



Entity Provisioning API REST Specification

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Direct inquiries to the TM Forum office:

240 Headquarters Plaza,
East Tower – 10th Floor,
Morristown, NJ 07960 USA

Tel No. +1 973 944 5100

Fax No. +1 973 944 5110

TM Forum Web Page: www.tmforum.org

TM Forum Web Page: www.tmforum.org

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INTRODUCTION

The following document is intended to provide details of the REST API for Entity Provisioning i.e. provisioning and lifecycle management of Network Services composed from Physical and Virtual Network Functions.

It is based on the requirements specified in TR255.

SAMPLE USE CASES

Please refer to TR255.

RESOURCE MODEL

Managed Entity and Task Resource Models

Network Service

A network service that is composed from one or many virtual or physical network functions.

```
{
  "id": "34",
  "href": "http://...",
  "name": "Secure Cloud Connect",
  "description": "Secure network connection to cloud services
",
  "type": "",
  "version": "1.2",
  "role": "Access to Amazon",
  "location": {
    "id": "L01237",
    "href": "http://..."
  },
  "autoModification": "scaleStorage",
  "priority": 0,
  "lockState": "locked",
  "state": "planning",
  "adminState": "unknown",
  "operationalState": "unknown",
  "schedule": [
    {
      "id": "SC43891",
      "href": "http://..."
    }
  ],
  "serviceSpecification": {
    "id": "SS0989",
    "href": "http://..."
  },
  "sap": [
    {
      "id": "SAP987",
      "href": "http://..."
    }
  ],
  "serviceCharacteristic": [
    {
      "name": "Bandwidth",
      "value": "10mbps"
    }
  ],
  "serviceRelationship": [
```



```
    {
      "type": "SupportedBy",
      "service": {
        "id": "S3456",
        "href": "http://.."
      }
    }
  ],
  "supportingNetworkFunction": [
    "anyOf": [
      {
        "$ref":
"#/definitions/VNFRef"
      }, {
        "$ref":
"#/definitions/PNFRef"
      }, {
        "$ref":
"#/definitions/VNF"
      }, {
        "$ref":
"#/definitions/PNF"
      }
    ]
  ],
  "relatedParty": [
    {
      "id": "RP4890",
      "role": "Admin",
      "href": "http://.."
    }
  ],
  "supportingService": [
    {
      "id": "SS7865",
      "href": "http://...."
    }
  ],
  "supportingResource": [
    {
      "id": "SR6095",
      "href": "http://..."
    }
  ]
}
```

| Field | Description |
|-------------|---|
| id | Identifier of the network service instance. Required to be unique. Used in URIs as the identifier of the service (for modify or delete use cases) |
| href | Reference to the service |
| name | User friendly moniker for the network service |
| description | A statement concerning the network service |
| type | Type of network service (Redundant as covered by ref to the service specification?) |

| | |
|----------------------------------|---|
| version | Version of the service |
| role | Used when network service is a component of a composite network service and the exact role of the service within the composite is not clear from descriptor/location. |
| location | Location of the network service |
| autoModification | List of the kinds of auto-modifications that are applied to a given network service e.g what can be scaled. |
| priority | Priority of the network service. Decides what happens in a contention scenario. |
| lockState | Is the service locked or available for modification. |
| state | Compound state defined in TR255. |
| adminState | Substate applicable to the Operational state defined in TR255. |
| operationalState | Substate applicable to the Operational state defined in TR255. |
| schedule | Schedule to modify the service to a desired config. |
| serviceSpecification | Specification on which the service is based. |
| sap | Access point of the service. |
| serviceCharacteristic | Type specific attributes of the network service. |
| serviceRelationship | Relationship of this service to any other service. |
| supportingNetworkFunction | Supporting physical or virtual network function by reference or value. |
| relatedParty | List of related parties including their roles. |
| supportingService | List of services that support this network service. |
| supportingResource | List of resources that support this service. |

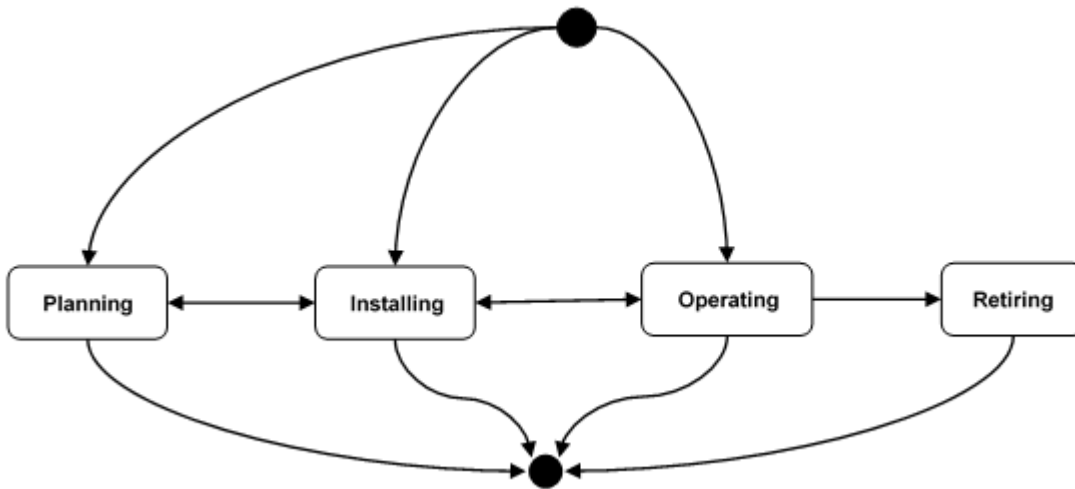


Figure 1 – Network service state model

VNF

A virtual network function.

```
[  
  {  
    "id": 45,  
    "href": "http://...",  
  }  
]
```

```
"name": "Firewall-CP0989",
"description": "Virtual Firewall",
"type": "string",
"version": "1.3",
"role": "LAN security",
"location": {
  "id": "L90987",
  "href": "http://"
},
"managementDomain": "OPS123",
"autoModification": "scaleStorage",
"priority": 0,
"adminState": "unknown",
"operationalState": "unknown",
"usageState": "unknown",
"state": "inactive",
"schedule": [
  {
    "id": "S509",
    "href": "http://.."
  }
],
"resourceSpecification": {
  "id": "R234",
  "href": "http://.."
},
"resourceCharacteristic": [
  {
    "name": "DPI",
    "value": "Yes"
  }
],
"resourceRelationship": [
  {
    "type": "Contains",
    "resource": {
      "id": "R345",
      "href": "http://.."
    }
  }
],
"vnfRelationship": [
  {
    "type": "Adjacent",
    "vnf": {
      "id": "VR639",
      "href": "http://..."
    }
  }
],
"pnfRelationship": [
  {
    "type": "Adjacent",
    "pnf": {
      "id": "PR854",
      "href": "http://..."
    }
  }
]
```

```

    ],
    "relatedParty": [
      {
        "id": "1234",
        "role": "owner",
        "href": "http://.."
      }
    ]
  }
]

```

| Field | Description |
|-------------------------------|---|
| id | Identifier of the VNF instance. Required to be unique. Used in URIs as the identifier of the service (for modify or delete use cases) |
| href | Reference to the VNF |
| name | User friendly moniker for the VNF |
| description | A statement concerning the VNF |
| type | Type of VNF |
| version | Version of the VNF |
| role | Used when VNF is a component of a network service and the exact role of the VNF within the service is not clear from descriptor/location. |
| location | Location of the network service |
| managementDomain | Management domain of the VNF |
| autoModification | List of the kinds of auto-modifications that are applied to a given network service. |
| priority | Priority of the VNF within the network service. |
| state | Compound state defined in TR255. |
| adminState | Substate applicable to the Operational state defined in TR255. |
| operationalState | Substate applicable to the Operational state defined in TR255. |
| usageState | Is the VNF Idle, Active or Busy |
| schedule | Schedule to modify the service to a desired state. |
| resourceSpecification | Specification of the resource on which the VNF is based. |
| resourceCharacteristic | Type specific attributes of the VNF. |
| resourceRelationship | Relationship of this VNF to any other resources. |
| vnfRelationship | Relationship of this VNF to any other VNF in the network service. |
| pnfRelationship | Relationship of this VNF to any other PNF in the network service. |
| relatedParty | List of related parties including their roles. |

PNF

A physical network function.

```

[
  {
    "id": 45,

```

```
"href": "http://..",
"name": "Firewall-CP0989",
"description": "Virtual Firewall",
"type": "string",
"version": "1.3",
"role": "LAN security",
"location": {
  "id": "L90987",
  "href": "http://"
},
"managementDomain": "OPS123",
"autoModification": "scaleStorage",
"priority": 0,
"adminState": "unknown",
"operationalState": "unknown",
"usageState": "unknown",
"state": "inactive",
"schedule": [
  {
    "id": "S509",
    "href": "http://.."
  }
],
"resourceSpecification": {
  "id": "R234",
  "href": "http://.."
},
"resourceCharacteristic": [
  {
    "name": "DPI",
    "value": "Yes"
  }
],
"resourceRelationship": [
  {
    "type": "Contains",
    "resource": {
      "id": "R345",
      "href": "http://.."
    }
  }
],
"vnfRelationship": [
  {
    "type": "Adjacent",
    "vnf": {
      "id": "VR639",
      "href": "http://..."
    }
  }
],
"pnfRelationship": [
  {
    "type": "Adjacent",
    "pnf": {
      "id": "PR854",
      "href": "http://..."
    }
  }
]
```

```
    }
  ],
  "relatedParty": [
    {
      "id": "1234",
      "role": "owner",
      "href": "http://..."
    }
  ]
}
```

| Field | Description |
|-------------------------------|---|
| id | Identifier of the PNF instance. Required to be unique. Used in URIs as the identifier of the service (for modify or delete use cases) |
| href | Reference to the PNF |
| name | User friendly moniker for the PNF |
| description | A statement concerning the PNF |
| type | Type of PNF |
| version | Version of the PNF |
| role | Used when PNF is a component of a network service and the exact role of the PNF within the service is not clear from descriptor/location. |
| location | Location of the network service |
| managementDomain | Management domain of the PNF |
| autoModification | List of the kinds of auto-modifications that are applied to a given network service. |
| priority | Priority of the PNF within the network service. |
| state | Compound state defined in TR255. |
| adminState | Substate applicable to the Operational state defined in TR255. |
| operationalState | Substate applicable to the Operational state defined in TR255. |
| usageState | Is the PNF Idle, Active or Busy |
| schedule | Schedule to modify the service to a desired state. |
| resourceSpecification | Specification of the resource on which the PNF is based. |
| resourceCharacteristic | Type specific attributes of the PNF. |
| resourceRelationship | Relationship of this PNF to any other resources. |
| vnfRelationship | Relationship of this PNF to any other VNF in the network service. |
| pnfRelationship | Relationship of this PNF to any other PNF in the network service. |
| relatedParty | List of related parties including their roles. |

NetworkService/Heal or VNF/Heal – Task Resource

Task resource used to request heal of the network service or VNF.

```
{
  "id": "56",
```

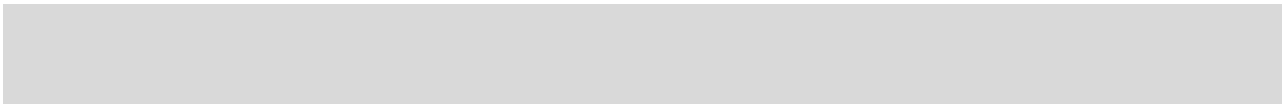
```
"href": "http://..",
"cause": "Logfile Size Exceeded",
"healAction": "Restart",
"healPolicy": "Minimise Network Latency ",
"startTime": "00:00:00",
"additionalParms": [
  {}
],
"healStatus": "In Progress"
}
```

| Field | Description |
|------------------------|---|
| id | Identifier of the Heal task resource. Required to be unique. Used in URLs as the identifier of the Heal task resource |
| href | Reference to the Network Service or the VNF that needs to be healed |
| cause | Reason why the heal is being requested. |
| healAction | Exact action to be taken as part of the heal process or a pointer to a script to be run |
| healPolicy | Reference to the policy to be applied |
| startTime | The time when the heal action needs to commence. This allows a delay to be added. |
| additionalParms | Additional parameters to be sent to the heal action as name value pairs. |
| healStatus | Status of the heal process. |

NetworkService/Scale or VNF/Scale – Task Resource

Task resource used to request scale of the network service or VNF.

```
{
  "id": "string",
  "href": "http://..",
  "type": "ScaleOut",
  "aspectId": "Quick Access Memory",
  "numberOfSteps": 1,
  "additionalParms": [
    {}
  ],
  "schedule": [
    {
      "id": "string",
      "href": "string"
    }
  ],
  "scaleStatus": "In Progress"
}
```



| Field | Description |
|------------------------|---|
| id | Identifier of the Scale task resource. Required to be unique. Used in URIs as the identifier of the Scale task resource |
| href | Reference to the Network Service or the VNF that needs to be scaled |
| type | Type of scale requested i.e. Scale out or Scale up etc. |
| aspectId | Exact action to be taken as part of the scale process |
| numberOfSteps | Number of scaling steps in the direction indicated by type of scale |
| schedule | Schedule for the scale. If not provided then needs to be done immediately |
| additionalParms | Various parameters needed to qualify the scale request. |
| scaleStatus | Status of the scale process. |

NetworkService/Migrate or VNF/Migrate – Task Resource

Task resource used to request migration of the network service or VNF.

```
{
  "id": "90",
  "href": "http://..",
  "adminStateModification": "locked",
  "sapsToRemove": [
    {
      "id": "string",
      "href": "string"
    }
  ],
  "sapsToAdd": [
    {
      "id": "string",
      "href": "string"
    }
  ],
  "priority": 0,
  "startTime": "string",
  "completionMode": "bestEffort",
  "location": "string",
  "characteristics": [
    {}
  ],
  "migrateStatus": "In Progress"
}
```


| Field | Description |
|-------------------------------|---|
| id | Identifier of the Migrate task resource. Required to be unique. Used in URIs as the identifier of the Migrate task resource |
| href | Reference to the Network Service or the VNF that needs to be migrated |
| adminStateModification | Sub-state required before migrate is carried out |
| sapsToRemove | Service Access Points that need to be removed when service is migrated |
| sapsToAdd | Service Access Points that need to be added when service is migrated |
| priority | Priority of the migrate operation. |
| startTime | Start time for the migrate process. Starts immediately if not populated. |
| completionMode | In what mode is the migrate operation to be performed. |
| location | Target location of the network service or VNF |
| characteristics | Additional attributes to pass to the migrate operation |
| migrateStatus | Status of the migrate operation |

Event Models

To be populated in the next version of the document once TR255 is updated.

API OPERATION TEMPLATES

For every single of operation on the entities use the following templates and provide sample REST requests and responses.

Remember that the following Uniform Contract rules must be used :

| Operation on Entities | Uniform API Operation | Description |
|--------------------------------|-----------------------|---|
| Query Entities | GET Resource | GET must be used to retrieve a representation of a resource. |
| Create Entity | POST Resource | POST must be used to create a new resource |
| Partial Update of an Entity | PATCH Resource | PATCH must be used to partially update a resource |
| Complete Update of an Entity | PUT Resource | PUT must be used to completely update a resource identified by its resource URI |
| Remove an Entity | DELETE Resource | DELETE must be used to remove a resource |
| Execute an Action on an Entity | POST on TASK Resource | POST must be used to execute Task Resources |
| Other Request Methods | POST on TASK Resource | GET and POST must not be used to tunnel other request methods. |

Filtering and attribute selection rules are described in the TMF REST Design Guidelines.

Notifications are also described in a subsequent section.

GET /api/NETWORKSERVICE/{ID}

This Uniform Contract operation is used to retrieve the representation a network service.

Note that collections can be retrieved via GET /API/ NETWORKSERVICE with no {ID}

Description :

- This operation is used to retrieve the service information including the ID
- Attribute selection is enabled.

Behavior :

- Status cod 200 – if the request was successful
- Status code 404 Not found – supplied ID does not match a known service

| |
|---|
| REQUEST |
| GET /api/networkService/id123455?fields=relatedParty,field2 ,field3&name=value Accept: application/json |
| RESPONSE |
| 200 Content-Type: application/json <pre>{ "id": "34", "href": "http://...", "name": "Secure Cloud Connect", "description": "Secure network connection to cloud services ", "type": "", "version": "1.2", "role": "Access to Amazon", "location": { "id": "L01237", "href": "http://.." }, "autoModification": "scaleStorage",</pre> |

```
"priority": 0,
"lockState": "locked",
"state": "planning",
"adminState": "unknown",
"operationalState": "unknown",
"schedule": [
  {
    "id": "SC43891",
    "href": "http://.."
  }
],
"serviceSpecification": {
  "id": "SS0989",
  "href": "http://.."
},
"sap": [
  {
    "id": "SAP987",
    "href": "http://..."
  }
],
"serviceCharacteristic": [
  {
    "name": "Bandwidth",
    "value": "10mbps"
  }
],
"serviceRelationship": [
  {
    "type": "SupportedBy",
    "service": {
      "id": "S3456",
      "href": "http://.."
    }
  }
],
"supportingNetworkFunction": [
  {
```

```
        "id": "SS7865",
        "href": http://....
    }
]
,
"relatedParty": [
    {
        "id": "RP4890",
        "role": "Admin",
        "href": "http://.."
    }
],
"supportingService": [
    {
        "id": "SS7865",
        "href": "http://...."
    }
],
"supportingResource": [
    {
        "id": "SR6095",
        "href": "http://..."
    }
]
}
```

Example see TMF REST Design Guidelines.

PATCH API/NETWORKSERVICE/{ID}

This Uniform Contract operation is used to partially update the representation of a network service.

The response of the operation can be sent back synchronously or not.

| Attribute name | Patchable | Rule |
|----------------|-----------|------|
|----------------|-----------|------|

Further document any rules that must be implemented when patching attributes.

| Rule name | Rule/Pre Condition/Side Effects/Post Conditons |
|-----------|--|
|-----------|--|

REQUEST

PATCH API/NETWORKSERVICE/{ID}
Content-type: application/json

```
{
  {
    "id": "34",
    "href": "http://...",
    "name": "Secure Cloud Connect",
    "description": "Secure network connection to cloud services ",
    "type": "",
    "version": "1.2",
    "role": "Access to Amazon",
    "location": {
      "id": "L01237",
      "href": "http://.."
    },
    "autoModification": "scaleStorage",
    "priority": 1,
    "lockState": "locked",
    "state": "planning",
    "adminState": "unknown",
```

```
"operationalState": "unknown",
"schedule": [
  {
    "id": "SC43891",
    "href": "http://.."
  }
],
"serviceSpecification": {
  "id": "SS0989",
  "href": "http://.."
},
"sap": [
  {
    "id": "SAP987",
    "href": "http://..."
  }
],
"serviceCharacteristic": [
  {
    "name": "Bandwidth",
    "value": "10mbps"
  }
],
"serviceRelationship": [
  {
    "type": "SupportedBy",
    "service": {
      "id": "S3456",
      "href": "http://.."
    }
  }
],
"supportingNetworkFunction": [
  {
    "id": "SS7865",
    "href": http://....
  }
]
```



```
,
  "relatedParty": [
    {
      "id": "RP4890",
      "role": "Admin",
      "href": "http://..."
    }
  ],
  "supportingService": [
    {
      "id": "SS7865",
      "href": "http://...."
    }
  ],
  "supportingResource": [
    {
      "id": "SR6095",
      "href": "http://..."
    }
  ]
}
```

RESPONSE

```
201
Content-Type: application/json

{ {
  "id": "34",
  "href": "http://...",
  "name": "Secure Cloud Connect",
  "description": "Secure network connection to cloud services ",
  "type": "",
  "version": "1.2",
  "role": "Access to Amazon",
  "location": {
    "id": "L01237",
    "href": "http://..."
  }
}
```

```
    },
    "autoModification": "scaleStorage",
    "priority": 1,
    "lockState": "locked",
    "state": "planning",
    "adminState": "unknown",
    "operationalState": "unknown",
    "schedule": [
      {
        "id": "SC43891",
        "href": "http://.."
      }
    ],
    "serviceSpecification": {
      "id": "SS0989",
      "href": "http://.."
    },
    "sap": [
      {
        "id": "SAP987",
        "href": "http://..."
      }
    ],
    "serviceCharacteristic": [
      {
        "name": "Bandwidth",
        "value": "10mbps"
      }
    ],
    "serviceRelationship": [
      {
        "type": "SupportedBy",
        "service": {
          "id": "S3456",
          "href": "http://.."
        }
      }
    ],
  ],
```

```
    "supportingNetworkFunction": [
    {
      "id": "SS7865",
      "href": http://....
    }
  ]
  ,
  "relatedParty": [
    {
      "id": "RP4890",
      "role": "Admin",
      "href": "http://.."
    }
  ],
  "supportingService": [
    {
      "id": "SS7865",
      "href": "http://...."
    }
  ],
  "supportingResource": [
    {
      "id": "SR6095",
      "href": "http://..."
    }
  ]
}
```

Example see TMF REST Design Guidelines.

POST API/{RESOURCE}/{ID}

This Uniform Contract operation is used to create a network service. Network Service is a managed entity.

This operation can create the network functions that this network service is composed of or include existing network functions.

Behavior :

- Returns HTTP/1.1 status code 202 accepted if the request was successful.
- A monitor object will be returned that can be queried to get the latest status of the operation.

ID Management :

ID is generated by the operation.

Specify the attributes required when an entity is created (and their default values if not):

| Attribute name | Mandatory | Default | Rule |
|----------------|-----------|---------|------|
| | | | |
| | | | |
| | | | |
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| | | | |

| | | | |
|--|--|--|--|
| | | | |
| | | | |

- Further specify any rules on the creation of the entity

| Rule name | Rule |
|-----------|------|
|-----------|------|

REQUEST

POST API/{RESOURCE}
Content-type: application/json

```
{
  {
    "id": "",
    "href": "",
    "name": "Secure Cloud Connect",
    "description": "Secure network connection to cloud services ",
    "type": "",
    "version": "1.2",
    "role": "Access to Amazon",
    "location": {
      "id": "L01237",
      "href": "http://.."
    },
    "autoModification": "scaleStorage",
    "priority": 0,
    "lockState": "locked",
    "state": "planning",
    "adminState": "unknown",
    "operationalState": "unknown",
    "schedule": [
      {
        "id": "SC43891",
        "href": "http://.."
      }
    ]
  }
}
```

```
    ],
    "serviceSpecification": {
      "id": "SS0989",
      "href": "http://.."
    },
    "sap": [
      {
        "id": "SAP987",
        "href": "http://..."
      }
    ],
    "serviceCharacteristic": [
      {
        "name": "Bandwidth",
        "value": "10mbps"
      }
    ],
    "serviceRelationship": [
      {
        "type": "SupportedBy",
        "service": {
          "id": "S3456",
          "href": "http://.."
        }
      }
    ],
    "supportingNetworkFunction": [
      {
        "id": "SS7865",
        "href": http://....
      }
    ]
  },
  "relatedParty": [
    {
      "id": "RP4890",
      "role": "Admin",
      "href": "http://.."
    }
  ]
}
```

```
    }
  ],
  "supportingService": [
    {
      "id": "SS7865",
      "href": "http://...."
    }
  ],
  "supportingResource": [
    {
      "id": "SR6095",
      "href": "http://..."
    }
  ]
}
```

RESPONSE

202 Accepted
Content-Type: application/json

```
{
//same as in request
}
```

Link: <http://server/api/networkService/monitor/38>;rel-related;title=monitor

Example see TMF REST Design Guidelines.

DELETE API/NETWORKSERVICE/{ID}

This Uniform Contract operation is used to delete a network service.

- The response of the operation can be sent back synchronously or not in case a “monitor” resource hyperlink is given in the response.
- Client can request some functions to be retained post the delete. This can be provided in the URL.

Behavior :

- Returns HTTP/1.1 status code 202 accepted if the request was successful.

- .Returns a monitor object that can be queried to get back the status of the object.

| |
|---|
| REQUEST |
| DELETE API/NETWORKSERVICE/{ID}?retainFunctions="VNF12344,PNF23445" |
| RESPONSE |
| 202 202 Accepted Content-Type: application/json { //same as in request } Link: http://server/api/networkService/monitor/38 ;rel-related;title=monitor |

Example see TMF REST Design Guidelines.

GET /api/VNF/{ID} - VNF can be substituted by PNF.

This Uniform Contract operation is used to retrieve the representation a network function (VNF or PNF).

The details for PNF and VNF are similar and will not be repeated. VNF in the specifications below can be substituted by PNF to get the specifications for operations on a physical network function (PNF).

Note that collections can be retrieved via GET /API/ VNF with no {ID}

Description :

- This operation is used to retrieve the VNF information including the ID
- Attribute selection is enabled.

Behavior :

- Status code 200 – if the request was successful
- Status code 404 Not found – supplied ID does not match a known VNF

| |
|---|
| REQUEST |
| GET /api/VNF/id123455?fields=relatedParty,field2 ,field3&name=value Accept: application/json |
| RESPONSE |
| 200 Content-Type: application/json <pre>[{ "id": 45, "href": "http://..", "name": "Firewall-CP0989", "description": "Virtual Firewall", "type": "string", "version": "1.3", "role": "LAN security", "location": { "id": "L90987", "href": "http://" }, "managementDomain": "OPS123", "autoModification": "scaleStorage", "priority": 0, "adminState": "unknown", "operationalState": "unknown", "usageState": "unknown", "state": "inactive", "schedule": [{ "id": "S509", "href": "http://.." }], "resourceSpecification": { "id": "R234", "href": "http://.." } },]</pre> |

```
"resourceCharacteristic": [
  {
    "name": "DPI",
    "value": "Yes"
  }
],
"resourceRelationship": [
  {
    "type": "Contains",
    "resource": {
      "id": "R345",
      "href": "http://.."
    }
  }
],
"vnfRelationship": [
  {
    "type": "Adjacent",
    "vnf": {
      "id": "VR639",
      "href": "http://..."
    }
  }
],
"pnfRelationship": [
  {
    "type": "Adjacent",
    "pnf": {
      "id": "PR854",
      "href": "http://..."
    }
  }
],
"relatedParty": [
  {
    "id": "1234",
    "role": "owner",
    "href": "http://.."
  }
]
```

```
    }  
  ]  
}  
]
```

Example see TMF REST Design Guidelines.

PATCH API/VNF/{ID} - VNF can be substituted by PNF.

This Uniform Contract operation is used to partially update the representation of a network function.

The response of the operation can be sent back synchronously or not.

| Attribute name | Patchable | Rule |
|----------------|-----------|------|
|----------------|-----------|------|

Further document any rules that must be implemented when patching attributes.

| Rule name | Rule/Pre Condition/Side Effects/Post Conditons |
|-----------|--|
|-----------|--|

REQUEST

```
PATCH API/VNF/{ID}  
Content-type: application/json  
} - VNF CAN BE SUBSTITUTED BY PNF.
```

RESPONSE

201

Content-Type: application/json

```
{ {
  "id": "34",
  "href": "http://...",
  "name": "Secure Cloud Connect",
  "description": "Secure network connection to cloud services ",
  "type": "",
  "version": "1.2",
  "role": "Access to Amazon",
  "location": {
    "id": "L01237",
    "href": "http://..."
  },
  "autoModification": "scaleStorage",
  "priority": 1,
  "lockState": "locked",
  "state": "planning",
  "adminState": "unknown",
  "operationalState": "unknown",
  "schedule": [
    {
      "id": "SC43891",
      "href": "http://..."
    }
  ],
  "serviceSpecification": {
    "id": "SS0989",
    "href": "http://..."
  },
  "sap": [
    {
      "id": "SAP987",
      "href": "http://..."
    }
  ],
}
```

```
"serviceCharacteristic": [
  {
    "name": "Bandwidth",
    "value": "10mbps"
  }
],
"serviceRelationship": [
  {
    "type": "SupportedBy",
    "service": {
      "id": "S3456",
      "href": "http://.."
    }
  }
],
"supportingNetworkFunction": [
  {
    "id": "SS7865",
    "href": http://....
  }
]
,
"relatedParty": [
  {
    "id": "RP4890",
    "role": "Admin",
    "href": "http://.."
  }
],
"supportingService": [
  {
    "id": "SS7865",
    "href": "http://...."
  }
],
"supportingResource": [
  {
    "id": "SR6095",
```

```
        "href": "http://..."
      }
    ]
  }
}
```

Example see TMF REST Design Guidelines.

POST API/VNF/{ID} - VNF can be substituted by PNF.

This Uniform Contract operation is used to create a network function. Network Service is a managed entity.

Behavior :

- Returns HTTP/1.1 status code 202 accepted if the request was successful.
- A monitor object will be returned that can be queried to get the latest status of the operation.

ID Management :

ID is generated by the operation.

Specify the attributes required when an entity is created (and their default values if not):

| Attribute name | Mandatory | Default | Rule |
|----------------|-----------|---------|------|
| | | | |
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| | | | |

- Further specify any rules on the creation of the entity

| Rule name | Rule |
|-----------|------|
|-----------|------|

```
REQUEST  
POST API/VNF  
Content-type: application/json  
  
    {  
        "id": "",  
        "href": "",  
        "name": "Firewall-CP0989",  
        "description": "Virtual Firewall",  
        "type": "string",  
        "version": "1.3",  
        "role": "LAN security",  
        "location": {  
            "id": "L90987",  
            "href": "http://"
```

```
"managementDomain": "OPS123",
"autoModification": "scaleStorage",
"priority": 0,
"adminState": "unknown",
"operationalState": "unknown",
"usageState": "unknown",
"state": "inactive",
"schedule": [
  {
    "id": "S509",
    "href": "http://.."
  }
],
"resourceSpecification": {
  "id": "R234",
  "href": "http://.."
},
"resourceCharacteristic": [
  {
    "name": "DPI",
    "value": "Yes"
  }
],
"resourceRelationship": [
  {
    "type": "Contains",
    "resource": {
      "id": "R345",
      "href": "http://.."
    }
  }
],
"vnfRelationship": [
  {
    "type": "Adjacent",
    "vnf": {
      "id": "VR639",
      "href": "http://..."
    }
  }
]
```



```
    }
  }
],
"pnfRelationship": [
  {
    "type": "Adjacent",
    "pnf": {
      "id": "PR854",
      "href": "http://..."
    }
  }
],
"relatedParty": [
  {
    "id": "1234",
    "role": "owner",
    "href": "http://..."
  }
]
}
```

RESPONSE

202 Accepted
Content-Type: application/json

```
{
//same as in request
}
```

Link: <http://server/api/VNF/monitor/55;rel-related;title=monitor>

Example see TMF REST Design Guidelines.

DELETE API/VNF/{ID} - VNF CAN BE REPLACED BY PNF

This Uniform Contract operation is used to delete a network function.

- The response of the operation can be sent back synchronously or not in case a “monitor” resource hyperlink is given in the response.

- Client can request some functions to be retained post the delete. This can be provided in the URL.

Behavior :

- Returns HTTP/1.1 status code 202 accepted if the request was successful.
- .Returns a monitor object that can be queried to get back the status of the object.

| |
|---|
| REQUEST |
| DELETE API/VNF/{ID} |
| RESPONSE |
| 202 202 Accepted Content-Type: application/json { //same as in request } Link: http://server/api/VNF/monitor/38 ;rel-related;title=monitor |

Example see TMF REST Design Guidelines.

GET /api/NETWORKSERVICE/HEAL{ID} - Network Service can be substituted by VNF.

This Uniform Contract operation is used to retrieve the representation of the “HEAL” task resource. The resource can be created against a NetworkService or VNF.

Description :

- This operation is used to retrieve the Heal task resource information including the ID
- Attribute selection is enabled.

Behavior :

- Status code 200 – if the request was successful
- Status code 404 Not found – supplied ID does not match a known Heal resource

| |
|--|
| REQUEST |
| GET /API/networkService/heal/123455 Accept: application/json |
| RESPONSE |
| 200 Content-Type: application/json <pre>{ "id": "56", "href": "http://..", "cause": "Logfile Size Exceeded", "healAction": "Restart", "healPolicy": "Minimise Network Latency ", "startTime": "00:00:00", "additionalParms": [{}], "healStatus": "In Progress" }</pre> |

Example see TMF REST Design Guidelines.

PATCH API/NETWORKSERVICE/HEAL/{ID} - NetworkService can be substituted by VNF,

This Uniform Contract operation is used to partially update the representation of a Heal task resource.

The response of the operation can be sent back synchronously or not. As the heal action may already be in progress then the patch can be applied on a best effort basis. It may be unsuccessful if the heal action has progressed beyond a certain point.

| Attribute name | Patchable | Rule |
|----------------|-----------|------|
|----------------|-----------|------|

Further document any rules that must be implemented when patching attributes.

| Rule name | Rule/Pre Condition/Side Effects/Post Conditons |
|-----------|--|
|-----------|--|

| REQUEST |
|--|
| <pre>PATCH API/networkService/heal/{ID} Content-type: application/json { "id": "56", "href": "http://..", "cause": "Logfile Size Exceeded", "healAction": "Restart", "healPolicy": "Minimise Network Latency ", "startTime": "00:00:00", "additionalParms": [{}], "healStatus": "In Progress" }</pre> |
| RESPONSE |
| <pre>201 Content-Type: application/json { //Same as request }</pre> |

Example see TMF REST Design Guidelines.

POST API/NETWORKSERVICE/HEAL - Network Service can be substituted by VNF.

This Uniform Contract operation is used to create a Heal task resource. This is an operation to request heal of a network service or a VNF.

Behavior :

- Returns HTTP/1.1 status code 202 accepted if the request was successful.
- A Heal object will be returned that can be queried to get the latest status of the operation.

ID Management :

ID is generated by the operation.

Specify the attributes required when an entity is created (and their default values if not):

| Attribute name | Mandatory | Default | Rule |
|----------------|-----------|---------|------|
| | | | |
| | | | |
| | | | |
| | | | |
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| | | | |
| | | | |

- Further specify any rules on the creation of the entity

| Rule name | Rule |
|-----------|------|
|-----------|------|

| REQUEST |
|---|
| POST API/networkService/Heal Content-type: application/json <pre>{ "id": "", "href": "http://..", "cause": "Logfile Size Exceeded", "healAction": "Restart", "healPolicy": "Minimise Network Latency ", "startTime": "00:00:00", "additionalParms": [{}], "healStatus": "In Progress" }</pre> |
| RESPONSE |
| 202 Accepted Content-Type: application/json <pre>{ "id": "56", "href": "http://..", "cause": "Logfile Size Exceeded", "healAction": "Restart", "healPolicy": "Minimise Network Latency ",</pre> |

```
"startTime": "00:00:00",
"additionalParms": [
  {}
],
"healStatus": "In Progress"
}
```

Example see TMF REST Design Guidelines.

DELETE API/NETWORKSERVICE/HEAL/{ID} - NETWORKSERVICE CAN BE SUBSTITUTED BY VNF

This Uniform Contract operation is used to delete a Heal task resource. This is where a heal may no longer be required on a network service or a VNF because the problem may have been resolved. This operations is performed on a best effort basis and will fail if the heal action has progressed beyond a certain point.

Behavior :

- Returns HTTP/1.1 status code 200 if the request was successful.

| |
|--|
| REQUEST |
| DELETE API/networkService/heal/{ID} |
| RESPONSE |
| 202 Accepted Content-Type: application/json { //same as in request } |

Example see TMF REST Design Guidelines.

GET /api/NETWORKSERVICE/SCALE{ID} - Network Service can be substituted by VNF.

This Uniform Contract operation is used to retrieve the representation of the “SCALE” task resource. The resource can be created against a NetworkService or VNF.

Description :

- This operation is used to retrieve the Scale task resource information including the ID
- Attribute selection is enabled.

Behavior :

- Status code 200 – if the request was successful
- Status code 404 Not found – supplied ID does not match a known Scale resource.

| |
|--|
| REQUEST |
| GET /API/networkService/scale/123455 Accept: application/json |
| RESPONSE |
| 200 Content-Type: application/json <pre>{ "id": "string", "href": "http://.", "type": "ScaleOut", "aspectId": "Quick Access Memory", "numberOfSteps": 1, "additionalParms": [{}], "schedule": [{ "id": "string", "href": "string"</pre> |


```
    }  
  ],  
  "scaleStatus": "In Progress"  
}
```

Example see TMF REST Design Guidelines.

PATCH API/**NETWORKSERVICE/SCALE/{ID}** - NetworkService can be substituted by VNF,

This Uniform Contract operation is used to partially update the representation of a Scale task resource.

The response of the operation can be sent back synchronously or not. As the Scale action may already be in progress then the patch can be applied on a best effort basis. It may be unsuccessful if the Scale action has progressed beyond a certain point.

| Attribute name | Patchable | Rule |
|----------------|-----------|------|
|----------------|-----------|------|

Further document any rules that must be implemented when patching attributes.

| Rule name | Rule/Pre Condition/Side Effects/Post Conditons |
|-----------|--|
|-----------|--|

REQUEST

PATCH API/networkService/scale/{ID}
Content-type: application/json

```
{
  "id": "string",
  "href": "http://.",
  "type": "ScaleOut",
  "aspectId": "Quick Access Memory",
  "numberOfSteps": 1,
  "additionalParms": [
    {}
  ],
  "schedule": [
    {
      "id": "string",
      "href": "string"
    }
  ],
  "scaleStatus": "In Progress"
}
```

RESPONSE

```
201
Content-Type: application/json
{
//Same as request
}
```

Example see TMF REST Design Guidelines.

POST API/NETWORKSERVICE/SCALE - Network Service can be substituted by VNF.

This Uniform Contract operation is used to create a Scale task resource. This is an operation to request Scale of a network service or a VNF.

Behavior :

- Returns HTTP/1.1 status code 202 accepted if the request was successful.
- A Scale object will be returned that can be queried to get the latest status of the operation.

REQUEST

POST API/networkService/scale
Content-type: application/json

```
{
  "id": "",
  "href": "http://..",
  "cause": "Logfile Size Exceeded",
  "ScaleAction": "Restart",
  "ScalePolicy": "Minimise Network Latency ",
  "startTime": "00:00:00",
  "additionalParms": [
    {}
  ],
  "ScaleStatus": "In Progress"
}
```

RESPONSE

202 Accepted
Content-Type: application/json

```
{
  {
    "id": "string",
    "href": "http://..",
    "type": "ScaleOut",
    "aspectId": "Quick Access Memory",
    "numberOfSteps": 1,
    "additionalParms": [
      {}
    ],
    "schedule": [
      {
        "id": "string",
        "href": "string"
      }
    ],
    "scaleStatus": "In Progress"
  }
}
```

```
}  
}
```

Example see TMF REST Design Guidelines.

DELETE API/NETWORKSERVICE/SCALE/{ID} - NETWORKSERVICE CAN BE SUBSTITUTED BY VNF

This Uniform Contract operation is used to delete a Scale task resource. This is where a Scale may no longer be required on a network service or a VNF because the problem may have been resolved. This operation is performed on a best effort basis and will fail if the Scale action has progressed beyond a certain point.

Behavior :

- Returns HTTP/1.1 status code 200 if the request was successful.

| |
|--|
| REQUEST |
| DELETE API/networkService/scale/{ID} |
| RESPONSE |
| 202 Accepted Content-Type: application/json { //same as in request } |

Example see TMF REST Design Guidelines.

GET /api/NETWORKSERVICE/MIGRATE{ID} - Network Service can be substituted by VNF.

This Uniform Contract operation is used to retrieve the representation of the “MIGRATE” task resource. The resource can be created against a NetworkService or VNF.

Description :

- This operation is used to retrieve the Migrate task resource information including the ID
- Attribute selection is enabled.

Behavior :

- Status code 200 – if the request was successful
- Status code 404 Not found – supplied ID does not match a known Migrate task resource

| |
|---|
| REQUEST |
| GET /API/networkService/migrate/123455 Accept: application/json |
| RESPONSE |
| 200 Content-Type: application/json <pre>{ "id": "90", "href": "http://..", "adminStateModification": "locked", "sapsToRemove": [{ "id": "string", "href": "string" }], "sapsToAdd": [{ "id": "string", "href": "string" }], "priority": 0, "startTime": "string",</pre> |

```
    "completionMode": "bestEffort",
    "location": "string",
    "characteristics": [
      {}
    ],
    "migrateStatus": "In Progress"
  }
```

Example see TMF REST Design Guidelines.

PATCH API/NETWORKSERVICE/MIGRATE/{ID} - NetworkService can be substituted by VNF,

This Uniform Contract operation is used to partially update the representation of a Migrate task resource.

The response of the operation can be sent back synchronously or not. As the Migrate action may already be in progress then the patch can be applied on a best effort basis. It may be unsuccessful if the Migrate action has progressed beyond a certain point.

| Attribute name | Patchable | Rule |
|----------------|-----------|------|
|----------------|-----------|------|

Further document any rules that must be implemented when patching attributes.

| Rule name | Rule/Pre Condition/Side Effects/Post Conditons |
|-----------|--|
|-----------|--|

| REQUEST |
|--|
| <pre>PATCH API/networkService/migrate/{ID} Content-type: application/json { "id": "90", "href": "http://..", "adminStateModification": "locked", "sapsToRemove": [{ "id": "string", "href": "string" }], "sapsToAdd": [{ "id": "string", "href": "string" }], "priority": 0, "startTime": "string", "completionMode": "bestEffort", "location": "string", "characteristics": [{}], "migrateStatus": "In Progress" }</pre> |
| RESPONSE |
| <pre>201 Content-Type: application/json { //Same as request }</pre> |

Example see TMF REST Design Guidelines.

POST API/NETWORKSERVICE/MIGRATE - Network Service can be substituted by VNF.

This Uniform Contract operation is used to create a Migrate task resource. This is an operation to request Migrate of a network service or a VNF.

Behavior :

- Returns HTTP/1.1 status code 202 accepted if the request was successful.
- A Migrate object will be returned that can be queried to get the latest status of the operation.

ID Management :

ID is generated by the operation.

Specify the attributes required when an entity is created (and their default values if not):

| Attribute name | Mandatory | Default | Rule |
|----------------|-----------|---------|------|
| | | | |
| | | | |
| | | | |
| | | | |
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| | | | |
| | | | |
| | | | |

- Further specify any rules on the creation of the entity

| Rule name | Rule |
|-----------|------|
|-----------|------|

REQUEST

POST API/networkService/migrate
Content-type: application/json

```
{
  "id": "90",
  "href": "http://..",
  "adminStateModification": "locked",
  "sapsToRemove": [
    {
      "id": "string",
      "href": "string"
    }
  ],
  "sapsToAdd": [
    {
      "id": "string",
      "href": "string"
    }
  ],
  "priority": 0,
  "startTime": "string",
  "completionMode": "bestEffort",
  "location": "string",
  "characteristics": [
    {}
  ]
}
```

```
    ],  
    "migrateStatus": "In Progress"  
  }  
}
```

RESPONSE

202 Accepted
Content-Type: application/json

```
{  
  "id": "90",  
  "href": "http://..",  
  "adminStateModification": "locked",  
  "sapsToRemove": [  
    {  
      "id": "string",  
      "href": "string"  
    }  
  ],  
  "sapsToAdd": [  
    {  
      "id": "string",  
      "href": "string"  
    }  
  ],  
  "priority": 0,  
  "startTime": "string",  
  "completionMode": "bestEffort",  
  "location": "string",  
  "characteristics": [  
    {}  
  ],  
  "migrateStatus": "In Progress"  
}
```

Example see TMF REST Design Guidelines.

DELETE API/NETWORKSERVICE/MIGRATE/{ID} - NETWORKSERVICE CAN BE SUBSTITUTED BY VNF

This Uniform Contract operation is used to delete a Migrate task resource. This is where a Migrate may no longer be required on a network service or a VNF because the problem may have been resolved. This operation is performed on a best effort basis and will fail if the Migrate action has progressed beyond a certain point.

Behavior :

- Returns HTTP/1.1 status code 200 if the request was successful.

| REQUEST |
|--|
| DELETE API/networkService/migrate/{ID} |
| RESPONSE |
| 202 Accepted Content-Type: application/json { //same as in request } |

Example see TMF REST Design Guidelines.

API NOTIFICATION TEMPLATES

For every single of operation on the entities use the following templates and provide sample REST notification POST calls.

It is assumed that the Pub/Sub uses the Register and UnRegister mechanisms described in the REST Guidelines reproduced below.

REGISTER LISTENER POST /HUB

Description :

Sets the communication endpoint address the service instance must use to deliver information about its health state, execution state, failures and metrics. Subsequent POST calls will be rejected by the service if it does not support multiple listeners. In this case DELETE /api/hub/{id} must be called before an endpoint can be created again.

Behavior :

Returns HTTP/1.1 status code 204 if the request was successful.

Returns HTTP/1.1 status code 409 if request is not successful.

| REQUEST |
|--|
| POST /api/hub Accept: application/json <code>{"callback": "http://in.listener.com"}</code> |
| RESPONSE |
| 201 Content-Type: application/json Location: /api/hub/42 <code>{"id": "42", "callback": "http://in.listener.com", "query": null}</code> |

UNREGISTER LISTENER DELETE HUB/{ID}

Description :

Clears the communication endpoint address that was set by creating the Hub.

Behavior :

Returns HTTP/1.1 status code 204 if the request was successful.

Returns HTTP/1.1 status code 404 if the resource is not found.

| REQUEST |
|--|
| DELETE /api/hub/{id} Accept: application/json |
| RESPONSE |
| 204 |

PUBLISH {EVENTTYPE} POST /LISTENER

Description :

Provide the Event description

Behavior :

Returns HTTP/1.1 status code 201 if the service is able to set the configuration.

| REQUEST |
|--|
| POST /client/listener Accept: application/json { "event": { |

EVENT BODY

```
    },  
    "eventType": "eventType"  
}
```

RESPONSE

201
Content-Type: application/json

Example see TMF REST Design Guidelines.

RELEASE HISTORY

| Release Number | Date | Release led by: | Description |
|----------------|------------|--|---|
| Release 1.0 | 11/14/2016 | Milind Bhagwat BT plc milind.2.bhagwat@bt.com | First Release of Draft Version of the Document. |
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