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SERIES M: TELECOMMUNICATION MANAGEMENT, INCLUDING TMN AND NETWORK MAINTENANCE

Integrated services digital networks

## Common management services – State management – Protocol neutral requirements and analysis

Recommendation ITU-T M.3701

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# Recommendation ITU-T M.3701

## Common management services – State management – Protocol neutral requirements and analysis


### Summary

Recommendation ITU-T M.3701 provides the requirements and analysis for one of the common management services – state management. The state management capabilities are intended for use by specific information object classes (IOCs).


### History

| Edition | Recommendation | Approval | Study Group |
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| 1.0 | ITU-T M.3701 | 2010-01-13 | 2 |


### Keywords

Common management service, state management.

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# Recommendation ITU-T M.3701

## Common management services – State management – Protocol neutral requirements and analysis

### 1 Scope

This Recommendation defines the requirements and specifies the semantics of the state and status information visible across the management interface. It also specifies the interaction required for the management of the state and status information.

The state and status attributes specified in this document shall be used, where applicable, as attributes in information object class (IOC) definitions of other management interface specifications. When used by the IOC definition, the semantics of the state and status attributes can be qualified and enhanced if deemed necessary.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference of a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T M.3020] Recommendation ITU-T M.3020 (2009), *Management interface specification methodology*.

[ITU-T M.3060] Recommendation ITU-T M.3060/Y.2401 (2006), *Principles for the Management of the Next Generation Networks*.

[ITU-T M.3700] Recommendation ITU-T M.3700 (2010), *Common management services – Object management – Protocol neutral requirements and analysis*.

[ITU-T M.3702] Recommendation ITU-T M.3702 (2010), *Common management services – Notification management – Protocol neutral requirements and analysis*.

[ITU-T X.680] Recommendation ITU-T X.680 (2008) | ISO/IEC 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.

[ITU-T X.731] Recommendation ITU-T X.731 (1992), *Information technology – Open Systems Interconnection – Systems management: State management function*.

### 3 Definitions

For the purposes of this Recommendation, the following terms and definitions apply.

This Recommendation uses the following terms from [ITU-T M.3020]:

– association;
– agent;
– data;
– information object class (IOC);
– Information Object;

– Information Object Instance;
– manager;
– UML.

This Recommendation uses the following terms from [ITU-T X.731]:
– capacity increase (CI)
– capacity decrease (CD)

## 4 Abbreviations

None.

## 5 Conventions

This Recommendation uses the conventions defined in [ITU-T M.3020] for requirements capture and analysis.

UML state diagrams are used for state attribute transition diagrams.

## 6 Requirements

The management state of a managed object represents the instantaneous condition of availability and operability of the associated resource from the point of view of management. Different classes of managed object have a variety of state attributes that express and control aspects of the operation of their associated resource that are peculiar to each class. However, the management state is expected to be common to a large number of resources and for this reason is to be standardized; it expresses key aspects of their usability at any given time. Its purpose is to control the general availability of a resource and to make visible information about that general availability.

### 6.1 Business level requirements

State management is defined to specify and to standardize the generic state and status attributes of managed resources. There are a variety of managed objects and the related network resources. Different managed objects and the network resources they model may require different subsets of the attributes defined in state management.

State management shall specify status attributes, modelling more detailed information about other aspects of the state of the corresponding network resources that may affect their operability and usage. The status attributes also contain more detailed information about the administrative constraints on its operation that are controlled by a manager.

| Identifier | Definition |
|---|---|
| REQ-SM-FUN-01 | State management shall specify an operability state which defines whether or not the resource is physically installed and working.<br>The operational state gives the information about the real capability of a resource to provide or not provide service.<br>– The operational state is "enabled" when the resource is able to provide service, "disabled" when the resource cannot provide service.<br>– A resource can lose the capability to provide service because of a fault or because another resource on which it depends is out of service (e.g., disabled or locked). |

– In case a resource does not lose completely its capability to provide service, the operational state shall be "enabled" and the availability status shall be "degraded".

REQ-SM-FUN-02 State management shall specify a usage state which defines whether or not the resource is actively in use at a specific instant, and if so, whether or not it has spare capacity for additional users at that instant.

A resource is said to be "in use" when it has received one or more requests for service that it has not yet completed or otherwise discharged, or when some part of its capacity has been allocated, and not yet reclaimed, as a result of a previous service request. Otherwise it is "not in use".

REQ-SM-FUN-03 State management shall specify an administration state which defines permission to use ("unlocked") or prohibition against using ("locked") the resource imposed through the management services.

The administrative state is used by the operator to make a resource available for service, or to remove a resource from service. For example:

– for fault correction, the administrative state can be used to isolate a faulty resource;

– in case of redundancy, the administrative state can be used to lock the active resource and let the standby resource become active (preventive maintenance);

– for test management, the administrative state can be used to put a resource out of service to run an intrusive test on it.

REQ-SM-FUN-04 State management shall specify a lifecycle state which represents the planned and tracked state of a physical or logical resource.

The lifecycle state tracks the plan for the managed object representing a resource.

– Inventoried resources may have a life cycle attribute so that their deployment can be planned, tracked, and managed.

– Logical resources, e.g., connection, are not inventoried; however, their deployment can be planned, tracked, and managed using a lifecycle state attribute.

REQ-SM-FUN-06 State management shall specify an alarm status which can have zero or more of the following values, not all of which are applicable to every class of managed object.

When the value of this attribute is empty, this implies that none of the status conditions described below are present.

– Under repair: The resource is currently being repaired. When under repair value is present, the operational state is either disabled or enabled.

– Critical: One or more critical alarms indicating a fault have been detected in the resource, and have not been cleared. The operational state of the managed object can be disabled or enabled.

– Major: One or more major alarms indicating a fault have been detected in the resource, and have not yet been cleared. The operational state of the managed object can be disabled or enabled.

– Minor: One or more minor alarms indicating a fault have been detected in the resource, and have not yet been cleared. The operational state of the managed object can be disabled or enabled.

– Alarm outstanding: One or more alarms have been detected in the resource. The condition may or may not be disabling. If the operational state is enabled, additional attributes, particular to the managed object class, may indicate the nature and cause of the condition and the services that are affected.

REQ-SM-FUN-07 State management shall specify a procedural status which is supported only by those classes of managed objects that represent some procedure (e.g., a test process) which progresses through a sequence of phases. Depending upon the managed object class definition, the procedure may be required to reach certain phase for the resource to be operational and available for use (i.e., for the managed object to be enabled). Not all phases may be applicable to every class of managed object. If the value of this attribute is an empty set, the managed object is ready; for example, the initialization is complete.

When the value of this attribute is empty, this implies that none of the status conditions described below are present.

– Initialization required: The resource requires initialization to be invoked by the manager before it can perform its normal functions, and this procedure has not been initiated. The manager may be able to invoke such initialization through an action. The terminating condition may also be present. The operational state is disabled.

– Not initialized: The resource requires initialization before it can perform its normal functions, and this procedure has not been initiated. The resource initializes itself autonomously, but the operational state may be either disabled or enabled, depending upon the managed object class definition.

– Initializing: The resource requires initialization before it can perform its normal functions, and this procedure has been initiated but is not yet complete. When this condition is present, the initialization required condition is absent, since initialization has already begun. The operational state may be disabled or enabled, depending upon the managed object class definition.

– Reporting: The resource has completed some processing operation and is notifying the results of the operation, e.g., a test process is sending its results. the operational state is enabled.

– Terminating: The resource is in a termination phase. If the resource does not reinitialize itself autonomously, the initialization required condition is also present and the operational state is disabled.

– Terminating: The resource is in a termination phase. If the resource does not reinitialize itself autonomously, the initialization required condition is also present and the operational state is disabled. Otherwise, the operational state may be either disabled or enabled, depending upon the managed object class definition.

REQ-SM-FUN-08 State management shall specify an availability status which can have zero or more of the following values, not all of which are applicable to every class of managed object.

When the value of this attribute is empty, this implies that none of the status conditions described below are present:

– In test: The resource is undergoing a test procedure. If the administrative state is locked or shutting down, then normal users are precluded from using the resource, and the control status attribute has the value reserved for test. Tests that do not exclude additional users can be present in any operational or administrative state but the reserved for test condition should not be present.

– Failed: The resource has an internal fault that prevents it from operating. The operational state is disabled.

– Power off: The resource requires power to be applied and is not powered on. For example, a fuse or other protection device is known to have removed power, or a low voltage condition has been detected. The operational state is disabled.

– On line: The resource is available for use. The operational state is enabled.

– Off line: The resource requires a routine operation to be performed to place it on line and make it available for use. The operation may be manual or automatic, or both. The operational state is disabled.

– Off duty: The resource has been made inactive by an internal control process in accordance with a predetermined time schedule. Under normal conditions the control process can be expected to reactivate the resource at some scheduled time, and it is therefore considered to be optional. The operational state is enabled or disabled.

– Dependency: The resource cannot operate because some other resource on which it depends (i.e., a resource not represented by the same managed object) is unavailable. For example, a device is not accessible because its controller is powered off. The operational state is disabled.

– Degraded: The service available from the resource is degraded in some respect, such as in speed or operating capacity. Failure of a test or an unacceptable performance measurement has established that some or all services are not functional or are degraded due to the presence of a defect. However, the resource remains available for service, either because some services are satisfactory or because degraded service is preferable to no service at all. Object specific attributes may be defined to represent further information indicating, for example, which services are not functional and the nature of the degradation. The operational state is enabled.

– Not installed: The resource represented by the managed object is not present, or is incomplete. For example, a plug-in module is missing, a cable is disconnected or a software module is not loaded. The operational state is disabled.

– Log full: This indicates a log full condition, which means that the maximum capacity of the log has been reached.

REQ-SM-FUN-09 State management shall specify a control status which can have zero or more of the following values, not all of which are applicable to every class of managed object.

When the value of this attribute is the empty set, this implies that none of the status conditions described below is present:

- Subject to test: The resource is available to normal users, but tests may be conducted on it simultaneously at unpredictable times, which may cause it to exhibit unusual characteristics to users.
- Part of services locked: This value indicates whether a manager has administratively restricted a particular part of a service from the user(s) of a resource. The administrative state is unlocked. Examples are incoming service barred, outgoing service barred, write locked by media key, read locked.
- Reserved for test: The resource has been made administratively unavailable to normal users because it is undergoing a test procedure. The administrative state is locked.
- Suspended: Service has been administratively suspended to the users of the resource. The resource may retain knowledge of current users and/or requests for usage, depending upon the managed object class definition, but does not resume performing services until the suspended condition is revoked. The administrative state is unlocked.

REQ-SM-FUN-10 State management shall specify a standby status which is only meaningful when the back-up relationship role exists for the managed object:

- Hot standby: The resource is not providing service, but is operating in synchronism with another resource that is to be backed-up (e.g., a computer shadowing another computer). A resource with a hot standby status will be immediately able to take over the role of the resource to be backed up, without the need for initialization activity, and will contain the same information as the resource to be backed up. The hot standby condition is mutually exclusive with the cold standby and providing service conditions.
- Cold standby: The resource is to back up another resource, but is not synchronized with that resource. A resource with a cold standby status will not be immediately able to take over the role of a resource to be backed up, and will require some initialization activity. The cold standby condition is mutually exclusive with the hot standby and providing service conditions.
- Providing service: The back up resource is providing service and is backing up another resource. The providing service condition is mutually exclusive with the hot standby and cold standby conditions.

REQ-SM-FUN-11 State management shall specify an unknown status is used to indicate that the state of the resource represented by the managed object is unknown.

REQ-SM-FUN-12 Changes of the state and status attributes of a resource shall be notified to the relative manager(s).

REQ-SM-FUN-13 State management shall specify a power consuming state to indicate the power consuming policy of the resource represented by the managed object. This attribute is used by the operator to control the power consuming policy of the device. It can be set to full power, power saving, sleeping or shutdown, defined as follows:

– Full power: A value of power consuming state. When set to this value, the resource will run in full power and will not consider power saving. If a large device contains parts that also support this attribute, when the container object set to full power state, all its parts shall turn into full power state.

– Power saving: A value of power consuming state. When set to this value, the resource is (or may be) partially running to save power; depending on how much the payload is lower than the maximum capacity of the resource, the degree of saving will be automatically decided by the resource. The constraint or policy to decide the degree of saving is out of scope of this document. If power saving is not supported by the resource, attempting to change to this state will have the same effect as full power state. If a large device contains parts that also support this attribute, when the container object is set to power saving state, its parts may still remain in full power state. But if one of the parts turns into power saving state, the container object shall turn into power saving state.

– Sleeping: A value of power consuming state. When set to this value, the resource is not running but keeps a snapshot of its memory before sleeping, and can resume running mode quickly. In this mode, the power is only consumed to meet the need of maintaining the memory. If it is not supported by the resource, attempting to change to this state will result in a failure.

– Shutdown: A value of power consuming state. When set to this value, the resource will be powered off and will not consume any more power. If it is not supported by the resource, attempting to change to this state will result in a failure.

REQ-SM-FUN-14 State management shall specify a power consuming status to indicate the current power consuming of the resource represented by the managed object. The value of this attribute is a percentage ranging from 0 to 100, where 100 percent represents the maximum power consumption of the device. This attribute cannot be modified by the operator.

REQ-SM-FUN-15 Within a managed element, when for any reason a resource changes its state, the change shall be propagated, in a consistent way, to all the other resources that are functionally dependent on the first one. Therefore:

- In case a fault occurring on a resource makes that resource completely out of service, if the current operational state is "enabled", it shall be changed to "disabled" and a state change notification shall be generated. Then, all the dependant resources (following the fault dependency diagram specific to that managed element) shall be checked and, in case they are "enabled" they shall be changed to "disabled". In this process, also the secondary status shall be changed consistently, in a way that it shall be possible to distinguish whether an object is disabled because it is faulty or because it is functionally dependent on another object which is disabled.
- In case a faulty resource is repaired, the operational state of that resource is changed from "disabled" to "enabled" and all the dependent resources are turned back to "enabled" (this is the simple case). In more complex cases, some of the objects may be disabled for different causes (different faults or faults plus locks on different superior resources); in those cases the repaired resource can be turned "enabled" only when all the causes are cleared (i.e., faults are repaired and superior resources are unlocked). Also, in this process the secondary status shall be changed consistently. This is true because a resource cannot have been in a disabled state when a fault occurred.
- In case the operator locks a resource, the process of the state change propagation is similar to the first case (resource failure) except for the locked resource which does not change its operational state but only the administrative state from "unlocked" to "locked". The dependent resources are processed as in the first case.
- In case the operator unlocks a resource, the process of the state change propagation is similar to the second case (fault reparation) except for the first resource (the unlocked one) which does not change its operational state but only the administrative state from "locked" to "unlocked". The dependent resources are processed as in the first case.

# 7 Analysis overview

State management defines information to be imported by other information object class definitions, as appropriate.

## 7.1 Concepts and background

Not applicable, as no interfaces are defined (see clause 7).

## 7.2 Information object classes

### 7.2.1 Imported information entities and local labels

No information entities are imported.

### 7.2.2 Class diagram

#### 7.2.2.1 Attributes and relationships

This clause depicts the set of information required for state management implementations in interfaces using this Recommendation. This clause provides the overview of all information object classes in UML. Subsequent clauses provide more detailed specification of various aspects of these information object classes.

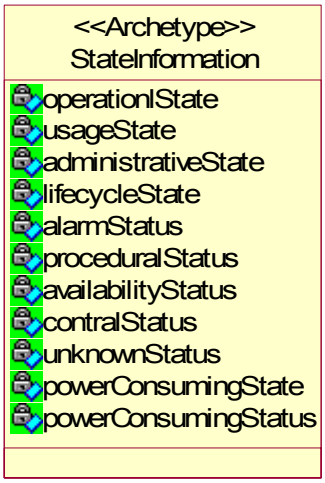


**Figure 1 – State information ArchType**

#### 7.2.2.2 Inheritance

There are no inheritance relationships.

### 7.2.3 Information object class definitions

This Recommendation defines the ArchType "StateInformation" for the state and status attributes.

#### 7.2.3.1 StateInformation

##### 7.2.3.1.1 Definition

The attributes defined by this Archetype can be imported and used in any IOC where such attributes are needed.

##### 7.2.3.1.2 Attributes

The following attributes are defined for this information object class. Support of a state or status attribute is specified by the IOC where the attribute is needed.

| Attribute name | Support qualifier | Read qualifier | Write qualifier | Requirement IDs |
|---|---|---|---|---|
| operationalState | O | M | – | REQ-SM-FUN-01 |
| usageState | O | M | – | REQ-SM-FUN-02 |
| administrativeState | O | M | M | REQ-SM-FUN-03 |
| lifecycleState | O | M | M | REQ-SM-FUN-04 |
| alarmStatus | O | M | – | REQ-SM-FUN-06 |
| proceduralStatus | O | M | – | REQ-SM-FUN-07 |
| availabilityStatus | O | M | – | REQ-SM-FUN-08 |

| Attribute name | Support qualifier | Read qualifier | Write qualifier | Requirement IDs |
|---|---|---|---|---|
| controlStatus | O | M | – | REQ-SM-FUN-09 |
| standbyStatus | O | M | – | REQ-SM-FUN-10 |
| unknownStatus | O | M | – | REQ-SM-FUN-11 |
| powerConsumingState | O | M | M | REQ-SM-FUN-13 |
| powerConsumingStatus | O | M | – | REQ-SM-FUN-14 |

#### 7.2.3.1.3 Attribute constraints

Table 1 illustrates the dependencies among the standby status attribute and the operational state, administrative state, procedural status and availability status attributes.

**Table 1 – Standby status conditions**

| Standby status | Operational state | Administrative state | Procedural status | Availability status |
|---|---|---|---|---|
| Hot standby | Enabled | Unlocked | – | On line |
| Cold standby | Enabled or disabled | Unlocked or locked | Not initialized or initialization required | Off line |
| Providing service | Enabled | Unlocked | – | On line |

The relationships among the power consuming state, administrative state, operational state and availability status are illustrated in the following table.

**Table 2 – Power consuming state relationship**

| Power consuming state | Administrative state | Operational state | Availability status |
|---|---|---|---|
| Full power | Lock/unlock/shutting down | Enable/disable | May be all other status except power off and not installed |
| Power saving | Lock/unlock/shutting down | Enable/disable | May be all other status except power off and not installed |
| Sleeping | Lock | Disable | Off line, off duty |
| Shutdown | Lock | Disable | Power off |

#### 7.2.3.1.4 Relationships

There is no Relationship definition in this document.

#### 7.2.3.1.5 State diagram

##### 7.2.3.1.5.1 Operational state

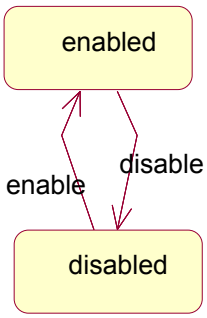


**Figure 2 – Operational state diagram**

##### 7.2.3.1.5.2 Usage state

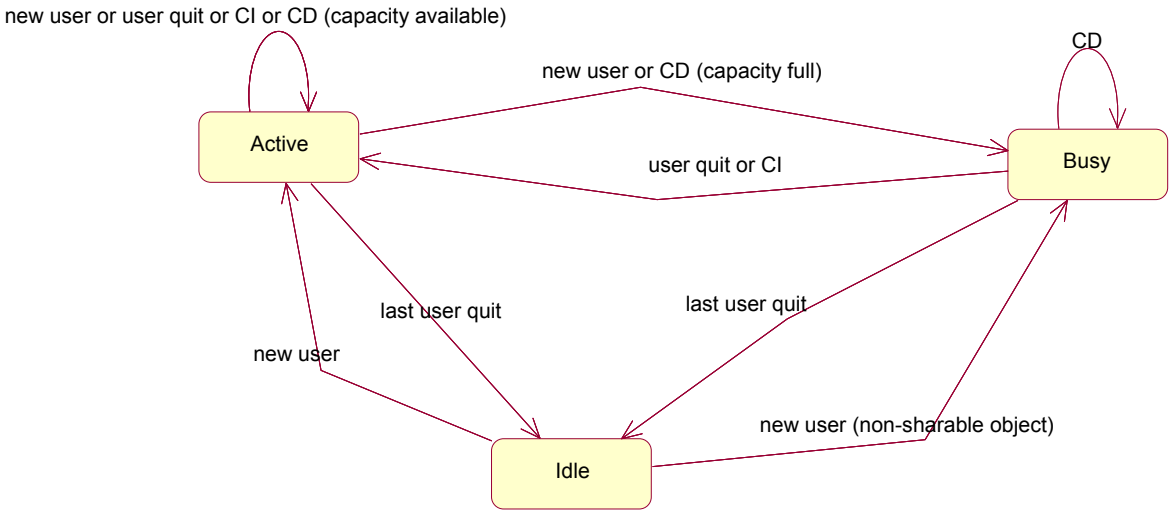


**Figure 3 – Usage state diagram**

#### 7.2.3.1.5.3 Administrative state

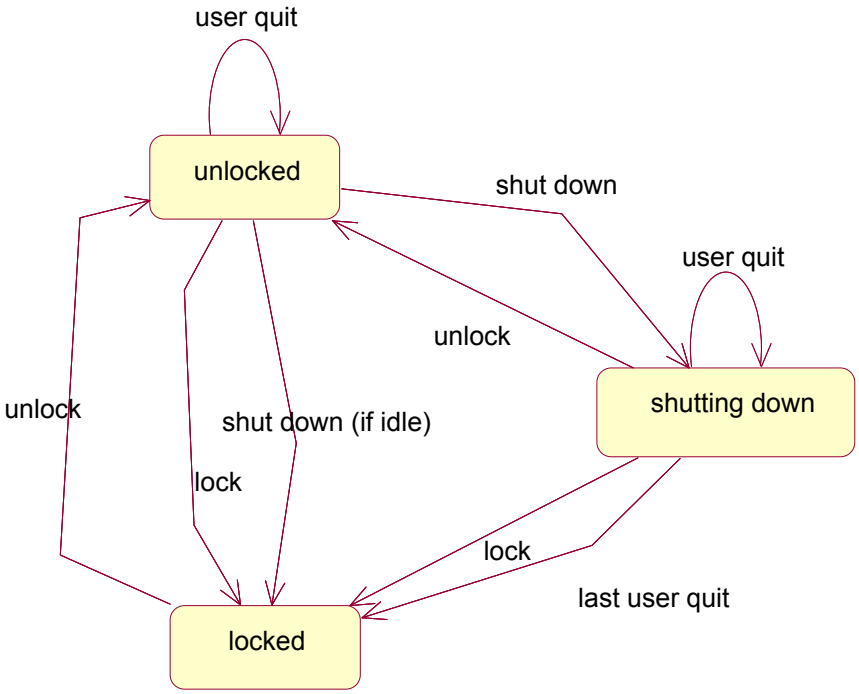


**Figure 4 – Administrative state diagram**

#### 7.2.3.1.5.4 Lifecycle state

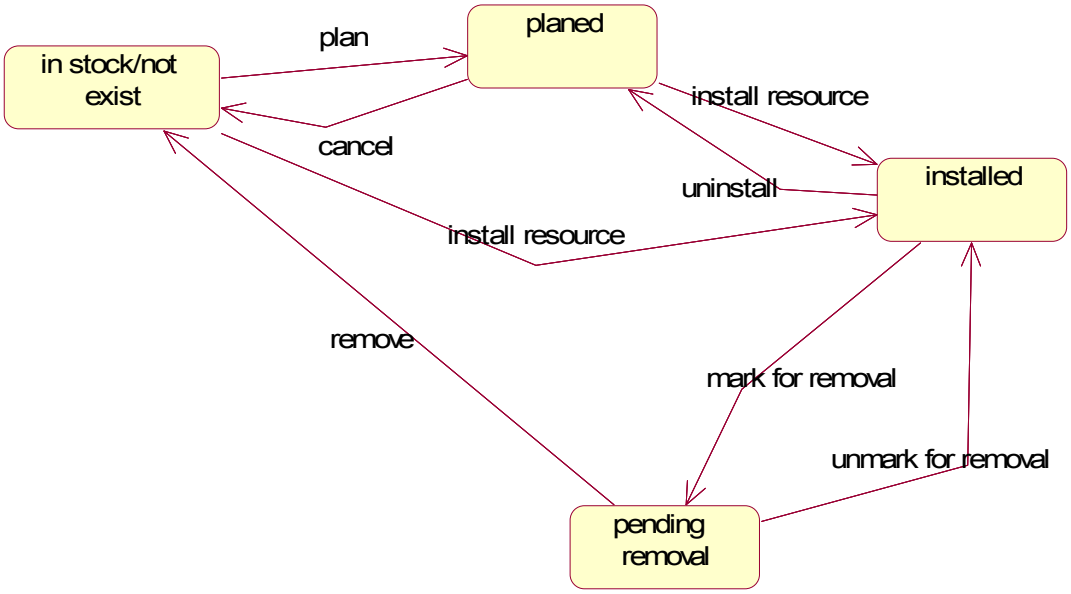


**Figure 5 – Lifecycle state diagram**

#### 7.2.3.1.5.5 Power consuming state

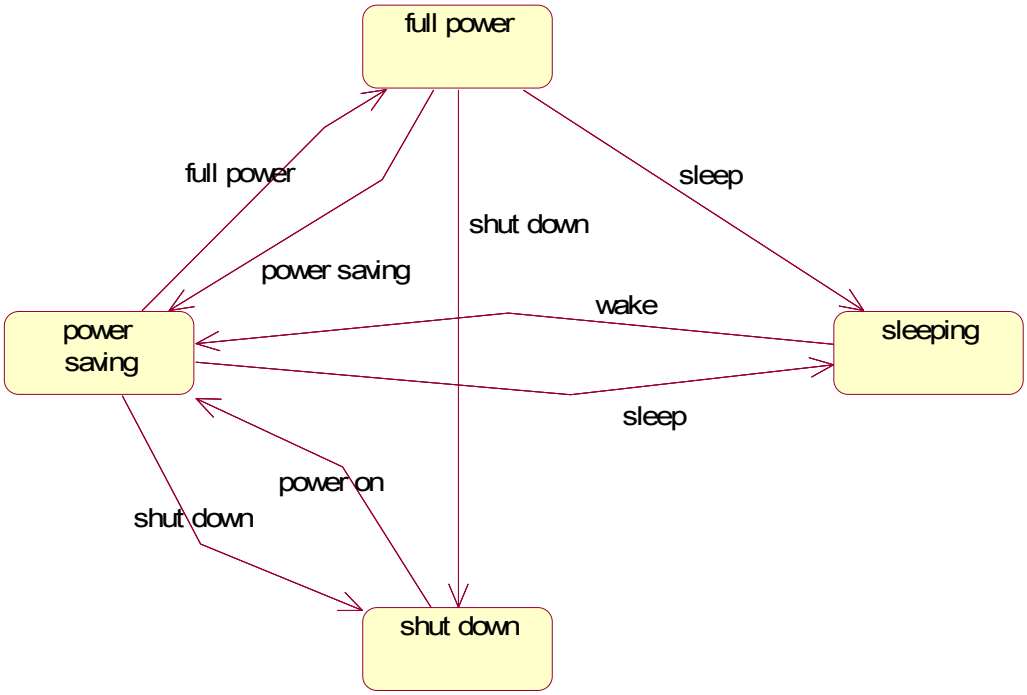


**Figure 6 – Power consuming state diagram**

#### 7.2.3.1.6 Notifications

There is no notification definition in this Recommendation.

### 7.2.4 Information relationship definitions

There is no information relationship definition in this Recommendation.

### 7.2.5 Information attribute definitions

#### 7.2.5.1 Definition and legal values

| Attribute name | Definition | Information type/Legal values |
|---|---|---|
| operationalState | Whether or not the resource is physically installed and working. | ENUMERATED{<br>disabled,<br>enabled<br>} |
| usageState | Represents whether or not the resource is actively in use at a specific instant, and if so, whether or not it has spare capacity for additional users at that instant. | It can have one of the following values, not all of which are applicable to every class of managed object.<br>ENUMERATED{<br>idle,<br>active,<br>busy<br>}<br>• idle: The resource is not currently in use. |

| Attribute name | Definition | Information type/Legal values |
|---|---|---|
| | | • active: The resource is in use, and has sufficient spare operating capacity to provide for additional users simultaneously.<br>• busy: The resource is in use, but it has no spare operating capacity to provide for additional users at this instant. |
| administrativeState | Represents permission to use ("unlocked") or prohibition against using ("locked") the resource imposed through the management services. | It can have one of the following values, not all of which are applicable to every class of managed object.<br>ENUMERATED{<br>locked,<br>shuttingDown,<br>unlocked<br>} |
| lifecycleState | Represents the planned and tracked state of a physical or logical resource. | ENUMERATED{<br>planned,<br>installed,<br>pendingRemoval<br>} |
| alarmStatus | Represents the severity status of fault for a resource. It can have zero or more values, each representing an existing severity. | SEQUENCE OF ENUMERATED{<br>under repair,<br>critical,<br>major,<br>minor,<br>alarmOutstanding<br>} |
| proceduralStatus | Represents a sequence of phases through which the resource needs to progress. | SEQUENCE OF ENUMERATED{<br>initializationRequired,<br>notInitialized,<br>initializing,<br>reporting,<br>terminating<br>} |
| availabilityStatus | Represents the availability of the resource for either carrying service or for being in other states, such as in testing. | SEQUENCE OF ENUMERATED{<br>inTest,<br>failed,<br>powerOff,<br>online,<br>offline,<br>offDuty,<br>dependency,<br>degraded,<br>notInstalled,<br>logFull<br>} |

| Attribute name | Definition | Information type/Legal values |
|---|---|---|
| controlStatus | Indicates that the resource is under some kind of control. | SEQUENCE OF ENUMERATED{<br>subjectToTest,<br>partOfServicesLocked,<br>reservedForTest,<br>suspended<br>} |
| standbyStatus | Represents the working mode for standby objects; whether it is providing service or standby as a back-up resource. | ENUMERATED{<br>hotStandby,<br>coldStandby,<br>providingService<br>} |
| unknownStatus | Indicates that the state of the resource represented by the managed object is unknown. | BOOLEAN<br>The value 'true' indicates that the resource is in an unknown state. |
| PowerConsumingState | Indicates the power consuming policy of the resource represented by the managed object. | ENUMERATED{<br>fullPower,<br>powerSaving,<br>sleeping,<br>shutdown<br>} |
| PowerConsumingLevel | Indicates the current power consuming of the resource represented by the managed object. | INTEGER(0..100)<br>percentage ranging from 0 to 100, where 100 percent represents the maximum power consumption of the device. |

#### 7.2.5.2 Constraints

| Name | Affected attribute(s) | Definition |
|---|---|---|
| Standby status conditions | Standby status<br>Operational state<br>Administrative state<br>Procedural status<br>Availability status | The relationship among these attributes is illustrated in Table 1, in clause 7.2.3.1.3, Attribute constraints |
| Power consuming state relationship | Power consuming state<br>Administrative state<br>Operational state<br>Availability status | The relationship among these attributes is illustrated in Table 1 in clause 7.2.3.1.4, Power consuming state relationship |

### 7.2.6 Common notifications

| Name | Qualifier | Notes |
|---|---|---|
| [ITU-T M.3700]: Attribute value change | M | Apply to attributes that has "status" in its name |
| [ITU-T M.3700]: State change | M | Apply to attributes that has "state" in its name |

### 7.2.7 System state model

There is no state definition for system in this Recommendation.

## 7.3 Interface definition

No interfaces are defined for state management. The Bibliography lists other specifications that define other information elements which may be of interest. [ITU-T M.3700] and [ITU-T M.3702], dealing with object management and notification management, respectively, also define interfaces applicable to state management.

## 7.4 IOC properties, inheritance and import

### 7.4.1 Property

There is no extra property definition in this Recommendation.

### 7.4.2 Inheritance

There are no inheritance relationships.

### 7.4.3 Import

There are no objects to import in this Recommendation.

# Bibliography

The protocol-neutral object management capabilities defined in this specification are based on multiple sources identified in this bibliography.


[b-ITU-T M.60] Recommendation ITU-T M.60 (1993), *Maintenance terminology and definitions.*

[b-ITU-T Q.827.1] Recommendation ITU-T Q.827.1 (2004), *Requirements and analysis for the common management functions of NMS-EMS Interfaces*.

[b-ITU-T X.731] Recommendation ITU-T X.731 (1992), *Information technology – Open Systems Interconnection – Systems management: State management function*.

[b-ITU-T X.733] Recommendation ITU-T X.733 (1992), *Information technology – Open Systems Interconnection – Systems Management: Alarm reporting function*.

[b-3GPP TS 32.601] 3GPP TS 32.601 (2009), *Telecommunication management; Configuration management (CM); Basic CM Integration Reference Point (IRP); Requirements*.

[b-3GPP TS 32.602] 3GPP TS 32.602 (2009), *Telecommunication management; Configuration management (CM); Basic CM Integration Reference Point (IRP): Information Service (SS)*.

[b-3GPP TS 32.661] 3GPP TS 32.661 (2009), *Telecommunication management; Configuration management (CM); Kernel CM; Requirements*.

[b-3GPP TS 32.662] 3GPP TS 32.662 (2009), *Telecommunication management; Configuration management (CM); Kernel CM; Information Service (IS)*.

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