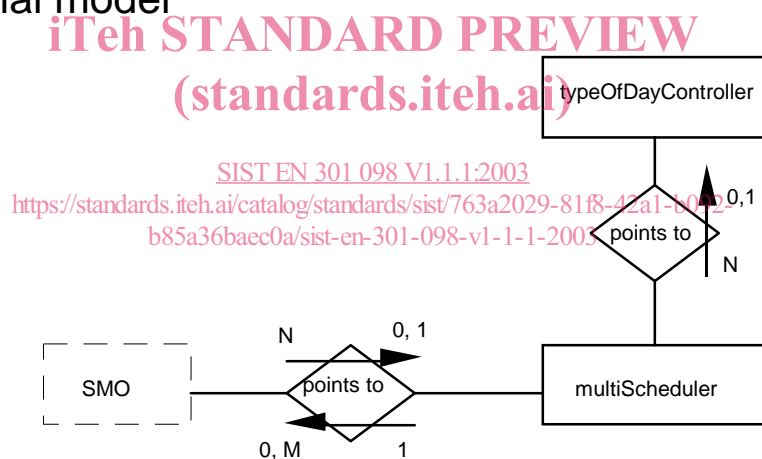


Figure 1: Scheduled selection E-R diagram

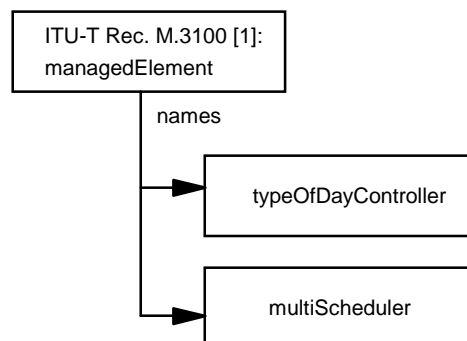


Figure 2: Naming Relations

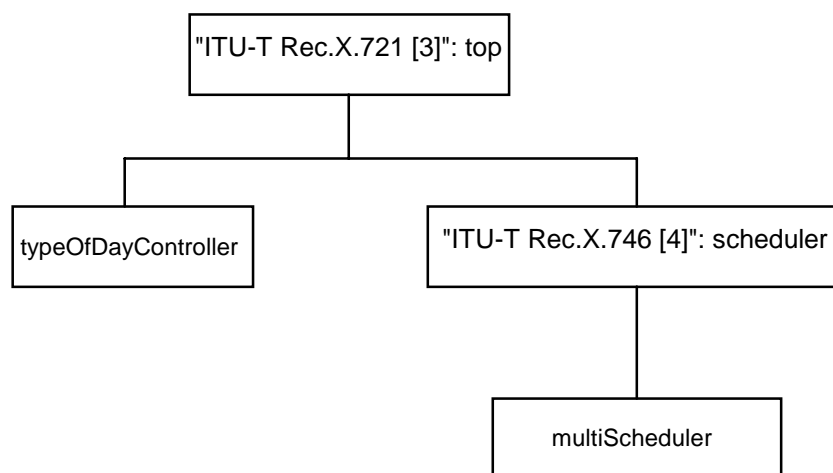


Figure 3: Inheritance tree

7 Information model description

This clause describes the object classes of the information model. For OC's descriptions the following table style is used.

Table 1: Generic OC's description

| Object Class: "Object class name" | | | |
|-----------------------------------|-----|-----------|-----------|
| Attributes | M/C | Value Set | Operation |
| | | | |
| Actions | M/C | | |
| | | | |
| Notifications | M/C | | |
| | | | |

The column M/C indicates whether the information presented by the attributes/actions/notifications is mandatory(M) or conditional(C).

The column "Value Set" indicates whether the attribute is single-valued or set-valued (see ITU-T Recommendation X.720 [5], subclause 5.1.2.2).

The column "Operation" indicates the operations that are possible on the attribute.

7.1 multiScheduler

The OC multiScheduler is inherited from ITU-T Recommendation X.746 [4] scheduler. It provides the ability to control activities for which more information is required than a simple on/off scheduling. This OC multiScheduler allows the definition of multiple independent schedules, each of which is associated with an activity. These activities are associated to index values or are triggered by operations. In the case of index values, the association between a particular index value and an activity is defined within the SMO.

Table 2: multiScheduler description

| Object Class: multiScheduler | | | |
|---|-----|-----------|-------------------------------------|
| Attributes | M/C | Value Set | Operation |
| schedulingData | M | Set | GET-REPLACE ADD-REMOVE |
| defaultIndex | C | Single | GET-REPLACE REPLACE-WITH-DEFAULT |
| typeOfDayControllerInstance | C | Single | GET-REPLACE |
| Notifications | | | |
| "ITU-T Recommendation X.746 [4]": operationNotificationPackage | C | | |

The following attributes describe the OC multiScheduler:

- schedulingData;

This attribute contains a set of schedules and related data controlling the activities;

- defaultIndex;

This attribute gives the index that is applicable when none of the intervals specified in the attribute schedulingData is valid or when the scheduler is suspended or deleted;

- typeOfDayControllerInstance;

This attribute identifies the instance of OC typeOfDayController that is relevant for this instance of OC multiScheduler.

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7.2 typeOfDayController

The OC typeOfDayController provides management information needed to map a specific date or a weekday to a type of day and contains the currently valid typeOfDay.

Table 3: typeOfDayController

| Object Class: typeOfDayController | | | |
|--|-----|-----------|---|
| Attributes | M/C | Value Set | Operation |
| typeOfDayControllerId | M | Single | GET |
| currentTypeOfDay | M | Single | GET |
| dateTranslationList | M | Set | GET-REPLACE REPLACE-WITH-DEFAULT ADD-REMOVE |
| weekDayTranslationList | M | Set | GET-REPLACE REPLACE-WITH-DEFAULT |
| Notifications | | | |
| "ITU-T Recommendation M.3100 [1]: (1995)": objectManagementNotificationsPackage | M | | |

The following attributes describe the OC typeOfDayController:

- typeOfDayControllerId;

This attribute is the object identifier attribute (RDN) of OC typeOfDayController;

- currentTypeOfDay;

This attribute indicates the value of typeOfDay that is currently valid;

- dateTranslationList;