TIP_Common_IA, TIP Common Model Information Agreement

TIP_Common_IA

Version 1.1

August 2012

Notice

1. Introduction

This document describes the TIP Common Model.

The Common Model groups a number of objects and base interfaces that might be used by interface developers. A part of the Common Model covers operational objects, like exceptions and notifications that are not available in the SID. The rest of the Common Model is common Information Model objects coming from the SID

1.1. Document Structure

The following sections are contained in this document:

- Section 1 is the document introduction
- Section 2 provides a summary description of the Common Model
- Section 3 describes the Information Model provided by this Common Model
- Section 4 describes all the Service Interfaces contained in this Common Model

1.2. Conventions Used In This Document

In this document, we use the following color conventions.

In the attribute tables:

- An attribute shown on white background is local.
- An attribute shown on lavender background is inherited.
- An attribute shown on green background is implicit.

Similarly, text in green color indicates implicit or generated data. Implicit information does not appear in the model, but will be added by the generators in the final interface specification based on the decoration present in the model. It can be additional attributes in an entity, additional notifications or additional operations. Implicit data is defined in the Internal Framework Model. Please refer to the Framework Guidebook for details.

All links are with blue color.

2. Interface Summary

2.1. Scope of the TIP Common Model

The TIP Common Model project provides common entities, data types and base service interfaces useable by all interfaces.

The TIP Common Model is available as a read-only module in all interface projects and developers can use any of its data in their project.

While the operational part of the TIP Common Model is specific, the information model part (datatypes and entities) is imported from the SID. The SID stays the master repository for all information models objects. However, rather than importing the needed common objects in a Dependencies project with the right transformations, it is simpler and more consistent to use them from the TIP Common Model.

During the import, a number of model transformation are applied. While most of those transformation are automated, a few of them are still manual. Also, the TIP Common Model will be used for defining interfaces with their associated RI and CTK. So what might be a micro change at Information Model level might imply large change in the implementation parts.

For the reasons above, strict governance is put in place to keep consistency of the information model part of the TIP Common Model with the SID.

The TIP Common Model includes:

- Base Types coming from the SID Base Types ABE
- Datatypes from the SID Network Resource Basic ABE
- Common Exceptions, not present in SID
- Common Notifications, not present in SID
- Schedule Definition, coming from the SID Schedule Definition ABE
- Management Job, coming from the SID Management Job ABE

If is important to distinguish the TIP Common Model from the TIP Internal Model. The TIP Internal Model defines objects that are used by generators to be injected in the interface specifications. This model cannot be referenced directly by interface developers. It will always be used implicitly. The easiest way to view the injected model elements is to look at the generated IA of the interface as the Documentation generator will add in green the injected model elements.

The TIP Internal Model covers:

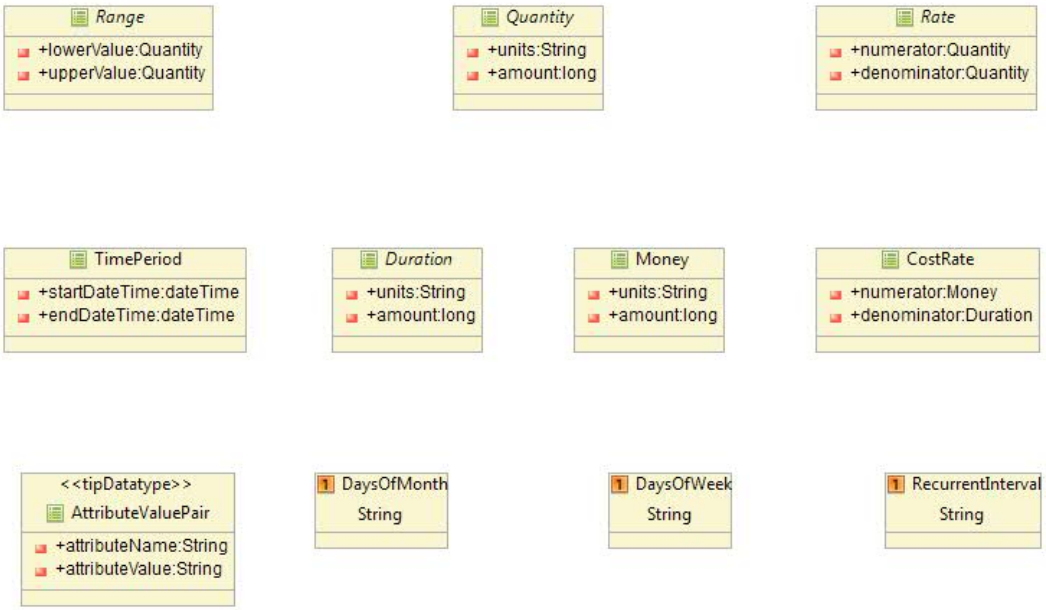
- Entity Identifier
- Pre-defined Exceptions
- Extensibility
- Iterators
- Base Notifications

2.2. Base Types

The Base Types are the datatypes present in the SID Base Types ABE (Qualified Name: SID Models::Common Business Entities Domain::Base Types ABE). Note that in Tigerstripe, the primitive types are not part of the model as they are defined in the profile.

The following Base Types are defined

- AttributeValuePair
- CostRate
- Duration
- Money
- Quantity
- Range
- Rate
- TimePeriod
- DaysOfMonth (enumeration)
- DaysOfWeek (enumeration)
- RecurrentInterval (enumeration)



In addition to the Tigerstripe primitive datatypes, the following primitive datatypes are supported:

- any
- date
- dateTime
- filter

- objectName
- time
- uri
- url
- unknown: when this datatype is present in the interface model, it indicates that the corresponding SID object has no datatype defined. The SID model would need to be fixed and the model re-imported to remove all unknown datatypes. Generation will fail if the model includes an unknown datatype.

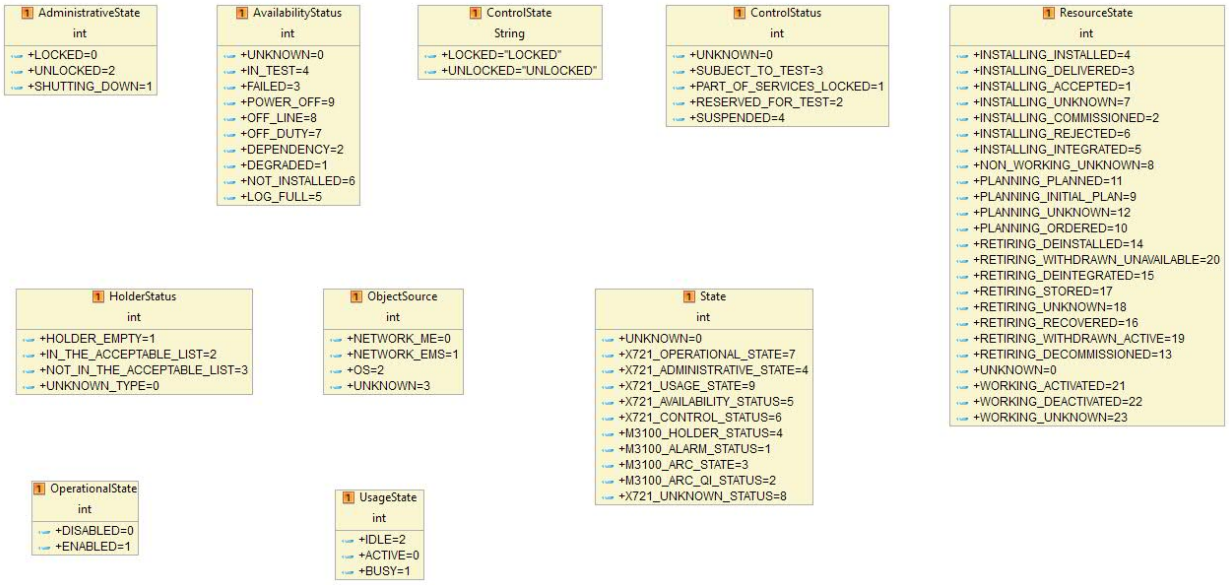
Note also that for strings, the String (with a capital S) should be used. Do not use the string (with a lowercap s) one.

2.3. NRB Datatypes

The NRB datatypes are present in the SID Network Resource Basic ABE (Qualified Name: SID Models::Resource Domain::Resource ABE::TIP Resource ABE::Network Resource Basic ABE). It includes enumerations and copmplex datatypes.

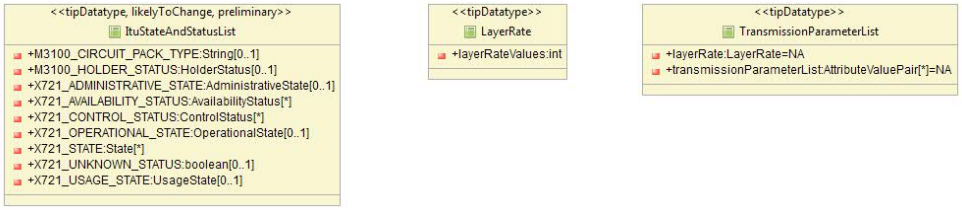
The enumerations present in NRB are the following:

- AdministrativeState
- AvailabilityStatus
- ControlState
- ControlStatus
- HolderStatus
- ObjectSource
- OperationalState
- ResourceState
- State
- UsageState



The complex datatypes present in NRB are the following:

- ituStateAndStatusList
- LayerRate
- TransmissionParameterList

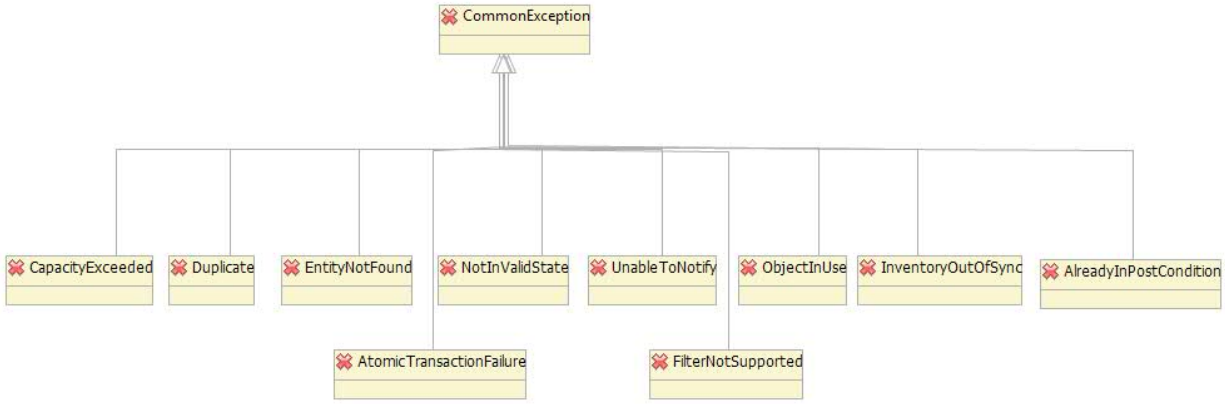


2.4. Common Exceptions

The common exceptions are optional and are used as needed for a given operation. They must be explicitly added to an operation. Interface developers should try as much as possible to reuse these common exceptions rather than creating new ones.

All common operations inherits from CommonException. CommonException is the root of the TIP Framework user modifiable Exception Hierarchy. All exceptions defined by an interface designer using the TIP Framework should extend from CommonException.

The figure below provides the hierarchy of optional common exceptions:



The optional common exceptions are:

- CapacityExceeded : This is the type of exception raised when the operation fails due to resources being created or activated beyond the capacity supported by the NE or target OS (the OS to which the operation is directed).
- Duplicate : This exception is thrown if an entity cannot be created because an object with the same identifier/ name already exists.
- EntityNotFound : This exception is thrown to indicate that the specified entity does not exist.
- NotInValidState : The state of the specified object is such that the target OS (the OS to which the operation is directed) cannot perform the request. In other words, the environment or the application is not in an appropriate state for the requested operation.
- UnableToNotify : The target OS (the OS to which the operation is directed) is unable to connect to the Notification Service.
- ObjectInUse : The object identified in the request is currently in use.
- InventoryOutOfSync : This is the type of exception raised when the operation fails due to out of synchronization of inventory between requesting OS (the OS which invokes the operation) and target OS (the OS to which the operation is directed).
- AlreadyInPostCondition : in case the operation does not support idempotence, this exception is used to indicate that the server is already in the post-condition that the operation is attempting to define.
- AtomicTransactionFailure: This exception is raised when an atomic operation does not succeed due to the failure of one of its sub-part. The details would indicate which object/ part failed.
- FilterNotSupported : This exception is raised when a filter definition is not supported by the filter. The details might provide more precise reason.

2.4.1 Pre-Defined Exceptions

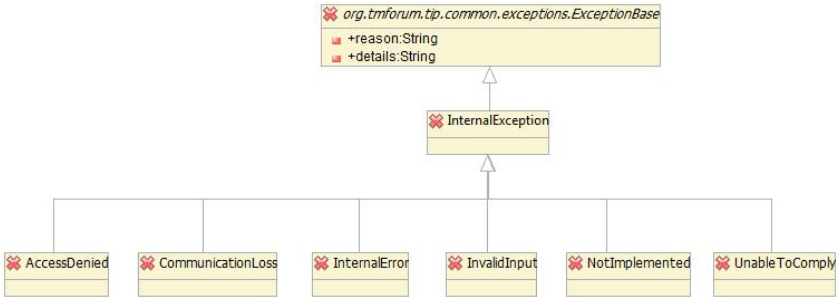
The predefined exceptions are part of the Internal Model, not visible to interface developers and are automatically inserted into all operations, with the exception of one-way operations which do not have exceptions at all.

InternalException is the root of the TIP Framework Internal Exception Heirarchy. All TIP interfaces will as a minimum support the exceptions extending from InternalException. InternalException inherits by injection from ExceptionBase.

ExceptionBase : This is the base definition of all TIP operation exceptions. This type is injected by the TIP Generators into code generated from Tigerstripe Exception artifacts where the 'Extends' field has been left as an empty string or as 'java.lang.Exception'. ExceptionBase contains 2 attributes:

- reason : Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation. Daatatype: String
- details : The more specific details about the exception. Can also be a stack trace. Datatype: String

The figure below provides the hierarchy of predefined common exceptions:

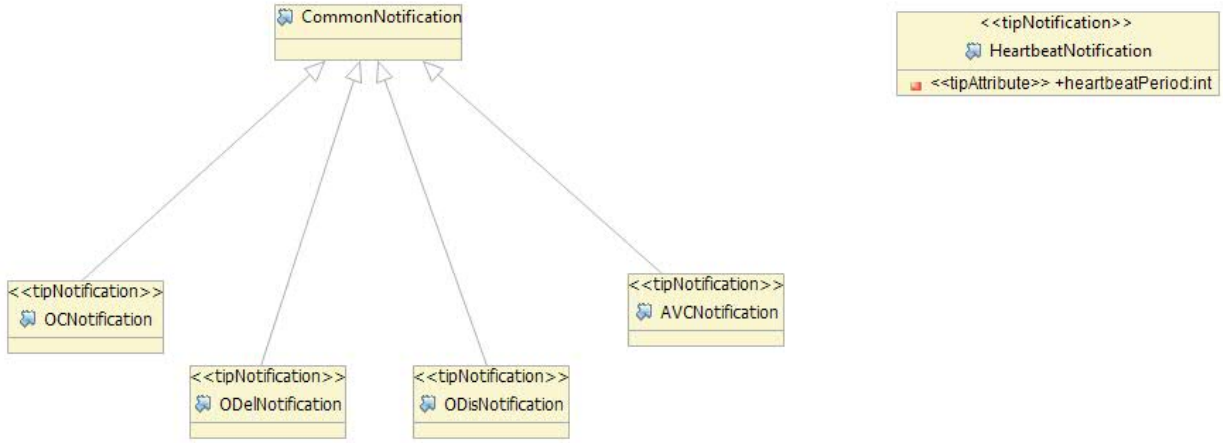


The predefined common exceptions are:

- AccessDenied : This is the type of exception raised when the operation fails for security reasons. The requesting OS does not have access rights to request the given operation. Even if access control is implemented by policies, this exception shall be used in case of access denied.
- CommunicationLoss : The target OS (the OS to which the operation is directed) is unable to communicate with an underlying system or resource, and such communication is required to complete the request.
- InternalError : The request has resulted in an OS internal error.
- InvalidInput : This is the type of exception raised for all failures related to operation input parameters. Typicaly, the request contains an input parameter that is syntactically incorrect or identifies an object of the wrong type or is out of range.
- NotImplemented : The entire request is not supported by the target OS or the request with the specified input parameters is not supported. Operations in the interface that include this exception in their throw clause have to be considered as optional operations. In case of attributes, it can be thrown by the modification or the request of an optional attribute to indicate that the attribute is not supported by the implementation. This exception cannot be thrown for a mandatory attribute or operation.
- UnableToComply : The target OS (the OS to which the operation is directed) cannot respond to the request. May be raised whenever the OS cannot respond to a request. Use Cases may identify specific conditions that will result in this exception. This is a general exception. Please use more detailed ones (Communication Loss, Access Denied...) whenever possible.

2.5. Common Notifications

The common notifications defined the base objects used for various notifications. None of the common notifications defined below contains attributes. They are shown on the figure below:



The common notifications are:

- CommonNotification : This is the root of the TIP Framework user modifiable Notification Heirarchy. All Notifications/Events defined by an interface designer using the TIP Framework should extend from CommonNotification.
- OCNotification : a generic Object Creation event, ancestor of all specific Object Creation events.
- ODelNotification : When an instance of an entity type has been removed, an event of the type will be sent out. in TIP, this is the only common Object Deletion event.
- ODisNotification : a generic Object Discovery event, ancestor of all specific Object Discovery events.
- AVCNotification : a generic Attribute Value Change event, ancestor of all specific Attribute Value Change events
- HeartbeatNotification: indicate the state of the notification delivery mechanism between the sending and receiving systems. This notification does not extend CommonNotification as it does not include an ObjectId.

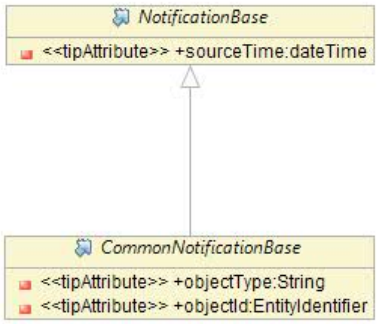
2.5.1 Internal Notifications

The internal notifications define the base notifications injected, part of the Internal Model.

There are 2 base notifications:

- NotificationBase : This is the base (abstract) definition used for all TIP notifications. This type is injected by the TIP Generators into code generated from Tigerstripe Event (i.e. notification) artifacts where the 'Extends' field has been left as an empty string.
- CommonNotificationBase : This is the base (abstract) definition used for all TIP Common Notifications. This type is injected by the TIP Generators into code generated from Tigerstripe Event (i.e. notification) artifacts where the 'Extends' field corresponds to 'org.tmforum.tip.fmk.common.notifications.CommonNotification'.

This is shown on the figure below:



NotificationBase includes the following attributes:

- sourceTime : The time at which the event was reported by the source system (NE, EMS or OS). It is the current time on the system where the event is generated. If a system (like an EMS) is carrying forward an event generated on a NE, then the time of the source (NE in this case) should be kept. Datatype: time.

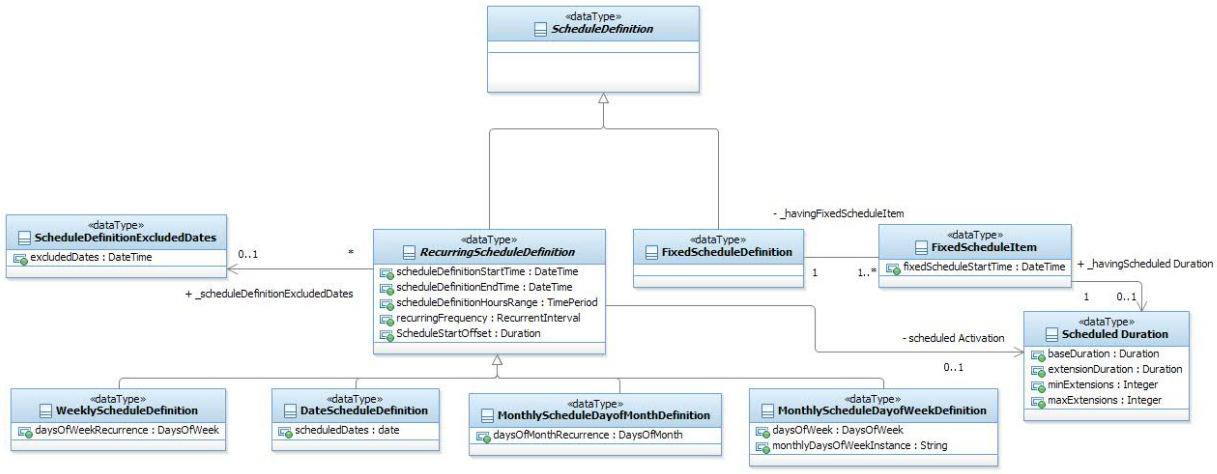
CommonNotificationBase includes the following attributes:

- objectType : The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type. Datatype: String.
- objectId : The identifier of the object associated with the event, as internal opaque identifier. Datatype: EntityIdentifier.

2.6. Schedule Definition

The Schedule Definition model is targeted to answer the need of applications to schedule jobs either on a recurring basis or at specific dates and times. The base entity for Schedule Definition is the ScheduleDefinition entity. A ScheduleDefinition entity is associated with a management job entity when it is scheduled. ScheduleDefinition is an abstract entity as any schedule definition has specific parameters that need to be defined by using its subentities.

The following diagram shows the data model of the Schedule Definition.



Recurring schedule definitions are composed of four parts:

First, the base RecurringScheduleDefinition entity. This entity has the general attributes necessary for any definition of a recurring schedule. RecurringScheduleDefinition is an abstract entity as any schedule definition having a specific recurrence pattern needs to be defined by using its sub-entities. The general attributes of a base schedule definition entity are:

- scheduleDefinitionStartTime -- The start time of a schedule definition.
- scheduleDefinitionEndTime -- The end time of a schedule definition.
- recurringFrequency -- An optional intra-day schedule recurrence, such as: every 5 minutes, 15 minutes, 30 minutes, 1 hour.
- scheduleDefinitionHoursRange -- A list of time ranges within a specific day when the schedule should be active, for example 08:00-12:00, 16:00-19:00.
- scheduleStartOffset -- An offset relating to the recurring interval. For example, if the recurring interval is 1 hour and the offset is 10 minutes, a job will be executed at 1:10, 2:10, 3:10, etc.

Second, the supported recurrence patterns are defined via the sub-entities of the ScheduleDefinition:

- WeeklyScheduleDefinition -- A schedule definition based on days of the week, for example every Saturday and Sunday. For this schedule an additional dayOfWeekRecurrence is added to define the list of the requested days. If no day is defined the schedule will be executed every day.
- MonthlyScheduleDaysofMonthDefinition -- A schedule definition based on days of the month, such as: 1st, 20th, 30th. For this schedule an additional dayOfMonthRecurrence is added to define the list of days.
- MonthlyScheduleDaysofWeekDefinition -- A schedule definition based on instances of days of week in the month, for example: the 1st Monday in a month. Two attributes are added to support this schedule: recurringWeekSequence for selecting the requested week and daysOfWeekRecurrence to indicate the requested days(s).
- DateScheduleDefinition -- This schedule definition supports the selection of specific dates such as: January 1st 2012, July 4th 2015, etc. A scheduledDates attribute is used to define the list of the requested dates.

A recurring schedule may optionally define the exclusion of specific dates from the scheduling definition is defined by associating a ScheduleDefinitionExclusion with the RecurringScheduleDefinition entity. The scheduleDefinitionExcludedDates attribute is used to define the list of dates that should be excluded from the schedule.

Finally, a Schedule Duration may optionally be defined by associating a Scheduled Duration Entity to the Recurring Schedule. A duration of a schedule is defined by specifying a base duration, an expected duration for the execution of a job. Extensions to the base duration may be optionally specified. It is possible to define expected duration for the extensions, the mean number of expected extensions and the maximal number of the expected extensions.

Unlike the Recurring schedule definition, it is possible to define a schedule containing exact execution times. This is done by using the FixedScheduleDefinition entity. Each fixed schedule is composed of a list of fixed schedule items. A fix schedule item provides the shedule for a specific execution, supplying the fixScheduleStartTime and a Schedule duration (as exaplained above).

2.7. File Transfer

In a number of cases, network elements as well as management systems might generate management information stored in file format or too bulky to be sent by request/ response message exchange. In this case a file transfer mechanism is needed and this section describes it.

File Transfer is needed for a number of management interfaces, including Performance Management, Inventory, and Configuration Management.

The File Transfer mechanism relies on an underlying ManagementJob object. ManagementJob is the support object for a data transfer operation. In this version, only asynchronous File Transfer is supported, meaning that the initial request returns immediately with the jobId while the file generation is done asynchronously

2.7.1 File Transfer Diagrams

The best way to illustrate the operation of File Transfer is through a set of diagrams showing the various use cases related to File Transfer.

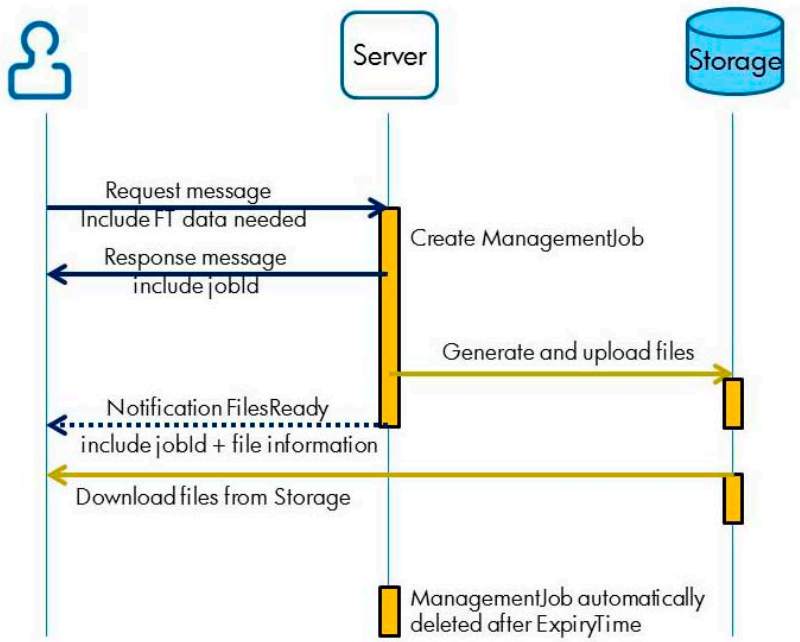
In all those diagrams, the following conventions are used:

- All exchanges that are part of the interface specification are in blue. Solid blue for request/response and dash for notifications.
- File transfer exchanges are outside of the interface specification and are in brown.

2.7.1.1 One-Time File Transfer

In a one-time File Transfer, a single request is issued by the client whose response will be returned as a set of files. It can be an inventory query, or a get operation to get a specific set of performance measurement, or a download of configuration information.

The following diagram is showing a one-time file transfer:

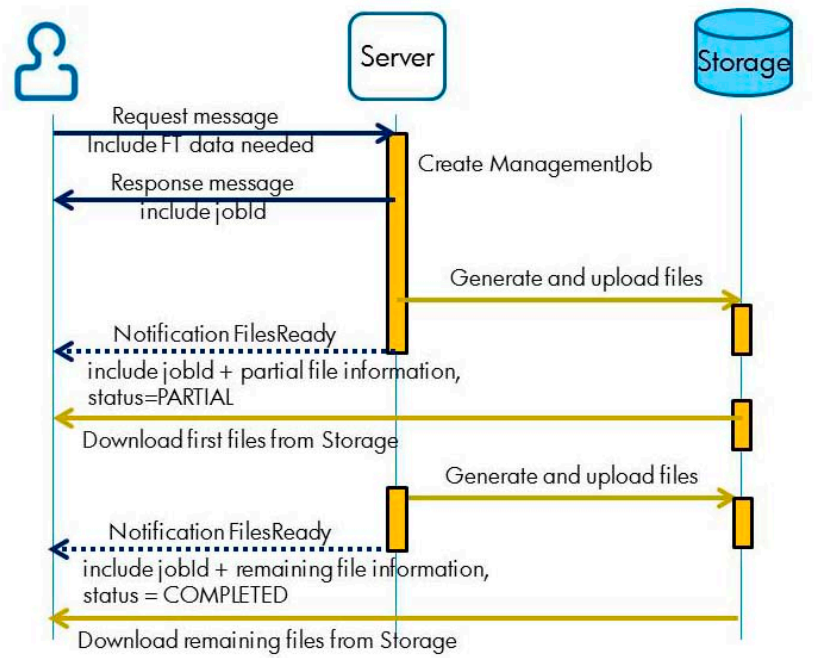


The client issues the interface request for getting the data. The server creates the corresponding job and replies to the request with the jobId as part of the response. The interface request does not have to be a create operation, it will usually be specific for each interface like a query or a get data.

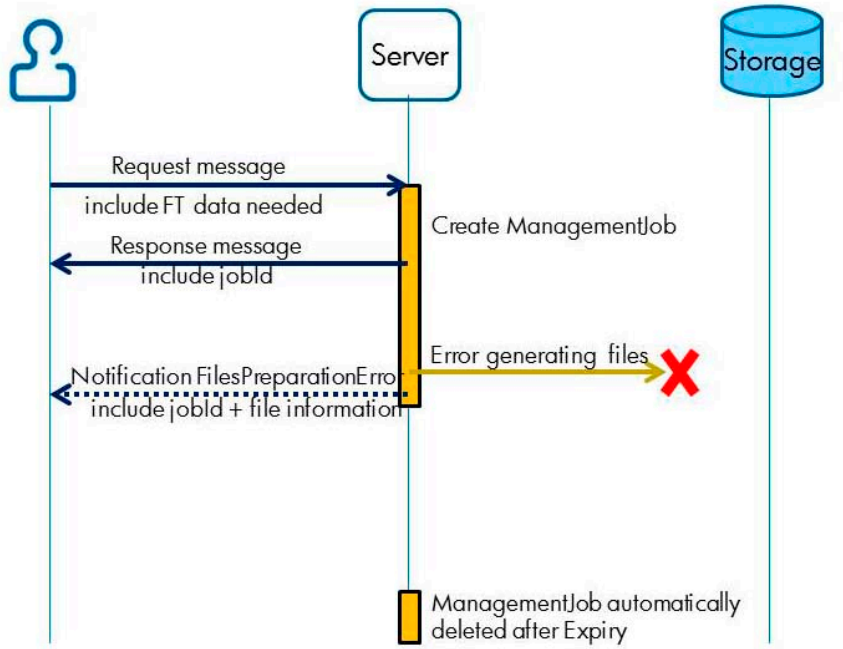
The server generates the file and when done, sends asynchronously a notification FilesReady to the client containing the jobId and the information about the files generated. The client would then download the files from the storage location.

In the diagram above, only a single FilesReady notification is sent when all files are available. However, in some cases, this scheme is not the best suited as some files might be generated right away while the server might have to wait longer for some others.

In this case, it is possible to send several FilesReady notifications for the same jobId, each one with a the list of files that are available for download as illustrated below:



In case of error during the generation of the files, the server will send a FilesPreparationError notification for the jobId with the information on the files in error as shown below:



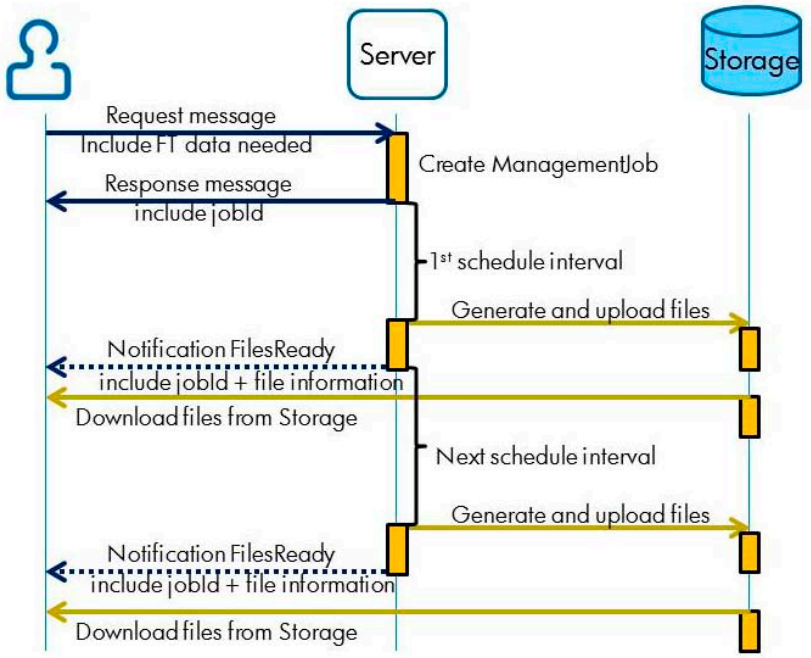
Note that some files might be successfully generated and some not, so it is possible to receive both FilesReady and FilesGenerationError for different group of files.

It is recommended to have the server handles automatically the deletion of the Management Job after the expiration of the files (expiry Time). So no delete operation should be offered for one-time management jobs. However, if it makes more sense for the interface to offer an explicit delete operation, it is the responsibility of the interface to provide it.

2.7.1.2 Scheduled File Transfer

In a scheduled File Transfer, the Schedule Definition associated with the Management Job controls the generation of files. For instance, every 15 mn from 8am to 8pm every weekday.

The overall principle is very similar to the one-time use case, except that files will be generated at regular occurrence based on the Schedule Definition. The schedule file Transfer is illustrated with the following diagram:

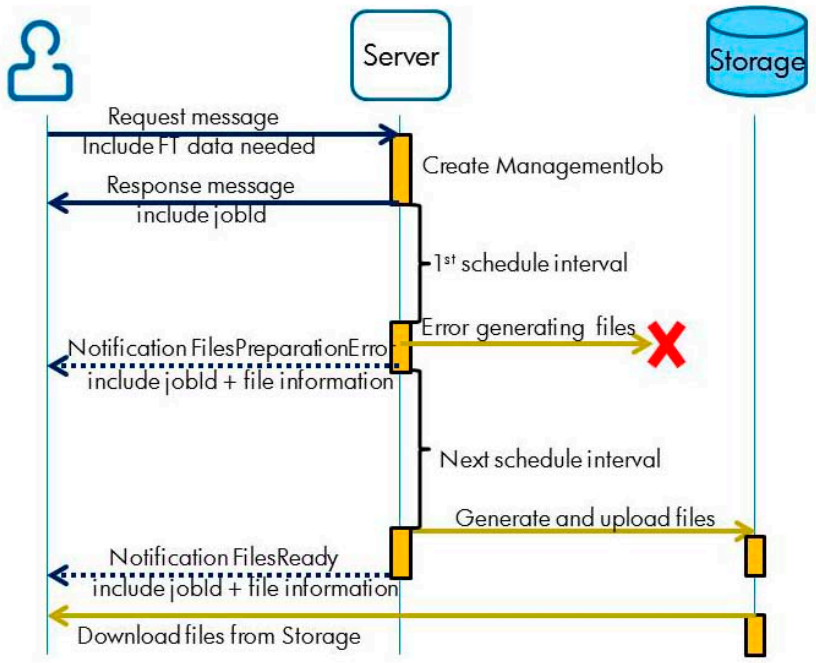


The client issues the interface request for getting the data. The server creates the corresponding job and replies to the request with the jobId as part of the response.

When the occurrence of the first schedule occurs, the server generates the file and when done, sends asynchronously a notification FilesReady to the client containing the jobId and the information about the files generated. The client would then download the files from the storage location.

When the next occurrence of the schedule occurs, this process is repeated, the server generates the new files, send a new FilesReady notification and the client downloads the new files.

In case of error during the generation of the files, the server will send a FilesPreparationError notification for the jobId with the information on the files in error as shown below:

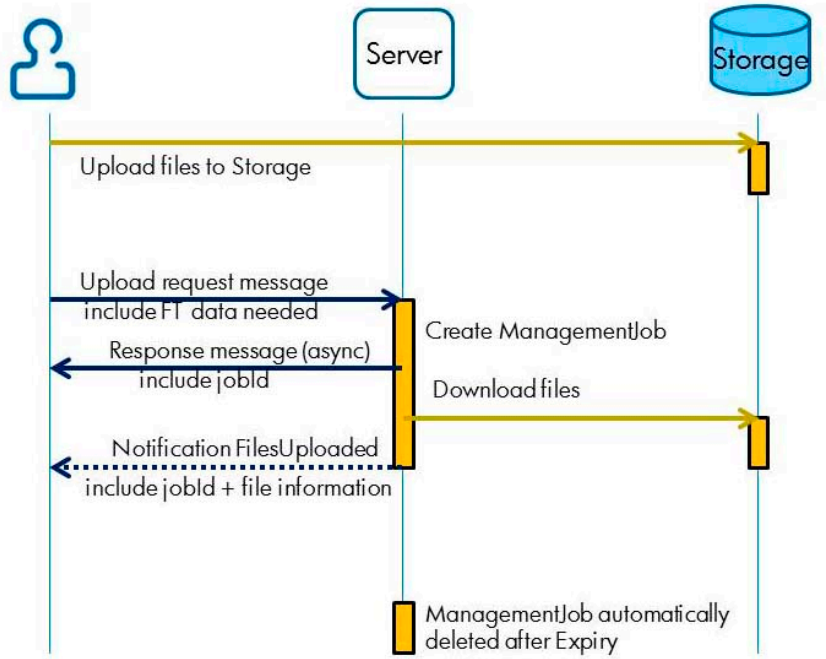


Having an error during one schedule occurrence does not stop the job and at the next schedule occurrence, the server will generate the files as shown on the diagram. If the error is considered fatal, it is an application decision at server side to stop generating files and is considered as outside the scope of File Transfer.

2.7.1.3 File Upload

In the Upload use case, the client is pushing some files to the server, it can be an import request to import some inventory data or a configuration download for instance.

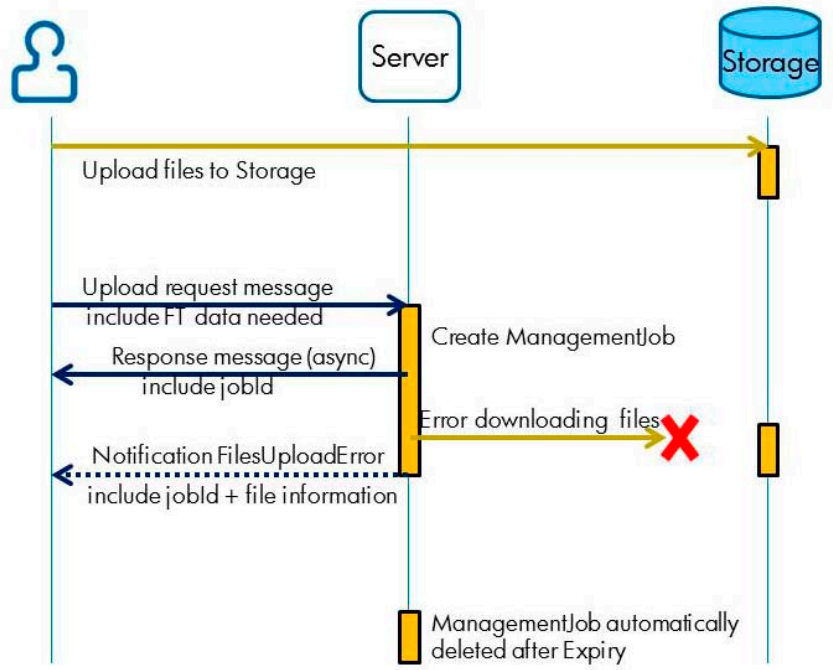
The following diagram is showing the upload file transfer use case:



The client starts by uploading the files to be transferred to some storage location. Once this transfer is completed, it issues an upload request through the interface. The server creates the corresponding job and replies to the request with the jobId as part of the response. The interface request does not have to be a create operation, it will usually be specific for each interface like an import or a download data.

The server downloads the file from the storage and when done sends asynchronously the notification FilesUploaded to the client containing the jobId and the information about the files uploaded. The client can then delete the files at the end of the expiry time.

In case of the server encounters some error during the downlaod of the files, the server will send a FilesUploadError notification for the jobId with the information on the files in error as shown below:



Note that some files might be successfully generated and some not, so it is possible to receive both FilesUploaded and FilesUploadError for different group of files.

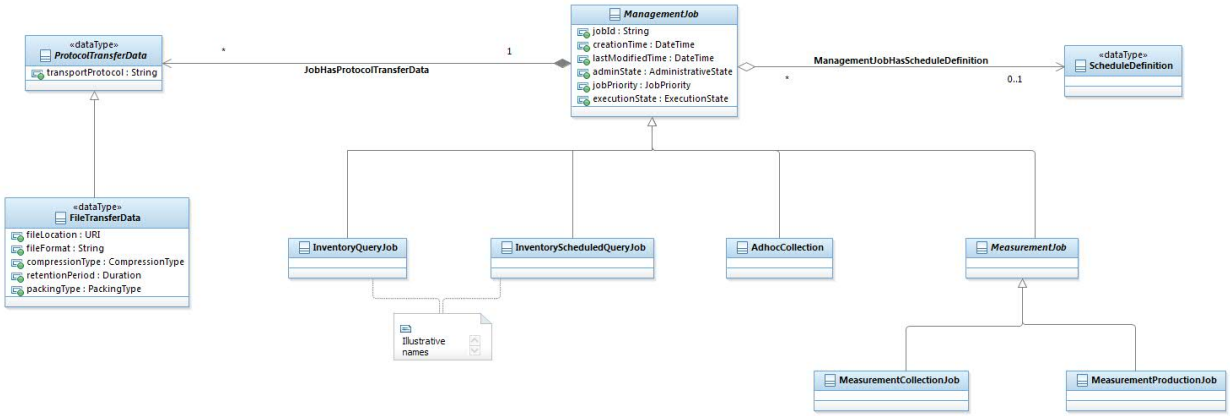
It is recommended to have the server handles automatically the deletion of the Management Job after the expiration of the files (expiry Time). So no delete operation should be offered for upload management jobs.

2.7.2 Management Job

As indicated earlier, Management Job is the support object for a data transfer operation. A Management Job is a management activity that may consist of several steps (related to data transfer) but is performed as a single logical unit.

It can be a one time activity or a regular one. In the latter case, a schedule definition is attached to the management job.

The following figure provides an overview of the ManagementJob:



Note that the inventory job names are illustrative, pending final names.

The ManagementJob is an abstract object and the interface developers using File Transfer would need to define their own job objects extending ManagementJob.

As ManagementJob is an abstract class, no standard operation (create, delete, get, set) is provided. It will be the responsibility of the interface developer to provide the needed common operations on the derived concrete classes.

The ProtocolTransferData and its derived FileTransferData provides the information controlling the file transfer operation.

While a ManagementJob can include multiple protocolTransferData in case multiple data transfer protocols are supported, in the current version, only a single protocolTransfer Data can be provided as only file transfer is supported currently.

The ManagementJob attributes don't store information on the files that were transferred. Only information used to control the file transfer is stored in the ManagementJob. The operation listAvailablefiles, listed later, provides information on the files available for download.

The attributes of the ManagementJob are:

- jobId: the ID of the management job. Datatype: String
- creationTime: the creation time of the management job. Datatype: dateTime
- lastModifiedTime: defines the time when one of the management job attribute was last modified. It is not related to the files being transfered. Datatype: dateTime
- adminState: the administrative state of the management job. Datatype: Enum (AdministrativeState), default=UNLOCKED
- jobPriority: the priority of the management job. The way the management application will use the JobPriority to schedule job execution is application specific and outside of the scope. Datatype: Integrer (range 1 to 10), default=5
- executionState: the execution state of the management job. It is used to indicate a failure in the execution of the job. Datatype: enum (ExecutionState), default = Executing

2.7.3 File Transfer Data

The attributes of the FileTransfer Data object are controlling the file transfer operation:

- transportProtocol: inherited from ProtiocolTransferData. Indicates the protocol that is used to transfer the requested data between the participating applications. Datatype: String, default=FILE_TRANSFER
- fileLocation: URI provided by the requesting OS indicating the rootname of the file(s) to be produced and location of where to place the retrieved file(s). datatype: uri
- fileFormat: Defines the format of the files.. Datatype: String
- compressionType: The type of compression to apply to the generated file(s). Default behavior (when request parameter is omitted) is NO_COMPRESSION. Implementation of this file processing instruction by the Target OS is optional, and any incompatible request shall be handled with the appropriate exception. Datatype: enumeration (NO_COMPRESSION, GZIP, OTHER). Vendor extension of this attribute is permitted, the value OTHER is used to indicate it. Default behavior (when request parameter is omitted) is NO_COMPRESSION.
- retentionPeriod:The maximum duration the files produced by this job will be retained on the producing OS. Datatype: Duration
- packingType: The type of packing to apply to all the file(s) generated from the same request. Implementation of this file processing instruction by the Target OS is optional, and any incompatible request shall be handled with the appropriate exception. Datatype: enumeration (NO_PACKING, ZIP, TAR, OTHER). Vendor extension of this attribute is permitted, the value OTHER is used to indicate it. Default behavior (when request parameter is omitted) is NO_ PACKING.

2.7.4 File Descriptor

The FileDescriptor datatype provides information on file(s) being transferred. It includes the following attributes:

- filename: Provides the file name(s) of the file being transferred. It is possible for the file name to contain a wildcard allowing specifying multiple files with one descriptor. However, the readyTime and expirationTime for all the files matching the wildcarded name should be identical. Datatype: String.
- fileLocation: URI indicating the location of the file(s) being produced. The file location does not include the file name. Datatype: URI.
- readyTime: Indicates the time at which the file(s) is ready for data transfer. The file(s) should not be changed after this time. Datatype: dateTime.
- expirationTime: indicates the time beyond which the file(s) will be deleted by the OS which made it available. By default, the expirationTime should be the readyTime + the retention period. Datatype: dateTime.

2.7.5 File Transfer Notifications

Four notifications are defined for file transfer:

- FilesReady: this notification indicates that the generated files are available and can be downloaded.
- FilesPreparationError: If the server encounters an error while generating the files, it will emit this notification to provide the information on the files in error.
- FilesUploaded: Only used when uploading files to the server. This notification indicates that the server has correctly downloaded the files.

- FileUploadError: Only used when uploading files to the server. If the server encounters an error while downloading the files, it will emit this notification to provide the information on the files that cannot be downloaded.

3. Information Model

Packages available from TIP Common Model:
- org.tmforum.tip.cbe.base
- org.tmforum.tip.cbe.job
- org.tmforum.tip.cbe.time.sched
- org.tmforum.tip.common.exceptions
- org.tmforum.tip.common.notifications
- org.tmforum.tip.resource.res.nrb

3.1. Package org.tmforum.tip.cbe.base

3.1.1. Data Types

3.1.1.1. AttributeValuePair

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Properties:
  This datatype is not extendable

3.1.1.1.1. Attributes

name	datatype	properties	description
attributeName	String	- multiplicity is 0..1 - unique - optional	
attributeValue	String	- multiplicity is 0..1 - unique - optional	

3.1.1.2. CostRate

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Description:
A base / value business entity used to represent a cost per time unit. e.g. $10/hr, 33 pence/min
- Properties:

3.1.1.2.1. Attributes

name	datatype	properties	description
numerator	Money	- multiplicity is 0..1 - unique - optional	
denominator	Duration	- multiplicity is 0..1 - unique - optional	

3.1.1.3. Duration

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Description:
A base / value business entity used to represent a length of time.Duration is a type of Quantity
- Properties:
This datatype is abstract

3.1.1.3.1. Attributes

name	datatype	properties	description
units	String	- multiplicity is 0..1 - unique - optional	
amount	long	- multiplicity is 0..1 - unique - optional	

3.1.1.4. Money

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Description:
A base / value business entity used to represent money
- Properties:

3.1.1.4.1. Attributes

name	datatype	properties	description
units	String	- multiplicity is 0..1 - unique - optional	Currency.
amount	long	- multiplicity is 0..1 - unique - optional	A positive floating point number.

3.1.1.5. Quantity

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Description:
A base / value business entity used to represent measurements.
- Properties:
This datatype is abstract

3.1.1.5.1. Attributes

name	datatype	properties	description
units	String	- multiplicity is 0..1 - unique - optional	The unit of measure for the quantity, such as meters, cubic yards, kilograms [ISO 1000].
amount	long	- multiplicity is 0..1 - unique - optional	

3.1.1.6. Range

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Properties:
This datatype is abstract

3.1.1.6.1. Attributes

name	datatype	properties	description
lowerValue	Quantity	- multiplicity is 0..1 - unique - optional	
upperValue	Quantity	- multiplicity is 0..1 - unique - optional	

3.1.1.7. Rate

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Description:
A base / value business entity used to represent the change in one quantity in terms of another
- Properties:
This datatype is abstract

3.1.1.7.1. Attributes

name	datatype	properties	description
numerator	Quantity	- multiplicity is 0..1 - unique - optional	
denominator	Quantity	- multiplicity is 0..1 - unique - optional	

3.1.1.8. TimePeriod

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.base
- Description:
A base / value business entity used to represent a period of time, between two timepoints
- Properties:

3.1.1.8.1. Attributes

name	datatype	properties	description
startDateTime	dateTime	- multiplicity is 0..1 - unique - optional	An instant of time, starting at the TimePeriod
endDateTime	dateTime	- multiplicity is 0..1 - unique - optional	An instant of time, ending at the TimePeriod

3.1.2. Enumerations

3.1.2.1. DaysOfMonth

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.base
- Properties:

3.1.2.1.1. Literals

name	datatype	properties	description
D_1	String	value is "D_1"	
D_2	String	value is "D_2"	
D_3	String	value is "D_3"	
D_4	String	value is "D_4"	
D_5	String	value is "D_5"	
D_6	String	value is "D_6"	
D_7	String	value is "D_7"	
D_8	String	value is "D_8"	
D_9	String	value is "D_9"	
D_10	String	value is "D_10"	
D_11	String	value is "D_11"	

D_12	String	value is "D_12"	
D_13	String	value is "D_13"	
D_14	String	value is "D_14"	
D_15	String	value is "D_15"	
D_16	String	value is "D_16"	
D_17	String	value is "D_17"	
D_18	String	value is "D_18"	
D_19	String	value is "D_19"	
D_20	String	value is "D_20"	
D_21	String	value is "D_21"	
D_22	String	value is "D_22"	
D_23	String	value is "D_23"	
D_24	String	value is "D_24"	
D_25	String	value is "D_25"	
D_26	String	value is "D_26"	
D_27	String	value is "D_27"	
D_28	String	value is "D_28"	
D_29	String	value is "D_29"	
D_30	String	value is "D_30"	
D_31	String	value is "D_31"	

3.1.2.2. DaysOfWeek

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.base
- Properties:

3.1.2.2.1. Literals

name	datatype	properties	description
Sunday	String	value is "Sunday"	
Monday	String	value is "Monday"	
Tuesday	String	value is "Tuesday"	
Wednesday	String	value is "Wednesday"	
Thursday	String	value is "Thursday"	
Friday	String	value is "Friday"	
Saturday	String	value is "Saturday"	

3.1.2.3. RecurrentInterval

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.base
- Properties:

3.1.2.3.1. Literals

name	datatype	properties	description
RI_1MN	String	value is "RI_1MN"	
RI_5MN	String	value is "RI_5MN"	
RI_15MN	String	value is "RI_15MN"	
RI_30MN	String	value is "RI_30MN"	
RI_1H	String	value is "RI_1H"	
RI_24H	String	value is "RI_24H"	
RI_1M	String	value is "RI_1M"	
NA	String	value is "NA"	

3.2. Package org.tmforum.tip.cbe.job

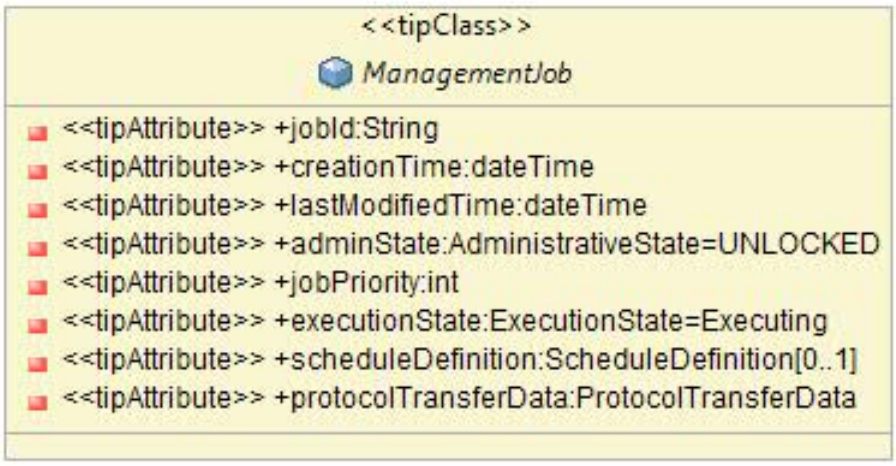
3.2.1. Entities

3.2.1.1. ManagementJob

- Type: Entity Artifact
- Package: org.tmforum.tip.cbe.job
- All super types:
  org.tmforum.tip.internal.entity.EntityBase
- Description:

A Management Job is a management activity that may consist of several steps but is performed as a single logical unit.It can be a one time activity or a regular one. In the latter case , a schedule definition is attached to the management job.

- Properties:
  This entity is abstract
  This entity is mandatory
  This entity is extendable
  This entity does not generate Object Creation notifications (NA)
  This entity does not generate Object Deletion notifications (NA)
  This entity does not generate Object Discovery notifications (NA)



3.2.1.1.1. Attributes

name	datatype	properties	description
jobId	String	- multiplicity is 1 - read only - unique - invariant - mandatory - AVC disabled (NA)	The ID of the management job.
creationTime	dateTime	- multiplicity is 0..1 - read only - unique - invariant - optional - AVC disabled (NA)	The creation time of the management job
lastModifiedTime	dateTime	- multiplicity is 0..1 - read only - unique - optional - AVC enabled	Defines the time when the management job was last modified.
adminState	AdministrativeState	- multiplicity is 0..1 - read only - unique - default value is 'UNLOCKED' - optional - AVC enabled	The administrative state of the management job
jobPriority	int	- multiplicity is 0..1 - unique - default value is '5' - optional - AVC enabled	The priority of the management job.The way the management application will use the JobPriority to schedule job execution is application specific and outside of the scope. Integer, limited to a range of 1 to 10.
executionState	ExecutionState	- multiplicity is 0..1 - unique - default value is 'Executing' - optional - AVC enabled	The execution state of the management job.It is used to indicate a failure in the execution of the job.
scheduleDefinition	ScheduleDefinition	- multiplicity is 0..1 - unique - optional - AVC enabled	If the management job is a regular one, then it will include a schedule definition.Not present for one-time jobs.
protocolTransferData	ProtocolTransferData	- multiplicity is 1 - read only - unique - invariant - mandatory - AVC disabled (NA)	Defines the information required for a data transfer.Based on the transport protocol value(s), the corresponding information classes will be used.
identifer	EntityIdentifier	- multiplicity is 1 - unique - invariant - mandatory - AVC enabled	The entity instance identifier EID.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional - AVC enabled	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.
aliasNames	CheckedCollection	- multiplicity is 0..1 - unique - optional - AVC enabled	The aliasNames attribute contains implementation specific name value pairs for local alternative names for the Entity. This is provided to pass more user friendly names for entities between systems or for debugging. The aliasNames attribute MUST NOT be used by an implimentation when comparing EntityIdentifiers. There is NO GUARANTEE that the contents of the aliasNames attribute is unique.

3.2.1.1.2. Associations

There are no associations (local or inherited) available.

3.2.2. Data Types

3.2.2.1. FileDescriptor

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.job
- Description:

Provides information on file(s) being transferred.

- Properties:

3.2.2.1.1. Attributes

name	datatype	properties	description
fileName	String	- multiplicity is 1 - unique - mandatory	Provides the file name(s) of the file being transferred.It is possible for the file name to contain a wildcard allowing specifying multiple files with one descriptor. However, the readyTime and expirationTime for all the files matching the wildcarded name should be identical.
fileLocation	uri	- multiplicity is 1 - unique - mandatory	URI indicating the location of the file(s) being produced. The file location does not include the file name.
readyTime	dateTime	- multiplicity is 1 - unique - mandatory	Indicates the time at which the file(s) is ready for data transfer. The file(s) should not be changed after this time.
expirationTime	dateTime	- multiplicity is 0..1 - unique - optional	Indicates the time beyond which the file(s) may be deleted by the OS which made it available. By default, the expirationTime should be the readyTime + the retention period.

3.2.2.2. FileTransferData

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.job
- All super types:

    org.tmforum.tip.cbe.job.ProtocolTransferData

- Description:

Defines the information required for a file based data transfer.

- Properties:

3.2.2.2.1. Attributes

name	datatype	properties	description
fileLocation	uri	- multiplicity is 1 - read only - unique - invariant - mandatory	URI provided by the requesting OS indicating the rootname of the file(s) to be produced and location of where to place the retrieved file(s).
fileFormat	String	- multiplicity is 1 - read only - unique - invariant - mandatory	Defines the format of the files.
compressionType	CompressionType	- multiplicity is 0..1 - read only - unique - default value is 'NO_COMPRESSION' - invariant - optional	The type of compression to apply to the generated file(s).Default behavior (when request parameter is omitted) is NO_COMPRESSION.Implementation of this file processing instruction by the Target OS is optional, and any incompatible request shall be handled with the appropriate exception. Vendor extension of this attribute is permitted, the value OTHER is used to indicate it.
retentionPeriod	Duration	- multiplicity is 1 - read only - unique - mandatory	The minimum duration the files produced by this job will be retained on the producing OS.

packingType	PackingType	- multiplicity is 0..1 - read only - unique - default value is 'NO_PACKING' - invariant - optional	The type of packing to apply to all the file(s) generated from the same request.Default behavior (when request parameter is omitted) is NO_ PACKING.Implementation of this file processing instruction by the Target OS is optional, and any incompatible request shall be handled with the appropriate exception. Vendor extension of this attribute is permitted, the value OTHER is used to indicate it.
transportProtocol	String	- multiplicity is 1 - read only - unique - default value is 'FILE_TRANSFER' - invariant - mandatory	The protocol that is used to transfer the requested data between the participating applications.

3.2.2.3. ProtocolTransferData

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.job
- Description:

Defines the information required for a data transfer. It contains information needed for the data transfer, but it does not contain result information, i.e. the list of file produced is not part of this object nor of its descendants.This class acts as a base class for all types of possible data transfers even if currently only File Transfer is supported.

- Properties:

This datatype is abstract

3.2.2.3.1. Attributes

name	datatype	properties	description
transportProtocol	String	- multiplicity is 1 - read only - unique - default value is 'FILE_TRANSFER' - invariant - mandatory	The protocol that is used to transfer the requested data between the participating applications.

3.2.3. Notifications

3.2.3.1. FilesPreparationError

- Type: Event Artifact
- Package: org.tmforum.tip.cbe.job
- All super types:

org.tmforum.tip.common.notifications.CommonNotification

org.tmforum.tip.internal.notifications.NotificationBase

- Description:

This notification is used for File Transfer.If the server encounters an error while generating the files, it will emit this notification to provide the information on the files in error. If the reason OTHER is used, then the description of the preparation error should be provided in the description field.This notification should not be considered as an alarm.The objectId attribute should contain the jobId associated with the ManagementJob to which this notification relates.

- Properties:

This notification is mandatory

3.2.3.1.1. Attributes

name	datatype	properties	description
fileInfo	FileDescriptor	- multiplicity is 0..1 - unique - mandatory	Provides information on the file generating the error.In case no file could be generated, this attribute is empty.
reason	FilePreparationErrorReason	- multiplicity is 1 - unique - mandatory	Detailed reason for the generation failure.If OTHER is used, then the description of the error should be provided.
description	String	- multiplicity is 0..1 - unique - optional	Description text for the file preparation failure.
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.
objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.2.3.2. FilesReady

- Type: Event Artifact
- Package: org.tmforum.tip.cbe.job
- All super types:
  org.tmforum.tip.common.notifications.CommonNotification
  org.tmforum.tip.internal.notifications.NotificationBase
- Description:

This notification is used for File Transfer.Once the server has generated the files to be transfered, it will emit this notification to indicate that the files are available and can be downloaded.The objectId attribute should contain the jobId associated with the ManagementJob to which this notification relates.

- Properties:

  This notification is mandatory

3.2.3.2.1. Attributes

name	datatype	properties	description
fileFormat	String	- multiplicity is 0..1 - unique - optional	Defines the format of the files.
compressionType	CompressionType	- multiplicity is 0..1 - unique - optional	The type of compression to apply to the generated file(s).Default behavior (when request parameter is omitted) is NO_COMPRESSION.Implementation of this file processing instruction by the Target OS is optional, and any incompatible request shall be handled with the appropriate exception. Vendor extension of this attribute is permitted, the value OTHER is used to indicate it.

packingType	PackingType	- multiplicity is 0..1 - unique - optional	The type of packing to apply to all the file(s) generated from the same request.Default behavior (when request parameter is omitted) is NO_ PACKING.Implementation of this file processing instruction by the Target OS is optional, and any incompatible request shall be handled with the appropriate exception. Vendor extension of this attribute is permitted, the value OTHER is used to indicate it.
fileInfo	FileDescriptor	- multiplicity is 1..* - unique - mandatory	Provides information on the files generated and available for download
fileTransferStatus	FileTransferStatus	- multiplicity is 1 - unique - mandatory	Indicates that if this File Transfer is partial/completeScheduled Job: 1 complete per schedule
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.
objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.2.3.3. FilesUploadError

- Type: Event Artifact
- Package: org.tmforum.tip.cbe.job
- All super types:
    org.tmforum.tip.common.notifications.CommonNotification
    org.tmforum.tip.internal.notifications.NotificationBase
- Description:

This notification is used for File Transfer and only when uploading files to the server.If the server encounters an error while downloading the files, it will emit this notification to provide the information on the files that cannot be downloaded. If the reason OTHER is used, then the description of the preparation error should be provided in the description field.
The objectId attribute should contain the jobId associated with the ManagementJob to which this notification relates.This notification is optional, but in case file upload is supported, it is required.

- Properties:
    This notification is optional

3.2.3.3.1. Attributes

name	datatype	properties	description
fileInfo	FileDescriptor	- multiplicity is 0..1 - unique - mandatory	Provides information on the file generating the error.In case no file could be generated, this attribute is empty.
reason	FilePreparationErrorReason	- multiplicity is 1 - unique - mandatory	Detailed reason for the download failure.If OTHER is used, then the description of the error should be provided.
description	String	- multiplicity is 0..1 - unique - optional	Description text for the download failure.
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.

objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.2.3.4. FilesUploaded

- Type: Event Artifact
- Package: org.tmforum.tip.cbe.job
- All super types:
  org.tmforum.tip.common.notifications.CommonNotification
  org.tmforum.tip.internal.notifications.NotificationBase
- Description:
This notification is used for File Transfer and only when uploading files to the server.This notification indicates that the server has correctly downloaded the files.The objectId attribute should contain the jobId associated with the ManagementJob to which this notification relates.This notification is optional, but in case file upload is supported, it is required.
- Properties:
  This notification is optional

3.2.3.4.1. Attributes

name	datatype	properties	description
fileInfo	FileDescriptor	- multiplicity is 1..* - unique - mandatory	Provides information on the files downloaded by the server.
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.
objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.2.4. Enumerations

3.2.4.1. CompressionType

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.job
- Description:
Enumeration of supported compressions.All extensions allowed. The value EXTENSION indicates that the compression type is defined in the extension info.
- Properties:

This enumeration is extendable

3.2.4.1.1. Literals

name	datatype	properties	description
NO_COMPRESSION	String	value is "NO_COMPRESSION"	
GZIP	String	value is "GZIP"	
OTHER	String	value is "OTHER"	

3.2.4.2. ExecutionState

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.job
- Description:
Defines the execution states of a management job. It is possible for an application to support only a subset of the values.
- Properties:

This enumeration is not extendable

3.2.4.2.1. Literals

name	datatype	properties	description
Executing	String	value is "Executing"	
Executing_Active	String	value is "Executing_Active"	
Executing_Idle	String	value is "Executing_Idle"	
Scheduled	String	value is "Scheduled"	
Failed	String	value is "Failed"	
Suspended	String	value is "Suspended"	

3.2.4.3. FilePreparationErrorReason

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.job
- Description:
This datatype provides a set of reason to use in case of file preparation error.
If the value OTHER is used, then the description of the preparation error should be provided in the description field of the event.
- Properties:

3.2.4.3.1. Literals

name	datatype	properties	description
ERROR_IN_PREPARATION	String	value is "ERROR_IN_PREPARATION"	
HARD_DISK_FULL	String	value is "HARD_DISK_FULL"	
HARD_DISK_FAILURE	String	value is "HARD_DISK_FAILURE"	
TOO_MANY_FILES	String	value is "TOO_MANY_FILES"	
COLLECTION_TIMEOUT	String	value is "COLLECTION_TIMEOUT"	

INCOMPLETE_TRUNCATED_FILE	String	value is "INCOMPLETE_TRUNCATED_FILE"	
CORRUPTED_FILE	String	value is "CORRUPTED_FILE"	
LOW_MEMORY	String	value is "LOW_MEMORY"	
DATA_NOT_AVAILABLE	String	value is "DATA_NOT_AVAILABLE"	
OTHER	String	value is "OTHER"	

3.2.4.4. FileTransferStatus

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.job
- Description:
This datatype indicates that if a File Transfer is partial/complete
- Properties:

3.2.4.4.1. Literals

name	datatype	properties	description
PARTIAL	String	value is "PARTIAL"	
COMPLETE	String	value is "COMPLETE"	

3.2.4.5. PackingType

- Type: Enumeration Artifact
- Package: org.tmforum.tip.cbe.job
- Properties:
    This enumeration is extendable

3.2.4.5.1. Literals

name	datatype	properties	description
NO_PACKING	String	value is "NO_PACKING"	
ZIP	String	value is "ZIP"	
TAR	String	value is "TAR"	
OTHER	String	value is "OTHER"	

3.3. Package org.tmforum.tip.cbe.time.sched

3.3.1. Data Types

3.3.1.1. DateScheduleDefinition

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- All super types:
    org.tmforum.tip.cbe.time.sched.ScheduleDefinition
- Description:
The date schedule is used to define a schedule that is based on specific dates, such as December 31st 2015, Feberaury 28th 2013, etc.
- Properties:

3.3.1.1.1. Attributes

name	datatype	properties	description
scheduledDates	dateTime	- multiplicity is 1..* - unique - mandatory	The list of dates when the date schedule definition is active on, e.g.November 1st 2022.

3.3.1.2. FixedScheduleDefinition

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- All super types:
    org.tmforum.tip.cbe.time.sched.ScheduleDefinition
- Description:
The FixedScheduleDefinition entity holds ta list of fixed executions in the sense that each execution has specific time parameters (i.e. starts at a certain date and time).
- Properties:

3.3.1.2.1. Attributes

name	datatype	properties	description
havingFixedScheduleItem	FixedScheduleItem	- multiplicity is 0..* - unique - optional	

3.3.1.3. FixedScheduleItem

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- Description:
The FixedScheduleItem entity holds a list of specific parameters (e.g. start date and time) related to a single execution .
- Properties:

3.3.1.3.1. Attributes

name	datatype	properties	description
fixedScheduleStartTime	dateTime	- multiplicity is 0..1 - unique - optional	The date and time to start a job/activity.
havingScheduledDuration	ScheduledDuration	- multiplicity is 0..1 - unique - optional	

3.3.1.4. MonthlyScheduleDayofMonthDefinition

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- All super types:
    org.tmforum.tip.cbe.time.sched.ScheduleDefinition
- Description:
The monthly schedule by days of month is used to define a schedule that is based on specifying which days of month are requited, e.g. the10th, 20th, 30th of each month.
- Properties:
    This datatype is abstract

3.3.1.4.1. Attributes

name	datatype	properties	description
daysOfMonthRecurrence	DaysOfMonth	- multiplicity is * - unique - mandatory	The list of days of month when the monthly schedule definition is active on, e.g. 10th , 15th , 20th.

3.3.1.5. MonthlyScheduleDayofWeekDefinition

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- All super types:
    org.tmforum.tip.cbe.time.sched.ScheduleDefinition
- Description:
The monthly schedule by days of week is used to define a monthly schedule based on the sequnce of day in a month by specifying its instance, e.g. the 1st Monday of the month.
- Properties:

3.3.1.5.1. Attributes

name	datatype	properties	description
daysOfWeek	DaysOfWeek	- multiplicity is 1..* - unique - mandatory	The list of days of week when the monthly schedule definition is active on, e.g. Monday, Tuesday, etc. This works with the weekly instance (1-5, last) as sprecified in the monthlyDaysOfWeekInstance attribute. For example: the 2nd Monday in a month.

monthlyDaysOfWeekInstance	String	- multiplicity is 1 - unique - mandatory	The instance of a selected day in the monthly schedule definition, 1-5 or "last" instance. For example: the 2nd Monday in a month.This works in conjunction with the daysOfWeek attribute.

3.3.1.6. RecurringScheduleDefinition

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- All super types:

    org.tmforum.tip.cbe.time.sched.ScheduleDefinition

- Description:

The RecurringScheduleDefinition entity holds the parameters related to a schedule that defines recurrent executions.

- Properties:

    This datatype is abstract

3.3.1.6.1. Attributes

name	datatype	properties	description
scheduleDefinitionStartTime	dateTime	- multiplicity is 0..1 - unique - optional	The Start time of the Schedule Definition. If the attribute is empty the Schedule will be active immediately.
scheduleDefinitionEndTime	dateTime	- multiplicity is 0..1 - unique - optional	The Endtime of the Schedule Definition. If the attribute is empty the Schedule run forever, not having a time constraint.
scheduleDefinitionHoursRange	TimePeriod	- multiplicity is 0..1 - unique - optional	A list of time ranges within a specific day that the schedule will be active on, for example 08:00-12:00, 16:00-19:00.
recurringFrequency	RecurrentInterval	- multiplicity is 0..1 - unique - optional	A recurring frequency to run a job within day that is included in schedule definition, for example: every 5 minutes, 15 minuute, 30 minutes, 1 hour.
ScheduleStartOffset	Duration	- multiplicity is 0..1 - unique - optional	This is an offeset relating to the recurring interval. For example, if the recurring interval is 1 hour and the offset is 10 minutes, a job will be executed at 1:10, 2:10, 3:10, etc.
scheduleDefinitionExcludedDates	ScheduleDefinitionExcludedDates	- multiplicity is 0..1 - unique - optional	A list of specific dates that should be excluded from the Schedule Definition.

3.3.1.7. ScheduleDefinition

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- Description:

The Schedule Definition base Entity holds the required parameters for the definition of a schedule that will be attached to jobs.

- Properties:

    This datatype is abstract

3.3.1.7.1. Attributes

There are no attributes (local or inherited) available.

3.3.1.8. ScheduleDefinitionExcludedDates

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- Description:
Excluded dates are dates that should be excluded from the Schedule definition, e.g. the schedule definition will not be active on May 1st 2014.
- Properties:

3.3.1.8.1. Attributes

name	datatype	properties	description
excludedDates	dateTime	- multiplicity is 1..* - unique - mandatory	

3.3.1.9. ScheduledDuration

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- Description:
The Scheduled Duration entity defines a set of parameters related to the duration of a job/activity, such as the planned base duration and possible extensions.
- Properties:

3.3.1.9.1. Attributes

name	datatype	properties	description
baseDuration	Duration	- multiplicity is 0..1 - unique - optional	The expected duration of a job (amount and units).
extensionDuration	Duration	- multiplicity is 0..1 - unique - optional	The duration of the expected extensions.
meanExtensions	int	- multiplicity is 0..1 - unique - optional	The mean number of expected extensions.
maxExtensions	int	- multiplicity is 0..1 - unique - optional	The maximal number of expected extensions.

3.3.1.10. WeeklyScheduleDefinition

- Type: Datatype Artifact
- Package: org.tmforum.tip.cbe.time.sched
- All super types:
    org.tmforum.tip.cbe.time.sched.ScheduleDefinition
- Description:
The weekly schedule is used to define a schedule that is based on the days of the week, e.g. a schedule that will be active only on Monday, Tuesday.
- Properties:

3.3.1.10.1. Attributes

name	datatype	properties	description
daysOfWeekRecurrence	DaysOfWeek	- multiplicity is * - unique - optional	The list of days of week when the weekly schedule definition is active on: e.g. Monday, Tuesday, Wednesday.

3.4. Package org.tmforum.tip.common.exceptions

3.4.1. Exceptions

3.4.1.1. AlreadyInPostCondition

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
    org.tmforum.tip.common.exceptions.CommonException
    org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
in case the operation does not support idempotence, this exception is used to indicate that the server is already in the post-condition that the operation is attempting to define.
- Properties:

3.4.1.1.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.2. AtomicTransactionFailure

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
    org.tmforum.tip.common.exceptions.CommonException
    org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
This exception is raised when an atomic operation does not succeed due to the failure of one of its sub-part. The details would indicate which object/ part failed.
- Properties:

3.4.1.2.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.3. CapacityExceeded

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
    org.tmforum.tip.common.exceptions.CommonException
    org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
This is the type of exception raised when the operation fails due to resources being created or activated beyond the capacity supported by the NE or target OS (the OS to which the operation is directed).
- Properties:

3.4.1.3.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.4. CommonException

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
    org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
This is the root of the TIP Framework user modifiable Exception Heirarchy. All exceptions defined by an interface designer using the TIP Framework should extend from CommonException
- Properties:

3.4.1.4.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.5. Duplicate

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
    org.tmforum.tip.common.exceptions.CommonException
    org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
This exception is thrown if an entity cannot be created because an object with the same identifier/name already exists.
- Properties:

3.4.1.5.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.6. EntityNotFound

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions

- All super types:
  org.tmforum.tip.common.exceptions.CommonException
  org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
This exception is thrown to indicate that the specified entity does not exist.
- Properties:

3.4.1.6.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.7. FilterNotSupported

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
  org.tmforum.tip.common.exceptions.CommonException
  org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
This exception is raised when a filter definition is not supported by the filter. The details might provide more precise reason.
- Properties:

3.4.1.7.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.8. InventoryOutOfSync

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
  org.tmforum.tip.common.exceptions.CommonException
  org.tmforum.tip.internal.exceptions.ExceptionBase

- Description:
This is the type of exception raised when the operation fails due to out of synchronization of inventory between requesting OS (the OS which invokes the operation) and target OS (the OS to which the operation is directed).
- Properties:

3.4.1.8.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.9. NotInValidState

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
    org.tmforum.tip.common.exceptions.CommonException
    org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
The state of the specified object is such that the target OS (the OS to which the operation is directed) cannot perform the request. In other words, the environment or the application is not in an appropriate state for the requested operation.
- Properties:

3.4.1.9.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.10. ObjectInUse

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
    org.tmforum.tip.common.exceptions.CommonException
    org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
The object identified in the request is currently in use.

- Properties:

3.4.1.10.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.4.1.11. UnableToNotify

- Type: Exception Artifact
- Package: org.tmforum.tip.common.exceptions
- All super types:
  org.tmforum.tip.common.exceptions.CommonException
  org.tmforum.tip.internal.exceptions.ExceptionBase
- Description:
The target OS (the OS to which the operation is directed) is unable to connect to the Notification Service.
- Properties:

3.4.1.11.1. Attributes

name	datatype	properties	description
reason	String	- multiplicity is 0..1 - unique - optional	Free string to define the reason the exception was raised. It should be a short text. Might reference the step in the use case where this exception occurs, if a detailed use case was made for this operation.
details	String	- multiplicity = 0..1 - unique - optional	The more specific details about the exception. Can also be a stack trace.

3.5. Package org.tmforum.tip.common.notifications

3.5.1. Notifications

3.5.1.1. AVCNotification

- Type: Event Artifact
- Package: org.tmforum.tip.common.notifications
- All super types:
  org.tmforum.tip.common.notifications.CommonNotification
  org.tmforum.tip.internal.notifications.NotificationBase
- Description:
a generic Attribute Value Change event, ancestor of all specific Attribute Value Change events

- Properties:
  This notification is optional

3.5.1.1.1. Attributes

name	datatype	properties	description
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.
objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.5.1.2. CommonNotification

- Type: Event Artifact
- Package: org.tmforum.tip.common.notifications
- All super types:
  org.tmforum.tip.internal.notifications.NotificationBase
- Description:
This is the root of the TIP Framework user modifiable Notification Heirarchy. All Notifications/Events defined by an interface designer using the TIP Framework should extend from CommonNotification
- Properties:
  This notification is optional

3.5.1.2.1. Attributes

name	datatype	properties	description
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).

3.5.1.3. HeartbeatNotification

- Type: Event Artifact
- Package: org.tmforum.tip.common.notifications
- All super types:
  org.tmforum.tip.internal.notifications.NotificationBase
- Description:
This Notification is used to indicate the state of the notification delivery mechanism between the sending and receiving systems. The sending system shall send out heartbeat notifications to the receiving system on a regular basis so that the receiving system can conclude that it is out of sync (regarding events) if it doesn't receive any heartbeat notifications for some time.

- Properties:

This notification is optional

3.5.1.3.1. Attributes

name	datatype	properties	description
heartbeatPeriod	int	- multiplicity is 1 - unique - mandatory	Defines the heartbeat period in seconds.
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).

3.5.1.4. OCNotification

- Type: Event Artifact
- Package: org.tmforum.tip.common.notifications
- All super types:

org.tmforum.tip.common.notifications.CommonNotification

org.tmforum.tip.internal.notifications.NotificationBase

- Description:

a generic Object Creation event, ancestor of all specific Object Creation events

- Properties:

This notification is optional

3.5.1.4.1. Attributes

name	datatype	properties	description
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.
objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.5.1.5. ODelNotification

- Type: Event Artifact
- Package: org.tmforum.tip.common.notifications
- All super types:

org.tmforum.tip.common.notifications.CommonNotification

org.tmforum.tip.internal.notifications.NotificationBase

- Description:
When an instance of an entity type has been removed, an event of the type will be sent out. in TIP, this is the only common Object Deletion event.
- Properties:
This notification is optional

3.5.1.5.1. Attributes

name	datatype	properties	description
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.
objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.5.1.6. ODisNotification

- Type: Event Artifact
- Package: org.tmforum.tip.common.notifications
- All super types:
org.tmforum.tip.common.notifications.CommonNotification
org.tmforum.tip.internal.notifications.NotificationBase
- Description:
a generic Object Discovery event, ancestor of all specific Object Discovery events
- Properties:
This notification is optional

3.5.1.6.1. Attributes

name	datatype	properties	description
sourceTime	time	- multiplicity is 0..1 - unique - mandatory	The time at which the event was reported by the source system (NE, EMS or OS).
objectId	EntityIdentifier	- multiplicity is 0..1 - unique - mandatory	The identifier of the object associated with the event, as internal opaque identifier.
objectType	String	- multiplicity is 0..1 - unique - mandatory	The type (class) of the object associated with the event. This attribute is needed to allow simple notification filtering based on the object type.
extensionInfo	Any	- multiplicity is 0..1 - unique - optional	A generic list of any type of elements. Used for vendor Extensions or loose element encapsulation from other namespaces.

3.6. Package org.tmforum.tip.resource.res.nrb

3.6.1. Data Types

3.6.1.1. ItuStateAndStatusList

- Type: Datatype Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Description:

This data type contains a list of ITU states and statuses. Each element of the list identifies a state or status and provides its relevant value.See R_TMF518_NRB_I_0004.

- Properties:

This datatype is not extendable

3.6.1.1.1. Attributes

name	datatype	properties	description
M3100_CIRCUIT_PACK_TYPE	String	- multiplicity is 0..1 - unique - optional	
M3100_HOLDER_STATUS	HolderStatus	- multiplicity is 0..1 - unique - optional	
X721_ADMINISTRATIVE_STATE	AdministrativeState	- multiplicity is 0..1 - unique - optional	
X721_AVAILABILITY_STATUS	AvailabilityStatus	- multiplicity is * - unique - optional	
X721_CONTROL_STATUS	ControlStatus	- multiplicity is * - unique - optional	
X721_OPERATIONAL_STATE	OperationalState	- multiplicity is 0..1 - unique - optional	
X721_STATE	State	- multiplicity is * - unique - optional	
X721_UNKNOWN_STATUS	boolean	- multiplicity is 0..1 - unique - optional	
X721_USAGE_STATE	UsageState	- multiplicity is 0..1 - unique - optional	

3.6.1.2. LayerRate

- Type: Datatype Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

This datatype is not extendable

3.6.1.2.1. Attributes

name	datatype	properties	description
layerRateValues	int	- multiplicity is 0..1 - unique - optional	

3.6.1.3. TransmissionParameterList

- Type: Datatype Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

  This datatype is not extendable

3.6.1.3.1. Attributes

name	datatype	properties	description
layerRate	LayerRate	- multiplicity is 0..1 - unique - optional	
transmissionParameterList	AttributeValuePair	- multiplicity is * - unique - optional	

3.6.2. Enumerations

3.6.2.1. AdministrativeState

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.1.1. Literals

name	datatype	properties	description
LOCKED	int	value is 0	
UNLOCKED	int	value is 2	
SHUTTING_DOWN	int	value is 1	

3.6.2.2. AvailabilityStatus

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb

- Properties:

3.6.2.2.1. Literals

name	datatype	properties	description
UNKNOWN	int	value is 0	
IN_TEST	int	value is 4	
FAILED	int	value is 3	
POWER_OFF	int	value is 9	
OFF_LINE	int	value is 8	
OFF_DUTY	int	value is 7	
DEPENDENCY	int	value is 2	
DEGRADED	int	value is 1	
NOT_INSTALLED	int	value is 6	
LOG_FULL	int	value is 5	

3.6.2.3. ControlState

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.3.1. Literals

name	datatype	properties	description
LOCKED	String	value is "LOCKED"	
UNLOCKED	String	value is "UNLOCKED"	

3.6.2.4. ControlStatus

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.4.1. Literals

name	datatype	properties	description
UNKNOWN	int	value is 0	
SUBJECT_TO_TEST	int	value is 3	
PART_OF_SERVICES_LOCKED	int	value is 1	
RESERVED_FOR_TEST	int	value is 2	
SUSPENDED	int	value is 4	

3.6.2.5. HolderStatus

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.5.1. Literals

name	datatype	properties	description
HOLDER_EMPTY	int	value is 1	
IN_THE_ACCEPTABLE_LIST	int	value is 2	
NOT_IN_THE_ACCEPTABLE_LIST	int	value is 3	
UNKNOWN_TYPE	int	value is 0	

3.6.2.6. ObjectSource

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.6.1. Literals

name	datatype	properties	description
NETWORK_ME	int	value is 0	
NETWORK_EMS	int	value is 1	
OS	int	value is 2	
UNKNOWN	int	value is 3	

3.6.2.7. OperationalState

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.7.1. Literals

name	datatype	properties	description
DISABLED	int	value is 0	
ENABLED	int	value is 1	

3.6.2.8. ResourceState

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.8.1. Literals

name	datatype	properties	description
INSTALLING_INSTALLED	int	value is 4	
INSTALLING_DELIVERED	int	value is 3	
INSTALLING_ACCEPTED	int	value is 1	
INSTALLING_UNKNOWN	int	value is 7	
INSTALLING_COMMISSIONED	int	value is 2	
INSTALLING_REJECTED	int	value is 6	
INSTALLING_INTEGRATED	int	value is 5	
NON_WORKING_UNKNOWN	int	value is 8	
PLANNING_PLANNED	int	value is 11	
PLANNING_INITIAL_PLAN	int	value is 9	
PLANNING_UNKNOWN	int	value is 12	
PLANNING_ORDERED	int	value is 10	
RETIRING_DEINSTALLED	int	value is 14	
RETIRING_WITHDRAWN_UNAVAILABLE	int	value is 20	
RETIRING_DEINTEGRATED	int	value is 15	
RETIRING_STORED	int	value is 17	
RETIRING_UNKNOWN	int	value is 18	
RETIRING_RECOVERED	int	value is 16	
RETIRING_WITHDRAWN_ACTIVE	int	value is 19	
RETIRING_DECOMMISSIONED	int	value is 13	
UNKNOWN	int	value is 0	
WORKING_ACTIVATED	int	value is 21	
WORKING_DEACTIVATED	int	value is 22	
WORKING_UNKNOWN	int	value is 23	

3.6.2.9. State

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.9.1. Literals

name	datatype	properties	description
UNKNOWN	int	value is 0	
X721_OPERATIONAL_STATE	int	value is 7	
X721_ADMINISTRATIVE_STATE	int	value is 4	
X721_USAGE_STATE	int	value is 9	
X721_AVAILABILITY_STATUS	int	value is 5	
X721_CONTROL_STATUS	int	value is 6	
M3100_HOLDER_STATUS	int	value is 4	
M3100_ALARM_STATUS	int	value is 1	
M3100_ARC_STATE	int	value is 3	
M3100_ARC_QI_STATUS	int	value is 2	
X721_UNKNOWN_STATUS	int	value is 8	

3.6.2.10. UsageState

- Type: Enumeration Artifact
- Package: org.tmforum.tip.resource.res.nrb
- Properties:

3.6.2.10.1. Literals

name	datatype	properties	description
IDLE	int	value is 2	
ACTIVE	int	value is 0	
BUSY	int	value is 1	

4. Service Interfaces

No service interface is available from TIP Common Model.