HPE NFV Director

On-Boarding Guide Operations: Deploy of a Tenant

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Second Edition

Hewlett Packard Enterprise

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Preface

About this guide

This Guide is intended to explain and guide the user through the deployment of a Tenant

Audience

This document is targeting any user level of NFV Director: Domain users, Organization Users, Tenant Users, Group Users and Datacenter users.

For On boarding VNFs please refer to VNF On-Boarding Guide

Document history

Table 1: Document history

Edition	Date	Description
2.0	30 August 2016	First Edition

Chapter 1 Deploy of a Tenant.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

** If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE.
FIND.Status== INSTANTIATED.
FIND.Path==

VIRTUAL_MACHINE**>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION**

>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

Chapter 2 Specific Elements of the TLD Deploy Tenant.

In this chapter the different elements of the specific TLD will be explained conscientiously.

2.1 TLD DEPLOY_TENANT: Quota Assignment Task.

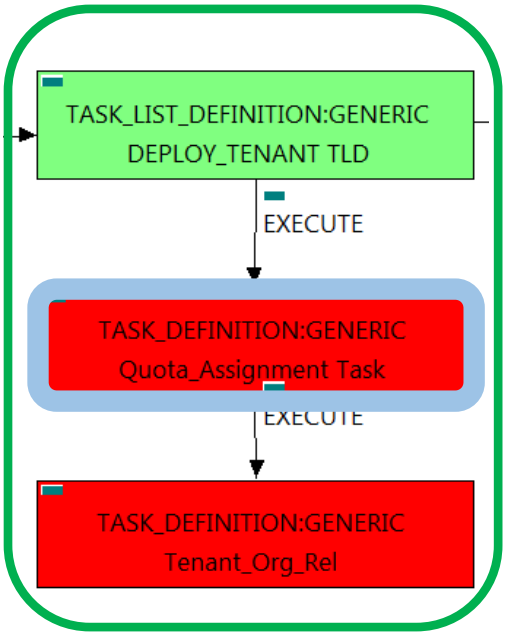

Figure 1: Quota Assignment task.

The TDs that have present in the their names “Assignment”, are Task Definitions responsible of the assignation of resources for an specific artifact, in the case of the quotas, the TLD it is going to assign an amount of each resource needed for the correct execution of the deployment.

Once finished, our VNF should have every quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment. This is crucial, because our component consume quotas during the execution of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Quota_Assignment Task
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
“WF_NFVD_ASSIGNMENT_QUOTA”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false
INPUT_MAPPING.MAPPING_LIST ==
assignmentRelationshipID=Quota_Assignment;
resourceTreeID=nfvd#quotaResourceID

The Workflow present in EXECUTE.Workflow it is going to seek the artifact identified by the Id given, this id should belong to an artifact TENANT:GENERIC in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow will assign all the resources needed by the TENANT:GENERIC to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

The assignation of resources it uses another WF that it is called from our workflow, “WF_NFVD_ASSIGN_RESOURCES”.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute “number_of_retries” set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

2.2 TLD DEPLOY_TENANT: Tenant_Org_Rel.

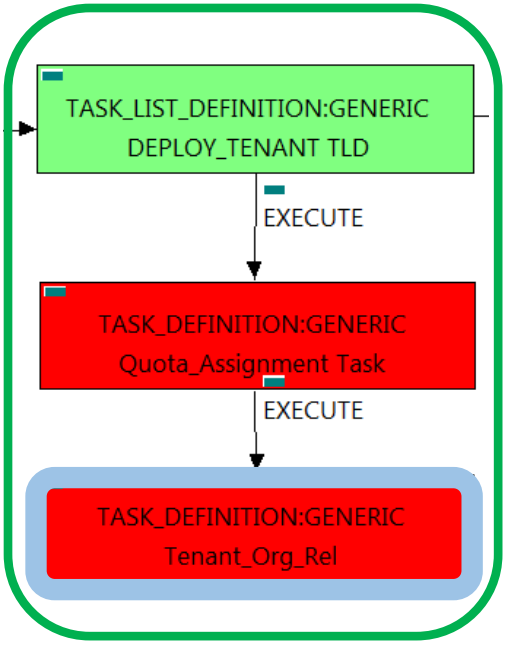

Figure 2: Creation of specific Quota for Tenant.

The TDs that have present in their names “Assignment”, are Task Definitions responsible of the assignation of resources for a specific artifact or deploy, in this case, we are looking for a TENANT to assign the Quotas “Compute” needed for the future deployment. In order to have a successful assignation we must have in our TLD Deploy TENANT an artifact POLICY: ASSIGMENT_RELATIONSHIP, with a GENERAL.Name==”Resource_Assigment”, also this artifact must be related with the OPERATION_GROUP: GENERIC of our TLD with a relationship of type PROVIDES and status ENABLED.

Once finished, our TENANT should have every Quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Tenant_Org_Rel
EXECUTE.Workflow ==	**“WF_NFVD_CREATE_QUOTA_ORG_TENANT_REL”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false
INPUT_MAPPING.MAPPING_LIST ==	**resourceTreeID=nfvd#currentArtifactID**

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow assign all the Quotas “Compute” needed by the TENANT:GENERIC to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute “number_of_retries” set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so no action taken.

Due to that the value of the attribute DATA.Lock is false, the artifact will be left without be blocked.

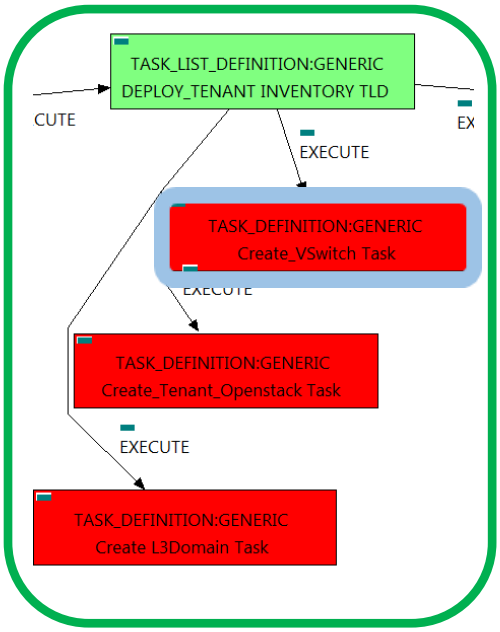

Figure 3 : Provision of a Virtual Switch.

2.3 TLD DEPLOY_TENANT_INVENTORY: Create_VSwitch task..

The TDs that have present in the their names “Provision” or “Create”, are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an “VSWITCH:VCENTER”, also it will be checked and created the relationship of type “ACCESS” with the artifact “PORT:GENERIC” child of a “SERVER:GENERIC”, this means, when this workflow finish, we will have a new artifact properly stored in our DDBB, one “VSWITCH:VCENTER” with status INSTANTIATED, and a relationship of type “ACCESS” between the artifact and the port. Due to the nature of the artifact, the artifact will not be duplicated if already exists for the specified VCENTER.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create_VSwitch Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow == **“WF_TS_PROVISION_VSWITCH”**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow== **“WF_TS_PROVISION_SDN_DOMAIN_UNDO”**
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow will query looking for an artifact Hypervisor of the type VCENTER to start the provisioning of the specific VSwitch, in case such artifact exist in our DDBB, the workflow will start a secondary workflow, this one is the responsible of the rest of the configurations needed to have properly instantiated the artifact VSwitch, the name of this workflow is: “WF_TS_PROVISION_VSWITCH_VCENTER”.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute “number_of_retries” set the number of rollback attempts. In this case, the TLD has assigned the rollback workflow “WF_TS_PROVISION_SDN_DOMAIN_UNDO”. For this TD the behavior set is “STOP”, if an error take place in this TD , no action will be taken, the execution of the TLD will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact VSwitch recently provisioned, will be blocked.

2.4 TLD DEPLOY_TENANT_INVENTORY: Create_Tenant_Openstack Task..

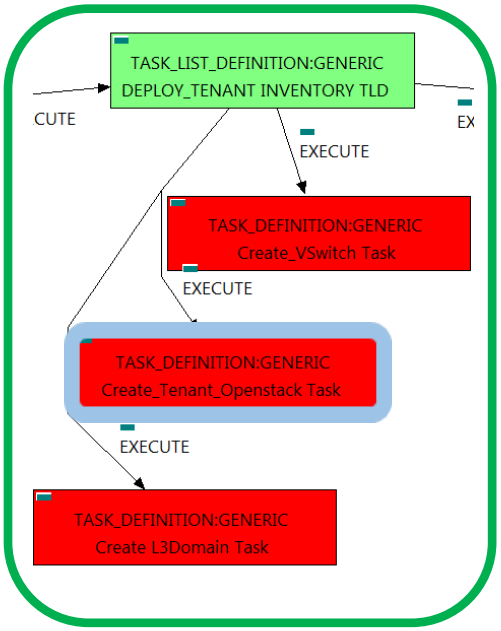

Figure 4: Creation of Tenant:Openstack artifact.

The TDs that have present in the their names “Provision”, are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an “TENANT:OPENSTACK”, this means, when this workflow finish, we will have a new artifact “TENANT:OPENSTACK” in our DDBB, as well, due to the nature of the artifact, the artifact will be prepared to be activated in the platform Openstack when will be required.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	Create_Tenant_Openstack Task
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_TENANT”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow create an artifact “TENANT:OPENSTACK” with status INSTANTIATED.

The WorkFlow also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

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2.5 TLD DEPLOY_TENANT_INVENTORY: Create_L3Domain Task..

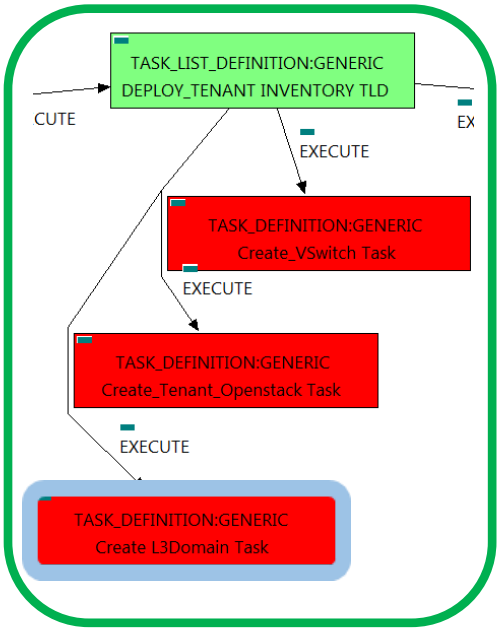

Figure 5: Creation of the L3Domain and L3Domain template artifacts.

The TDs that have present in the their names “Provision”, are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an “L3DOMAIN:DCN” and a “L3DOMAIN:TEMPALTE:DCN”, this means, when this workflow finish, we will have two new artifacts properly stored in our DDBB, one “L3DOMAIN:DCN” and one“L3DOMAIN:TEMPLATE:DCN” with status INSTANTIATED, and a relationship of type “USE” between them. Due to the nature of the artifact, the artifact will be prepared to be activated in the platform VSD when will be required.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create L3Domain Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow ==
“WF_TS_PROVISION_SDN_DOMAIN”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
“WF_TS_PROVISION_SDN_DOMAIN_UNDO”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow create a L3DOMAIN:DCN, and a L3DOMAIN:TEMPLATE:DCN artifacts

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_PROVISION_SDN_DOMAIN_UNDO”, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

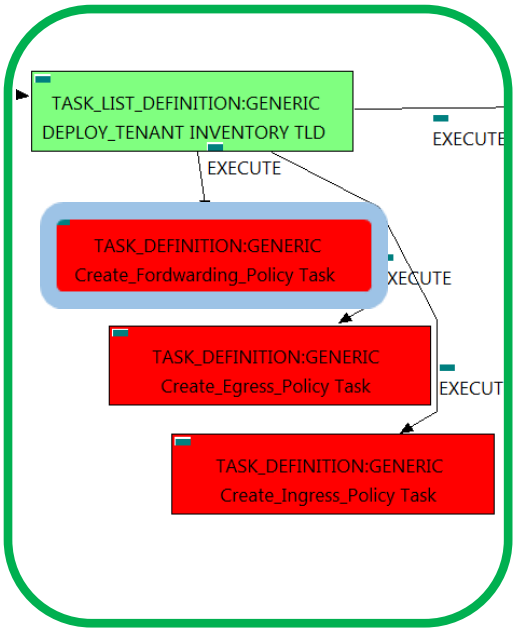

Figure 6: Creation of the Forwarding Policies.

2.6 DEPLOY_TENANT_INVENTORY TLD: Create_Forwarding_Policy Task..

This TD it is going to provision a INGRESSADVFORWARD:TEMPLATE:DCN policies, this means, the WF implied in this TLD is going to query from TENANT:GENERIC through the SDN_CONTROLLER reaching the L3DOMAIN:DCN to create the policy. Once the TD has the artifact that it is going to act as parent, the TD will start to validate some attributes present in those artifacts in order to create the policy INGRESSADVFORWARD:TEMPLATE:DCN related to policy L3DOMAIN:DCN with a relationship of type MANAGE and status ENABLED.

Once finished, we will have provisioned an INGRESSADVFORWARD:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required, a relationship of type MANAGE between our L3DOMAIN and the policy INGRESSADVFORWARD recently created.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create_Fordwarding_Policy Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow ==
“WF_TS_PROVISION_SDN_FORWARD_POLICIES”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
“WF_TS_PROVISION_SDN_FORWARD_POLICIES_UNDO”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start the provisioning, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_PROVISION_SDN_FORWARD_POLICIES_UNDO”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

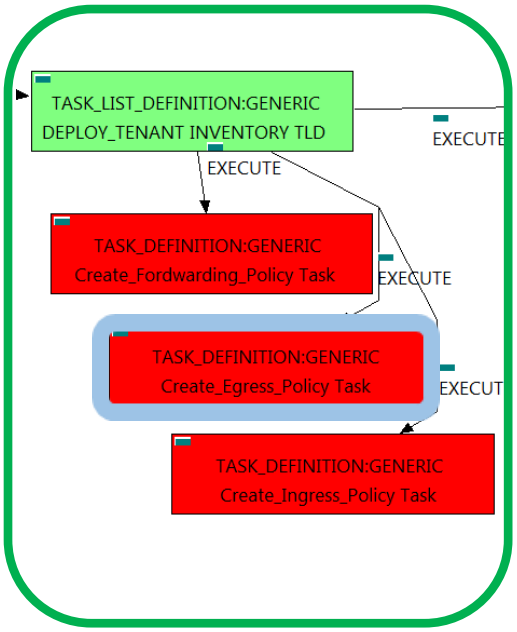

Figure 7: Creation of the Egress Policies.

2.7 DEPLOY_TENANT_INVENTORY TLD: Create_Egress_Policy Task..

This TD it is going to provision a EGRESSACL:TEMPLATE:DCN policies, this means, the WF implied in this TLD is going to query from TENANT:GENERIC through the SDN_CONTROLLER reaching the L3DOMAIN:DCN to create the policy. Once the TD has the artifact that it is going to act as parent, the TD will start to validate some attributes present in those artifacts in order to create the policy EGRESSACL:TEMPLATE:DCN related to policy L3DOMAIN:DCN with a relationship of type MANAGE and status ENABLED.

Once finished, we will have provisioned an EGRESSACL:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required, a relationship of type MANAGE between our L3DOMAIN and the policy EGRESSACL recently created.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Create_Egress_Policy Task
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_SDN_EGRESSACL_POLICIES”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**“WF_TS_PROVISION_SDN_EGRESSACL_POLICIES_UNDO”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start the provisioning of the EGRESSSACL policies for the Tenant, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_PROVISION_SDN_EGRESSACL_POLICIES_UNDO”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

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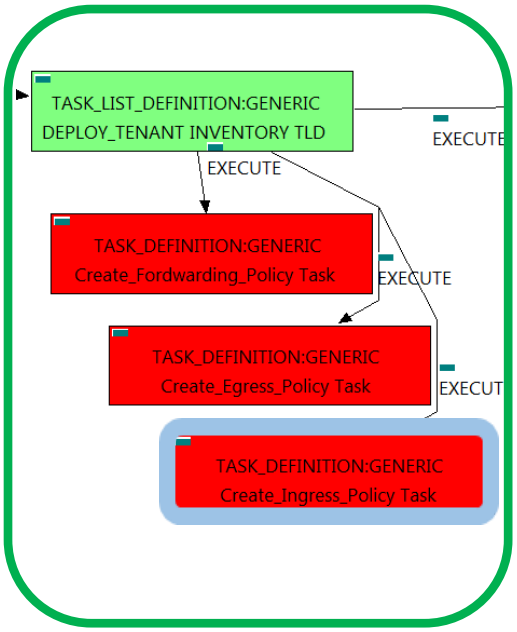


Figure 8: Creation of the Ingress Policies for Tenant.

2.8 DEPLOY_TENANT_INVENTORY TLD: Create_Ingress_Policy Task..

This TD it is going to provision a INGRESSACL:TEMPLATE:DCN policies, this means, the WF implied in this TLD is going to query from TENANT:GENERIC through the SDN_CONTROLLER reaching the L3DOMAIN:DCN to create the policy. Once the TD has the artifact that it is going to act as parent, the TD will start to validate some attributes present in those artifacts in order to create the policy INGRESSACL:TEMPLATE:DCN related to policy L3DOMAIN:DCN with a relationship of type MANAGE and status ENABLED.

Once finished, we will have provisioned an INGRESSACL:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required, a relationship of type MANAGE between our L3DOMAIN and the policy INGRESSACL recently created.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Create_Ingress_Policy Task
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_SDN_INGRESSACL_POLICIES”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**“WF_TS_PROVISION_SDN_INGRESSACL_POLICIES_UNDO”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start the provisioning of the INGRESSSACL policies for the Tenant, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_PROVISION_SDN_INGRESSACL_POLICIES_UNDO”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

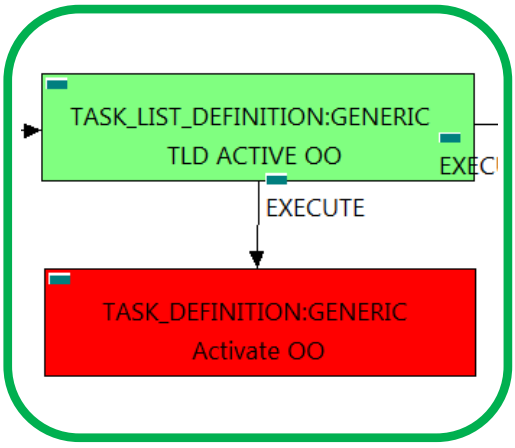


Figure 9 : Activation of the OO for Tenant.

2.9 . TLD ACTIVE OO: Activate OO.

The TDs that have present in their names “Check”, are Task Definitions that validate the configuration of an artifact, in this case, the configuration of the IMAGE present in our DCs, the workflow will check, validate, and in case of need, deploy the IMAGE related with the VMs present in our DC.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Activate OO
FIND.Condition ==	status==constant:INSTANTIATED
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_OO_TENANT”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start.This workflow it is going to query and update the entity given, in this case, Tenant, with the values needed for the correct behavior of the users with the specific entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute “number_of_retries” set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so no action taken.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

2.10 . TLD ACTIVE: Activate_VSwitch task.

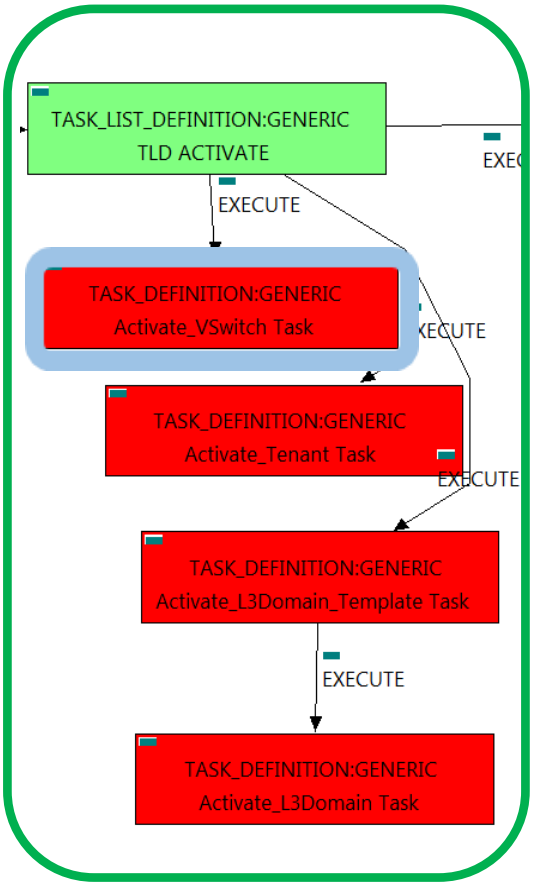


Figure 10: Activation of a VSwitch artifact.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “VSWITCH:VCENTER”, this means, when this workflow finish, we will have a VSWITCH:VCENTER with status ACTIVE in our platform.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_VSwitch Task
FIND.MainArtifact ==
TENANT>RESOURCE_POOL>DATACENTER>
HYPERVISOR>SERVER>
VSWITCH:VCENTER#GENERAL.Name=NFVD
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_VSWITCH_VCENTER”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
“WF_TS_DEACTIVATE_SDN_L3DOMAIN”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VSWITCH:VCENTER that match the FIND.MainArtifact attribute with value “GENERAL.Name==NFVD” in Status INSTANTIATED in the DDBB, notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_L3DOMAIN”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

2.11 . TLD ACTIVE: Activate_Tenant task.

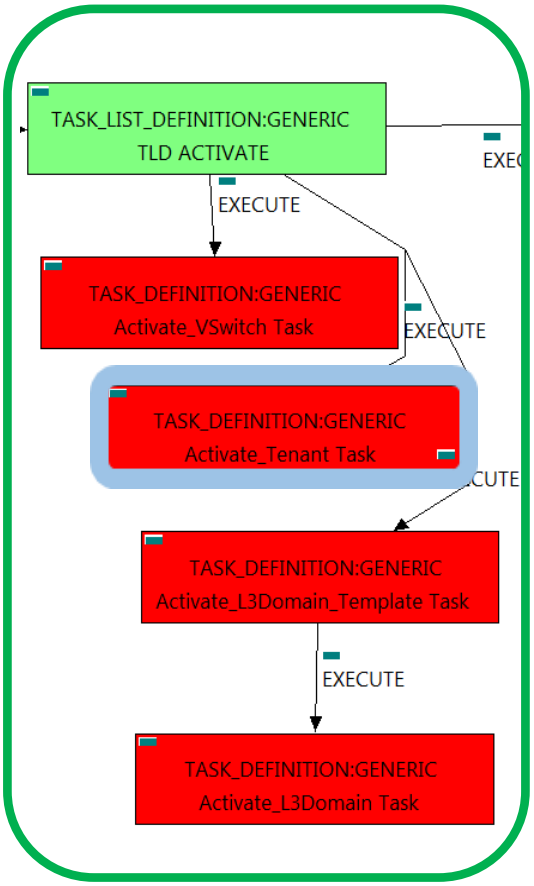


Figure 11: Activation of the Tenant artifact.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “TENANT:OPENSTACK”, this means, when this workflow finish, we will have a TENANT:OPENSTACK with status ACTIVE in our Openstack platform, also the TD will update the status and other attributes of the instance that represents the artifact TENANT:OS in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_VSwitch Task
FIND.Condition == **GENERAL.VDC_id==%Id%**
FIND.path ==

TENANT:GENERIC>RESOURCE_POOL>VIM>TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>TENANT:OPENSTACK@status=INSTANTIATED

EXECUTE.Workflow ==
“WF_TS_ACTIVATE_TENANT”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
“WF_TS_DEACTIVATE_TENANT”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a TENANT:OPENSTACK that match the FIND.Condition attribute with value “GENERAL.VDC_id==%Id%” with a Status INSTANTIATED in the DDBB, notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the MultiplePath present in the category FIND. Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_TENANT”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

2.12 . TLD ACTIVE: Activate_L3Domain_Template task.

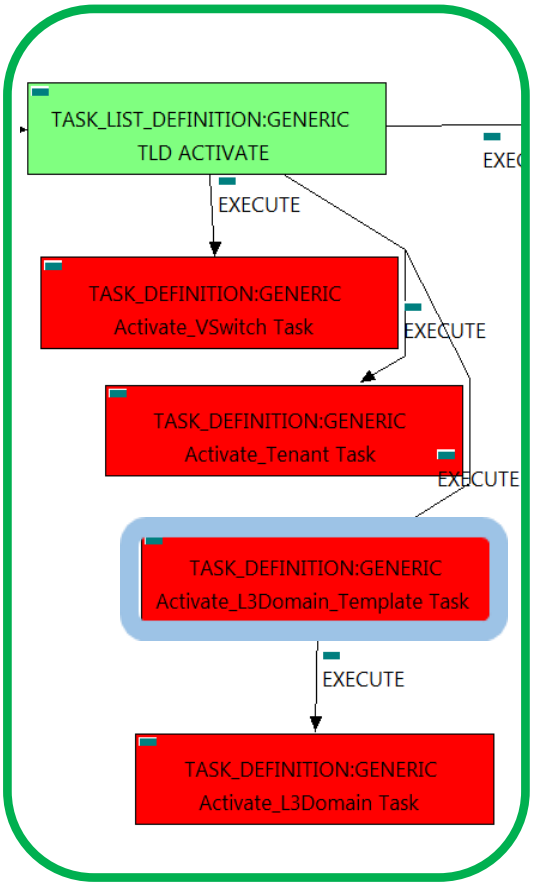


Figure 12: Activate L3Domain Template.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “L3DOMAIN:TEMPLATE:DCN”, this means, when this workflow finish, we will have a L3DOMAIN:TEMPLATE:DCN”, with status ACTIVE in our VSD platform, also the TD will update the status and other attributes of the instance that represents the artifact “L3DOMAIN:TEMPLATE:DCN”, in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Activate_L3Domain_Template Task
FIND.Condition == **GENERAL.VDC_id== Id%**
FIND.path ==

TENANT:GENERIC>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED

SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_L3DOMAIN_TEMPLATE”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
“WF_TS_DEACTIVATE__SDN_L3DOMAIN_TEMPLATE”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “L3DOMAIN:TEMPLATE:DCN” that match the FIND.Condition attribute with value “GENERAL.VDC_id==%Id%”,in Status INSTANTIATED in the DDBB, notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the MultiplePath present in the category FIND. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with

the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_L3DOMAIN_TEMPLATE", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

2.13 . TLD ACTIVE: Activate_L3Domain task.

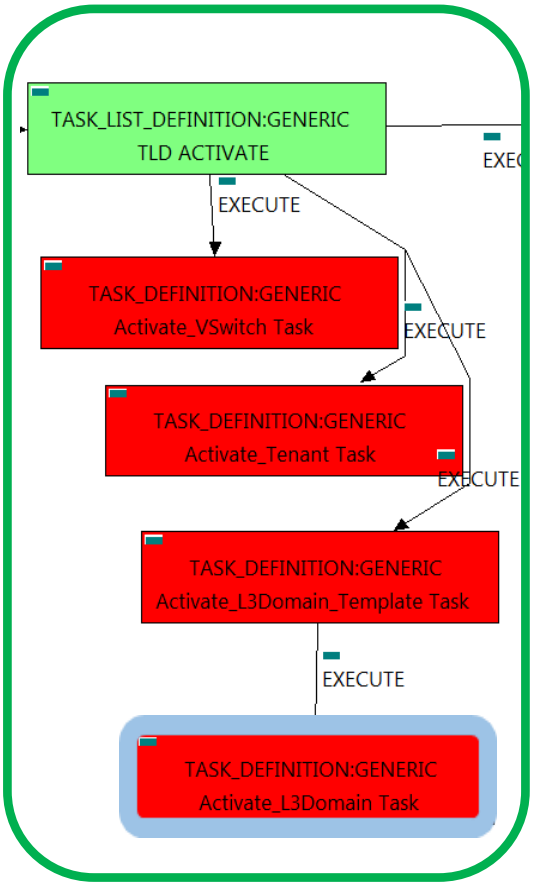


Figure 13: Activate L3Domain Artifact.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “L3DOMAIN:DCN”, this means, when this workflow finish, we will have a L3DOMAIN:DCN”, with status ACTIVE in our VSD platform, also the TD will update the status and other attributes of the instance that represents the artifact “L3DOMAIN:DCN”, in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Activate_L3Domain Task
FIND.MainArtifact ==
L3DOMAIN:TEMPLATE>L3DOMAIN:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SDN_L3DOMAIN”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
“WF_TS_DEACTIVATE_SDN_L3DOMAIN”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “L3DOMAIN:DCN with Status INSTANTIATED in the DDBB. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_L3DOMAIN”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

2.14 . TLD ACTIVE_POLICIES: Getting L3Domain task.

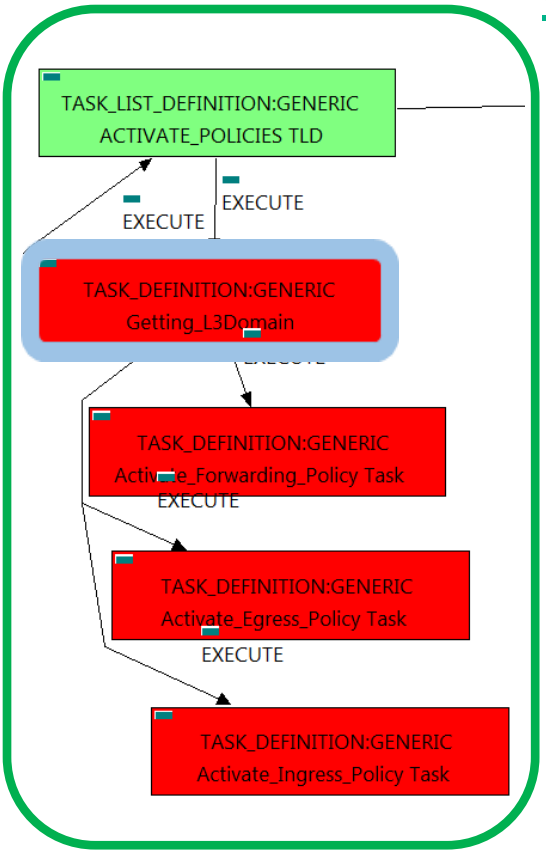


Figure 14: Getting the adequate L3Domain.

This TD it is going to assure the selection of the correct artifact that later on will be used by the workflow executed.

Once finished, we will have assured that all the policies of types INGRESSACL, EGRESSACL and INGRESSADVFORWARD are children of the right L3DOMAIN:DCN, as well as they will be prepared to be activated when required.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Getting_L3Domain Task
FIND.Condition == **GENERAL.VDC_id==%Id%**
FIND.Path ==

TENANT:GENERIC>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE,
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE,
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE,
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE

SET.Running_Status ==	ACTIVE.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “L3DOMAIN:GENERIC” in Status ACTIVE in the DDBB that matches the condition present in the attribute FIND.Condition, notice that we are not trying to get a TENANT:GENERIC in status ACTIVE. The query it is going to use the MultiplePath present in the category FIND.Path.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

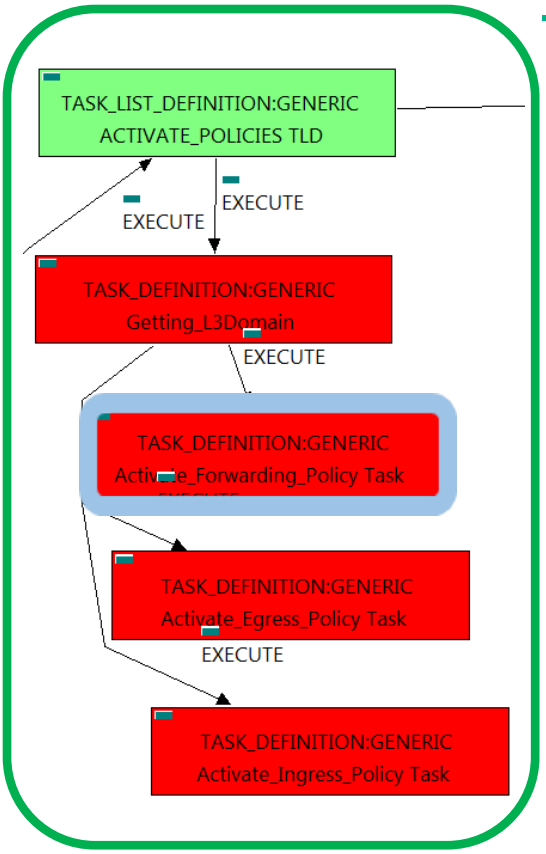


Figure 15: Activation of Forwarding Entry policies.

2.15 . TLD ACTIVE_POLICIES: Activate_Forwarding_Policy task.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “INGRESSADVFORWARD”, this means, when this workflow finish, we will have a INGRESSADVFORWARD with status ACTIVE associated to the L3DOMAIN:DCN, and finally related to the TENANT:GENERIC that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_Forwarding_Policy Task
FIND.MainArtifact ==
L3DOMAIN:DCN>
INGRESSADVFORWARD:TEMPLATE:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_DEACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an INGRESSADVFORWARD:TEMPLATE:DCN in Status INSTANTIATED in the DDBB that matches the condition present in the attribute FIND.MainArtifact, notice that we are not trying to get a L3DOMAIN:DCN in status ACTIVE. The query it is going to use the Path present in the attribute FIND.MainArtifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

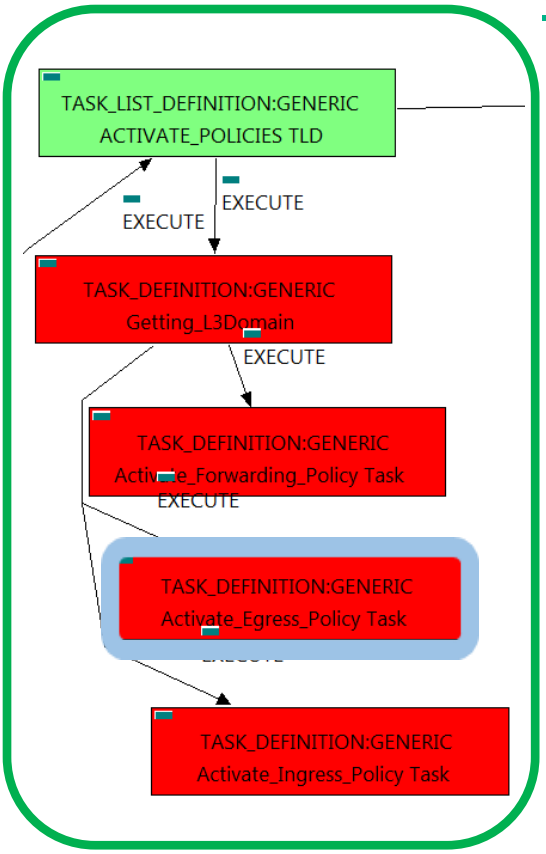


Figure 16: Activation of the Egress policies.

2.16 . TLD ACTIVE_POLICIES: Activate_Egress_Policy task.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “EGRESSACL”, this means, when this workflow finish, we will have a EGRESSACL with status ACTIVE associated to the L3DOMAIN:DCN, and finally related to the TENANT:GENERIC that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Activate_Egress_Policy Task
FIND.MainArtifact ==
L3DOMAIN:DCN>
EGRESSACL:TEMPLATE:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SDN_EGRESSACL_POLICY”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_DEACTIVATE_SDN_EGRESSACL_POLICY”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an EGRESSACL:TEMPLATE:DCN in Status INSTANTIATED in the DDBB that matches the condition present in the attribute FIND.MainArtifact, notice that we are not trying to get a L3DOMAIN:DCN in status ACTIVE. The query it is going to use the Path present in the attribute FIND.MainArtifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_EGRESSACL_POLICY”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

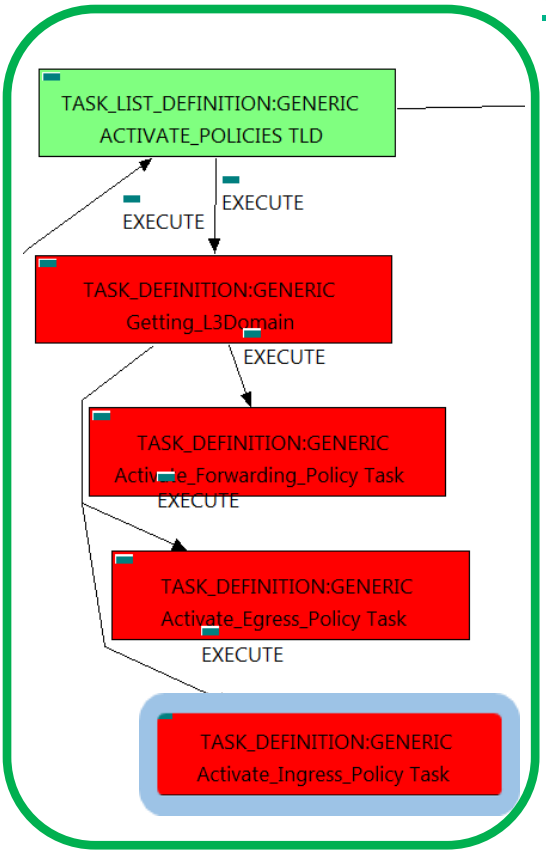


Figure 17: Activation of Ingress policies.

2.17 . TLD ACTIVE_POLICIES: Activate_Ingress_Policy task.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “INGRESSACL”, this means, when this workflow finish, we will have a INGRESSACL with status ACTIVE associated to the L3DOMAIN:DCN, and finally related to the TENANT:GENERIC that it is going to be used it in the activation.

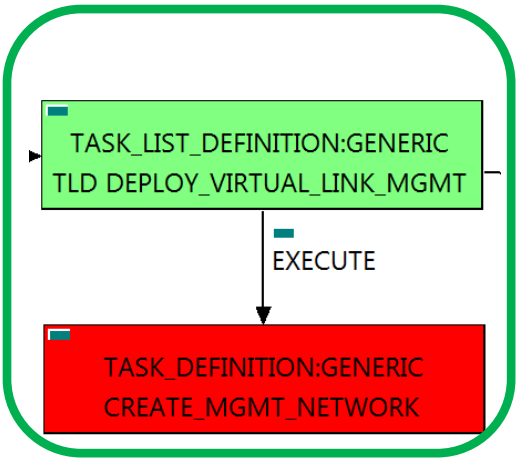
Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_Ingress_Policy Task
FIND.MainArtifact ==
L3DOMAIN:DCN>
INGRESSACL:TEMPLATE:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SDN_INGRESSACL_POLICY”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_DEACTIVATE_SDN_INGRESSACL_POLICY”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an INGRESSACL:TEMPLATE:DCN in Status INSTANTIATED in the DDBB that matches the condition present in the attribute FIND.MainArtifact, notice that we are not trying to get a L3DOMAIN:DCN in status ACTIVE. The query it is going to use the Path present in the attribute FIND.MainArtifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_INGRESSACL_POLICY”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.



2.18 . TLD DEPLOY_VIRTUAL_LINK_MGMT: CREATE_MGMT_NETWORK.

The TDs that have present in the their names “Create”, are Task Definitions responsible of the creation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifacts that are going to be provisioned are a number of NETWORKs and SUBNETWORKs..

Once finished, we should have a ZONE:DCN and a SUBNETWORK:DCN related to the previous ZONE:DCN, also, we should have at the end of the execution of the TD, a NETWORK:OPENSTACK and a SUBNETWORK:OPENSTACK related to the previous NETWORK:OPENSTACK, also we must have all the relationship needed for the correct behavior of the Service Net. All of the elements related to the entity given.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CREATE_MGMT_NETWORK
FIND.MainArtifact ==
TENANT:GENERIC>
VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
“WF_TS_PROVISION_NETWORK”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_PROVISION_NETWORK_UNDO”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a TENANT:GENERIC in Status INSTANTIATED in the DDBB . Once found , the WF will start the provision, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This workflow will start another two more, the one that provision in SDN, “WF_TS_PROVISION_NETWORK_SDN” and the one that provision in the Openstack platform, “WF_TS_PROVISION_NETWORK_OPENSTACK”.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_PROVISION_NETWORK_UNDO”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

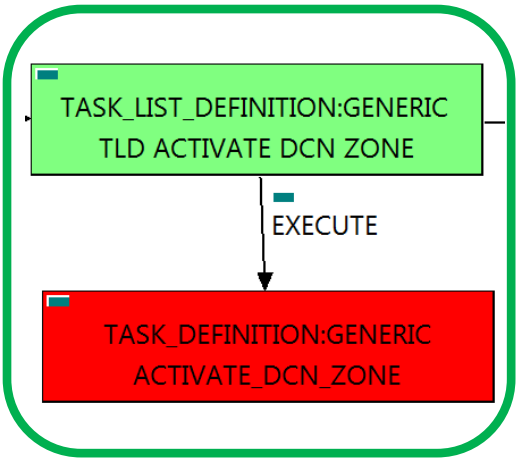


Figure 18: Activation of a network in DCN.

2.19 . TLD ACTIVATE DCN ZONE: ACTIVATE_DCN_ZONE.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “ZONE:DCN”, this means, when this workflow finish, we will have a ZONE(Network) with status ACTIVE.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_MGMT_NETWORK
FIND.MainArtifact ==	**TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT> NETWORK:GENERIC>ZONE:TEMPLATE> ZONE:DCN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_SDN_ZONE”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow =	**“WF_TS_DEACTIVATE_SDN_ZONE”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “ZONE” in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_ZONE”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

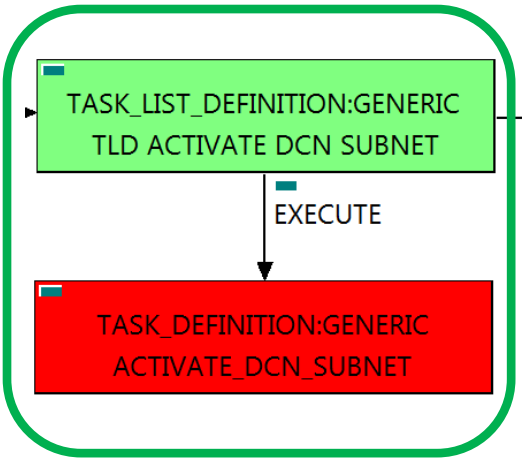


Figure 19: Activation of a Subnetwork in DCN.

2.20 . TLD ACTIVATE DCN SUBNET: ACTIVATE_DCN_SUBNET.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “SUBNETWORK:DCN”, this means, when this workflow finish, we will have a SUBNETWORK:DCN with status ACTIVE.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_DCN_SUBNET
FIND.MainArtifact ==	**TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT> NETWORK:GENERIC>ZONE:TEMPLATE>SUBNETWORK:TEMPLATE:D(SUBNETWORK:DCN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_SDN_SUBNETWORK”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow =	**“WF_TS_DEACTIVATE_SDN_SUBNETWORK”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “SUBNETWORK” in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_SUBNETWORK”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

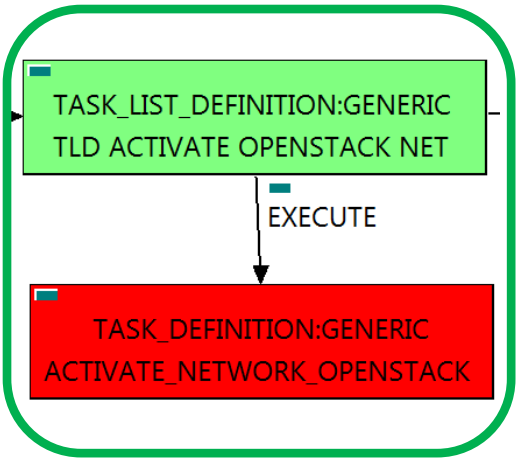


Figure 20: Activation of Network in Openstack Platform.

2.21 . TLD ACTIVATE OPENSTACK NET: ACTIVATE_NETWORK_OPENSTACK.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “NETWORK:OPENSTACK”, this means, when this workflow finish, we will have a NETWORK:OPENSTACK with status ACTIVE.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_NETWORK_OPENSTACK
FIND.MainArtifact ==	**TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT> NETWORK:GENERIC> NETWORK:OPENSTACK@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_NETWORK”**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow =	**“WF_TS_DEACTIVATE_NETWORK”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “NETWORK:OPENSTACK” in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_NETWORK”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

2.22 . TLD ACTIVATE OPENSTACK SUBNET: ACTIVATE_SUBNETWORK_OPENSTACK.

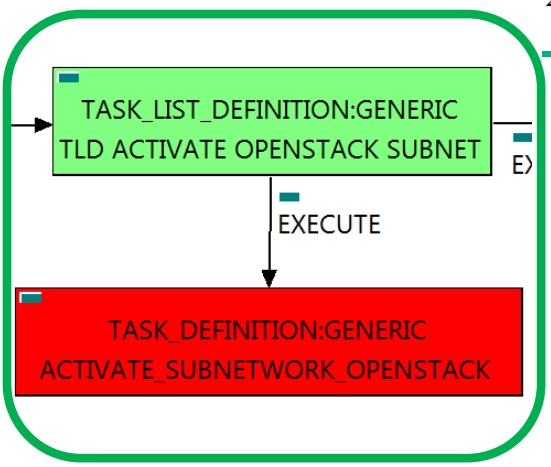


Figure 21: Activation of Subnetwork in Openstack Platform.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “SUBNETWORK:OPENSTACK”, this means, when this workflow finish, we will have a SUBNETWORK:OPENSTACK with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_SUBNETWORK_OPENSTACK
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>NETWORK:OPENSTACK>
SUBNETWORK:OPENSTACK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SUBNETWORK”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_DEACTIVATE_SUBNETWORK”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “SUBNETWORK:OPENSTACK” in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SUBNETWORK”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

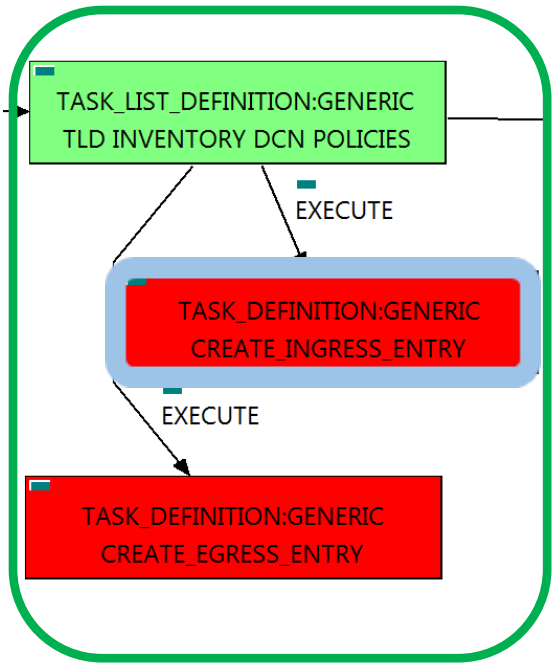


Figure 22: Create Ingress Entry policies for Tenant.

2.23 . TLD INVENTORY DCN POLICIES: CREATE INGRESS ENTRY.

This TD it is going to provision a INGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWORK on each VIRTUAL_LINK that we have in our DC, this means, the WF implied in this TLD is going to query the VIRTUAL_LINK trying to reach the NETWORKS on the VL:MANAGEMENT component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy INGRESSACLENTRY:TEMPLATE:DCN related to policy INGRESSACL:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Once finished, we will have provisioned an INGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the INGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == CREATE_INGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>
VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_UNDO"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK" in Running Status INSTANTIATED in the DDBB . Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

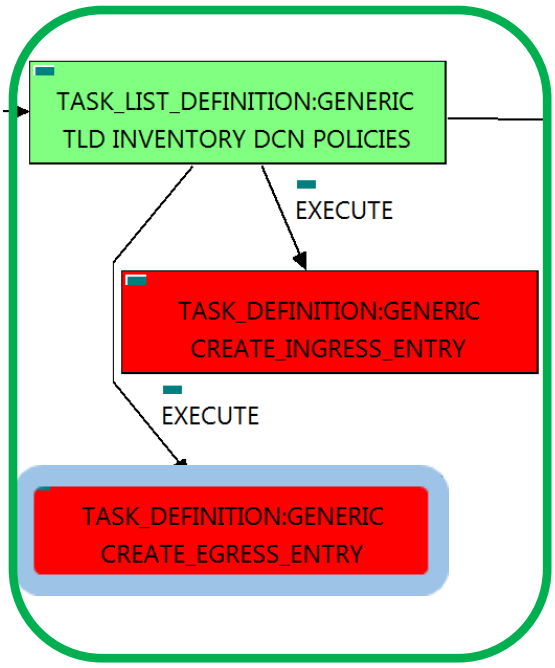


Figure 23: Create Egress Entry policies for Tenant.

2.24 . TLD INVENTORY DCN POLICIES: CREATE EGRESS ENTRY.

This TD it is going to provision a EGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWROK on each VIRTUAL_LINK that we have in our DC, this means, the WF implied in this TLD is going to query the VIRTUAL_LINK trying to reach the NETWORKS on the VL:MANAGEMENT component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy EGRESSACLENTRY:TEMPLATE:DCN related to policy EGRESSACL:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Once finished, we will have provisioned an EGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the EGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == CREATE_EGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>
VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
“WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_UNDO”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “VIRTUAL_LINK” in Running Status INSTANTIATED in the DDBB . Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_UNDO”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

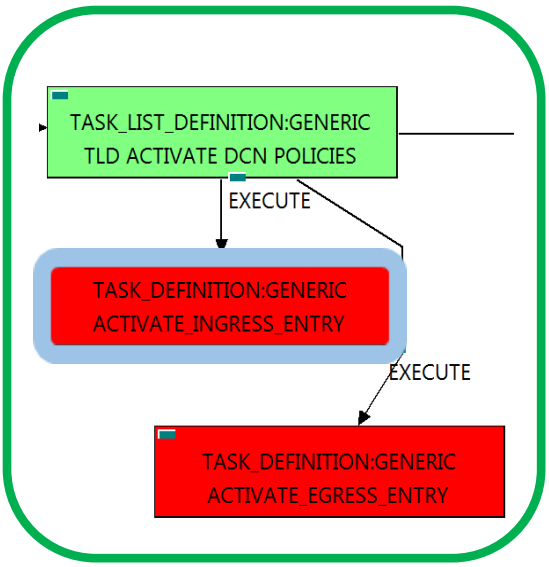


Figure 24: Activate Ingress Entry policies for Tenant.

2.25 . TLD ACTIVATE DCN POLICIES: ACTIVATE_INGRESS_ENTRY.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “INGRESSACLENTRY”, this means, when this workflow finish, we will have a INGRESSACLENTRY with status ACTIVE associated to the INGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_INGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN
<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SDN_INGRESSACLENTRY_POLICY”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “INGRESSACLENTRY” in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_INGRESSACLENTRIES_POLICY”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

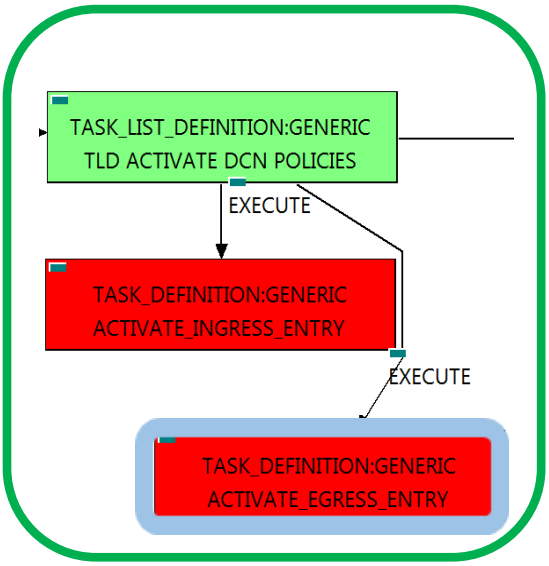


Figure 25: Activate Ingress Entry policies for Tenant.

2.26 . TLD ACTIVATE DCN POLICIES: ACTIVATE_EGRESS_ENTRY.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “EGRESSACLENTRY”, this means, when this workflow finish, we will have a EGRESSACLENTRY with status ACTIVE associated to the EGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_EGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN
<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SDN_EGRESSACLENTRY_POLICY”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
“WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY”
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “EGRESSACLENTRY” in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is “WF_TS_DEACTIVATE_SDN_EGRESSACLENTRIES_POLICY”, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

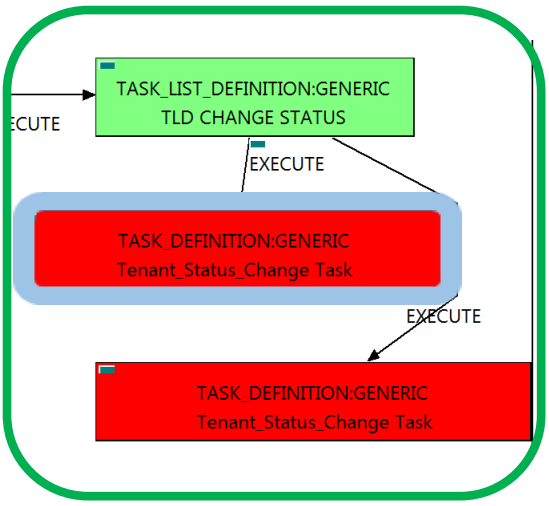


Figure 26: Status change Virtual Link Management.

2.27 . TLD CHANGE STATUS: Tenant_Status_Change task.

The TDs that have present in their names “Status Change”, are Task Definitions responsible of the change in the status of the entity associated, in this case a TENANT:GENERIC. When the WF has finished we will have an TENANT:GENERIC with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Tenant_Status_Change Task
FIND.MainArtifact == **TENANT:GENERIC> VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED**	
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

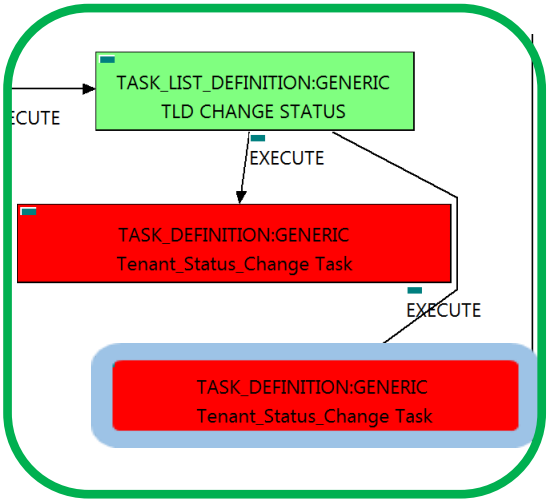


Figure 27: Change status of the Tenant .

2.28 . TLD CHANGE STATUS: Tenant_Status_Change task.

The TDs that have present in their names “Status Change”, are Task Definitions responsible of the change in the status of the entity associated, in this case a ”VIRTUAL_LINK:MANAGEMENT”. When the WF has finished we will have an “VIRTUAL_LINK:MANAGEMENT” with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Tenant_Status_Change Task
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.