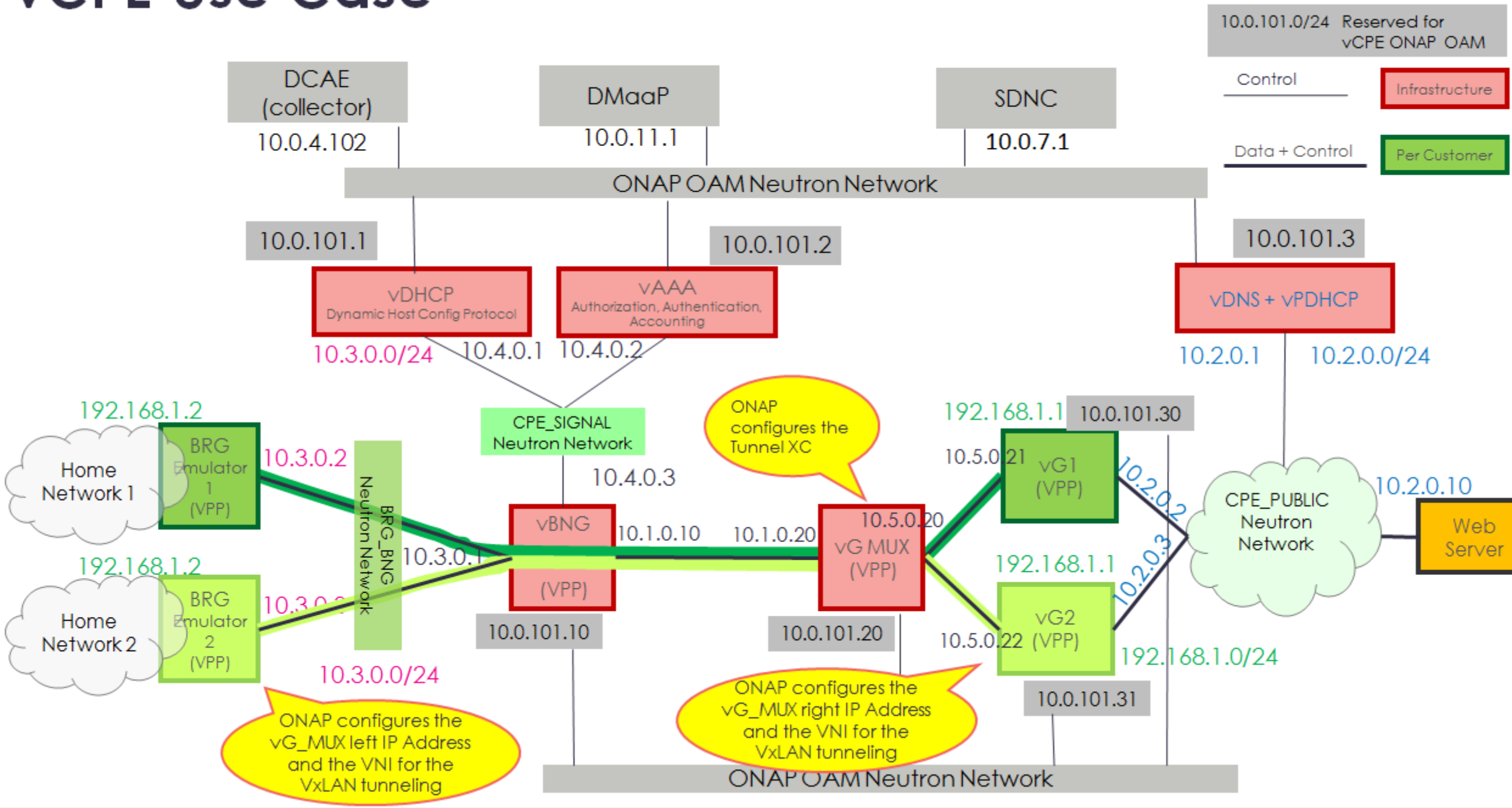
Illustrative Sequence Diagrams
for Residential Broadband vCPE Use Case

vCPE Use Case



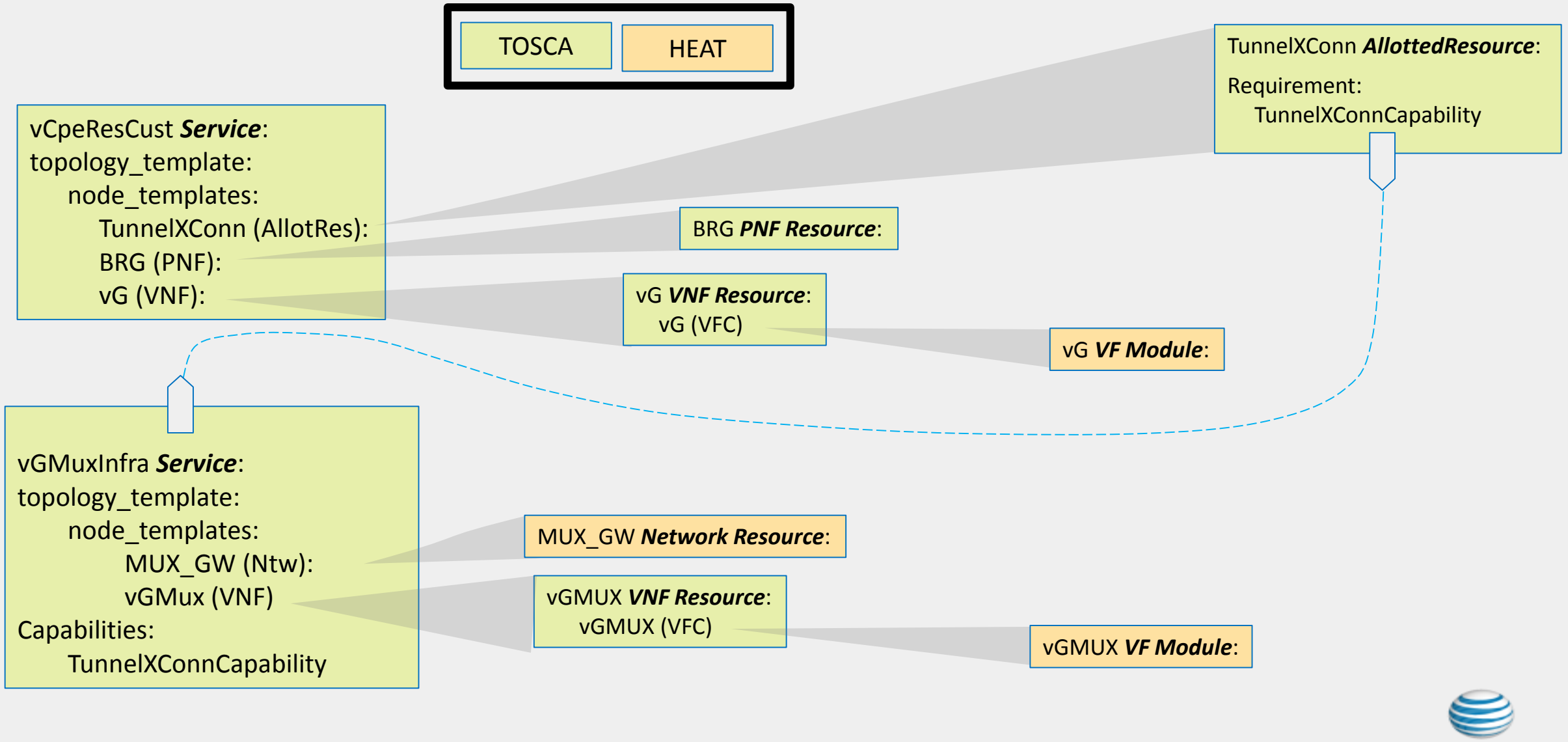
Residential Broadband vCPE Use Case Model: Infrastructure Flows

Note that in this table "_X" indicates applicability to both the "_HEAT" and "_TOSCA" approaches.

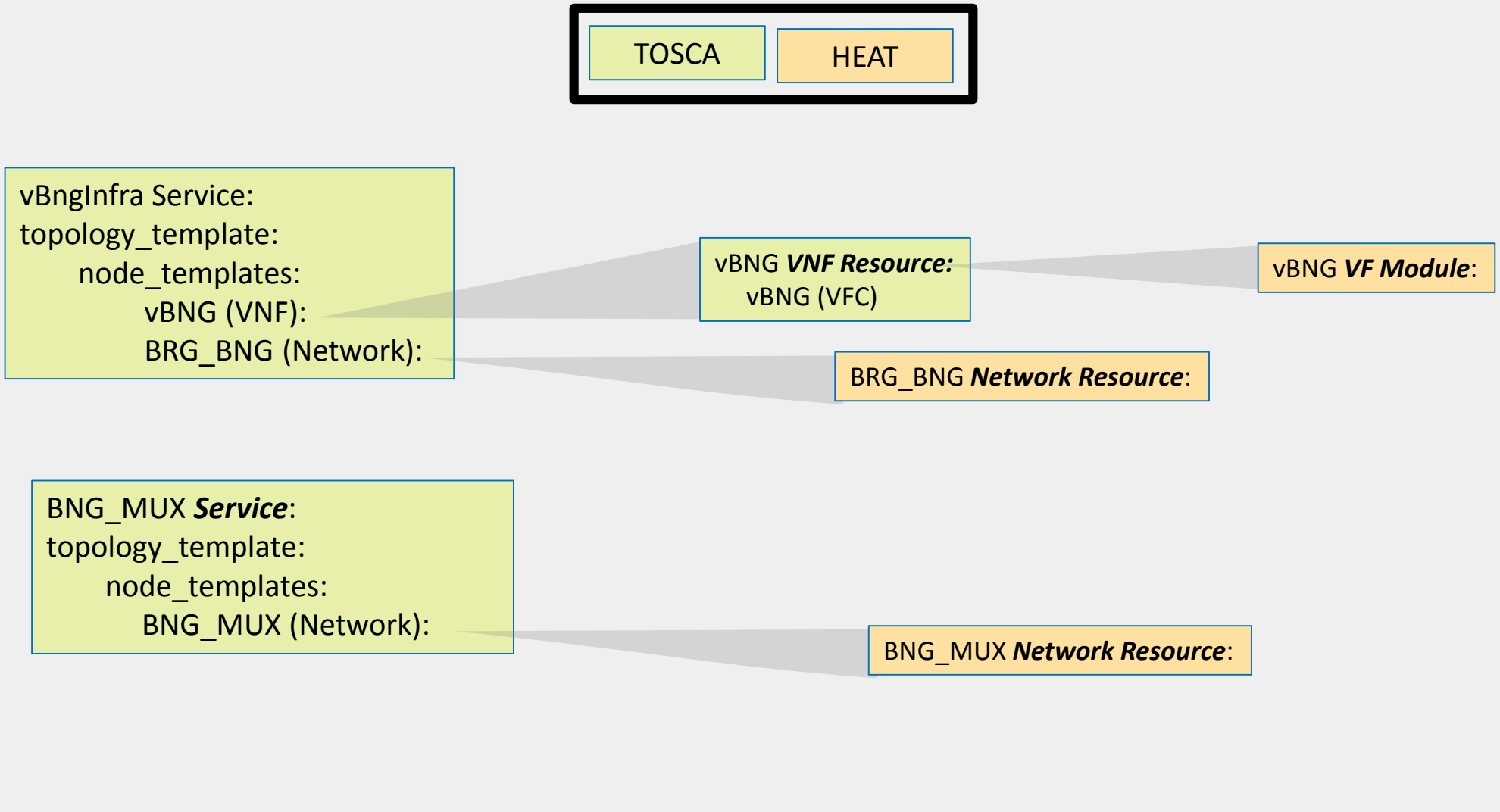
Service	Service Level Flow	Resource	Resource Level Flow	SDNC Northbound API	SDNC DG
vCpeCoreInfra_X	Generic Service	vCpeCoreInfraVnfs_X (VNF)	Generic VNF	GENERIC-RESOURCE	Generic DG
	"	CPE_PUBLIC (Network)	Generic Ntw	GENERIC-RESOURCE	Generic DG
	"	CPE_SIGNAL (Network)	Generic Ntw	GENERIC-RESOURCE	Generic DG
vGMuxInfra	Generic Service	vGMUX (VNF)	Generic VNF	GENERIC-RESOURCE	Generic DG
"	"	MUX_GW (Network)	Generic Ntw	GENERIC-RESOURCE	Generic DG
vBngInfra	Generic Service	vBNG (VNF)	Generic VNF	GENERIC-RESOURCE	Generic DG
	"	BRG_BNG (Network)	Generic Ntw	GENERIC-RESOURCE	Generic DG
BNG_MUX	Generic Service	BNG_MUX (Network)	Generic Ntw	GENERIC-RESOURCE	Generic DG
BRG_EMU	Generic Service	BRG_EMU (VNF)	Generic VNF	GENERIC-RESOURCE	Custom Process (Event Handling)
vCpeResCust	Custom [New]	TunnelXConn (AR)	Custom [New]	GENERIC-RESOURCE	Custom DG [New]
"	"	vG (VNF)	Generic VNF	GENERIC-RESOURCE	Generic DG
"	"	BRG (PNF)	Custom [New]	GENERIC-RESOURCE	Custom DG [New]

For simple Services which include only simple networks and VNFs (e.g., with no multi-data instances that map to different VF Modules), there is an SO "Generic Service" flow ("top level flow") that calls the Generic VNF and/or the Generic Network resource-level flows. The SDNC functionality is also "generic" such that only modeling and configuration is needed to drive SDNC behavior for a specific VNF type. For example, this SDNC generic VNF flow can automatically assign the IP Addresses if pre-loaded. For "Generic VNF" the IP Addresses are pre-loaded. E.g., pre-load 25 vG instances with their assignments pre-populated. SDNC keeps track of which instances have/have not been assigned. It is expected that these SO and SDNC assets will be leveraged.

Residential Broadband vCPE Use Case Model: vCpeResCust & vGMuxInfra Topology



Residential Broadband vCPE Use Case Model: vBngInfra and BNG_MUX Topology



Residential Broadband vCPE Use Case Model: BRG_EMU Topology (Use Case Only)

The BRG_EMU Service is an artificial construct to leverage ONAP to instantiate the BRG Emulator, which is implemented as a VNF in this Use Case. This Service would have no analogue in the "real world".

TOSCA HEAT

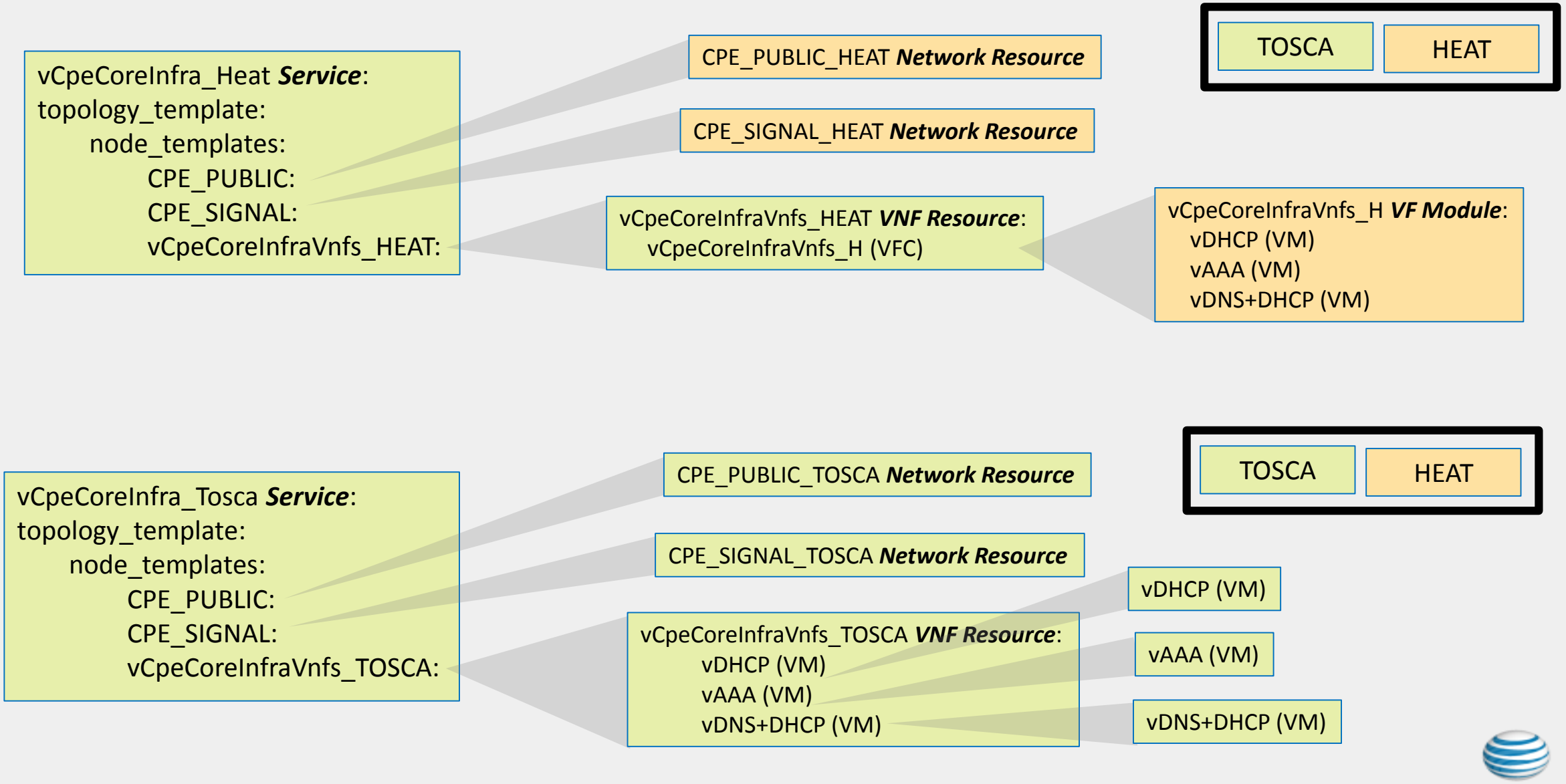
BRG_EMU ***Service***:
topology_template:
node_templates:
vBRG_EMU (VNF):

vBRG_EMU ***VNF Resource***:
vBRG (VFC)

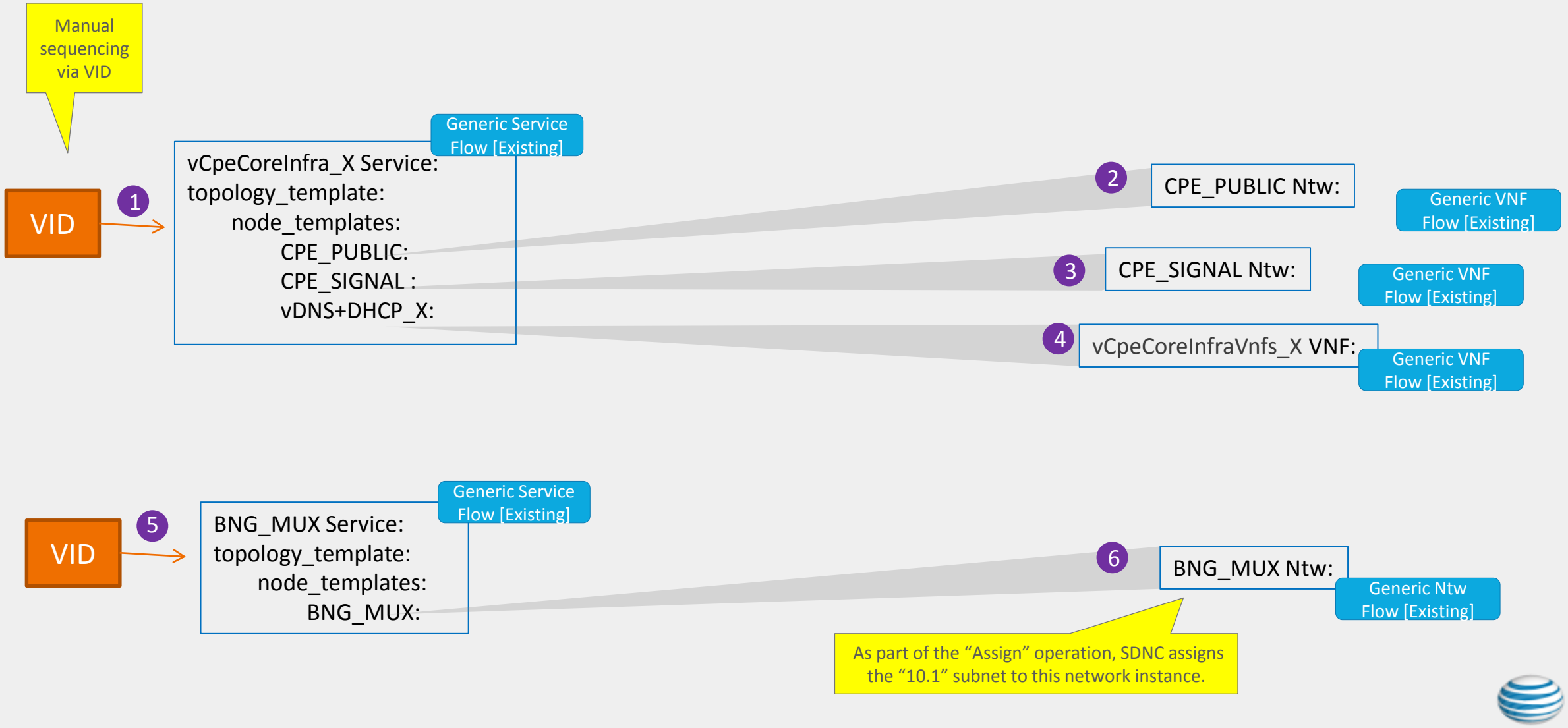
vBRG_EMU ***VF Module***:

The vBRG_EMU VNF has no modeling relationship with the BRG PNF which is referenced in the vCpeResCust Service. The BRG PNF is designed to be useful in the "real world" in which a BRG is a true PNF, whereas the vBRG_EMU VNF is a construct that is useful only for standing up the BRG Emulator used in this Use Case.

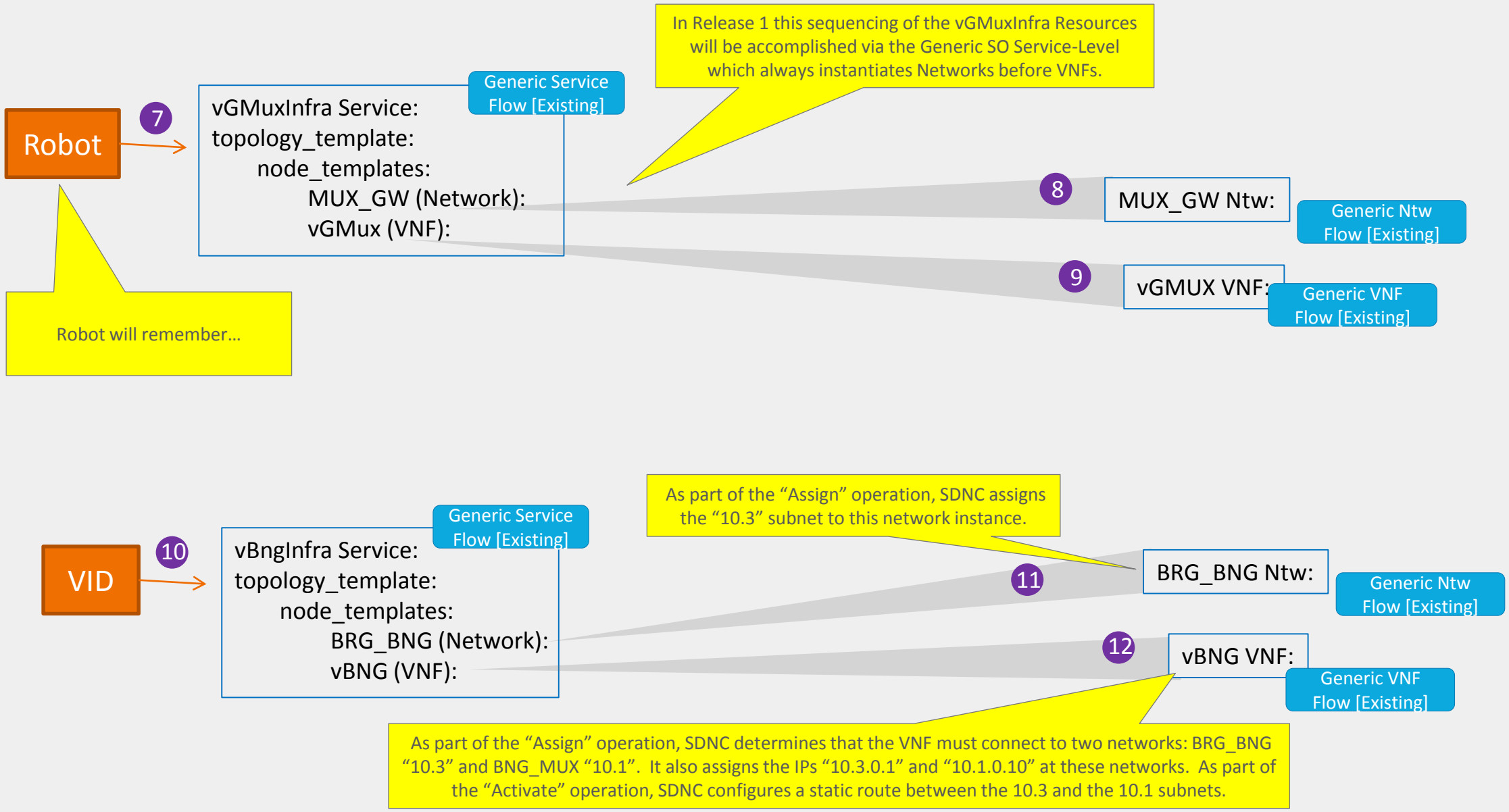
Residential Broadband vCPE Use Case: vCpeCoreInfra Topology



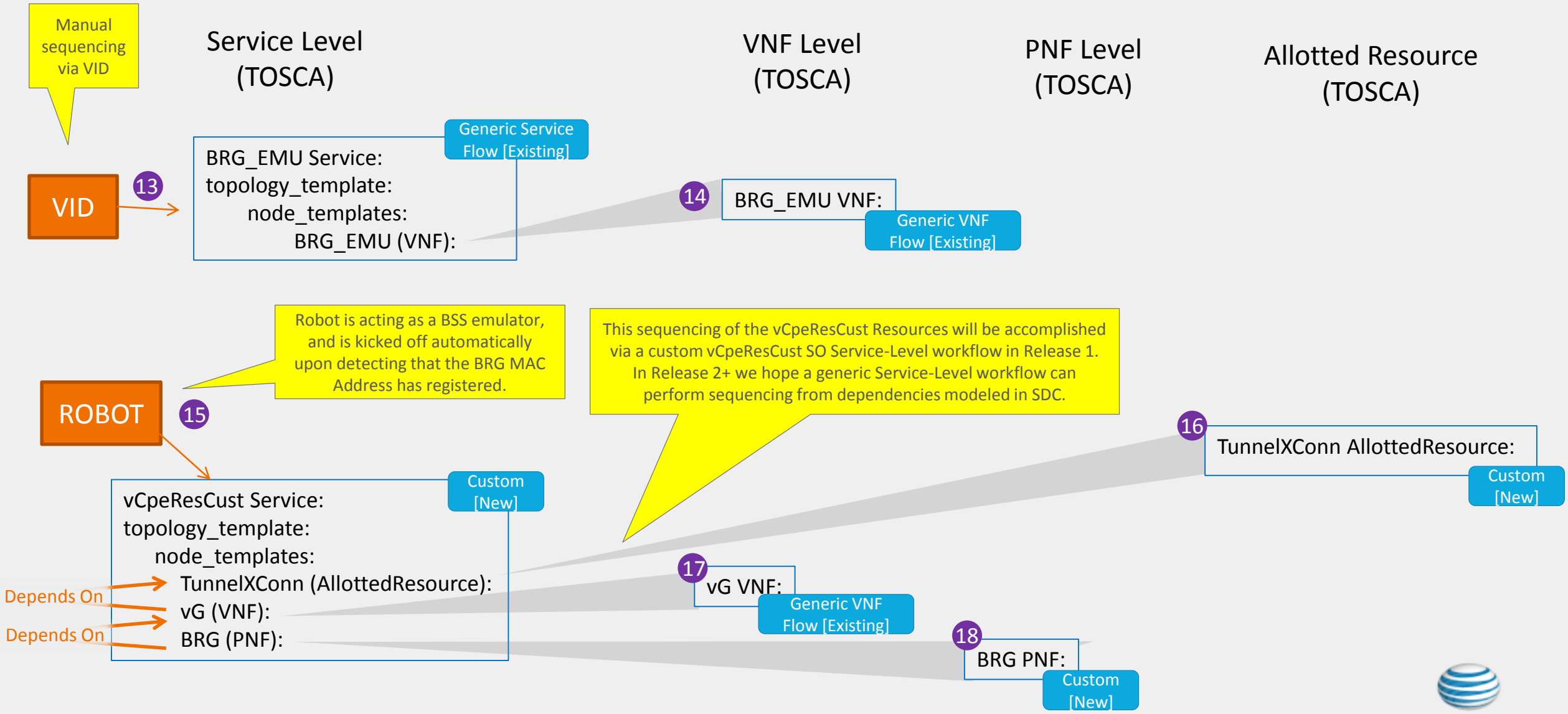
Residential Broadband vCPE Use Case Model: Infrastructure Instantiation Sequencing



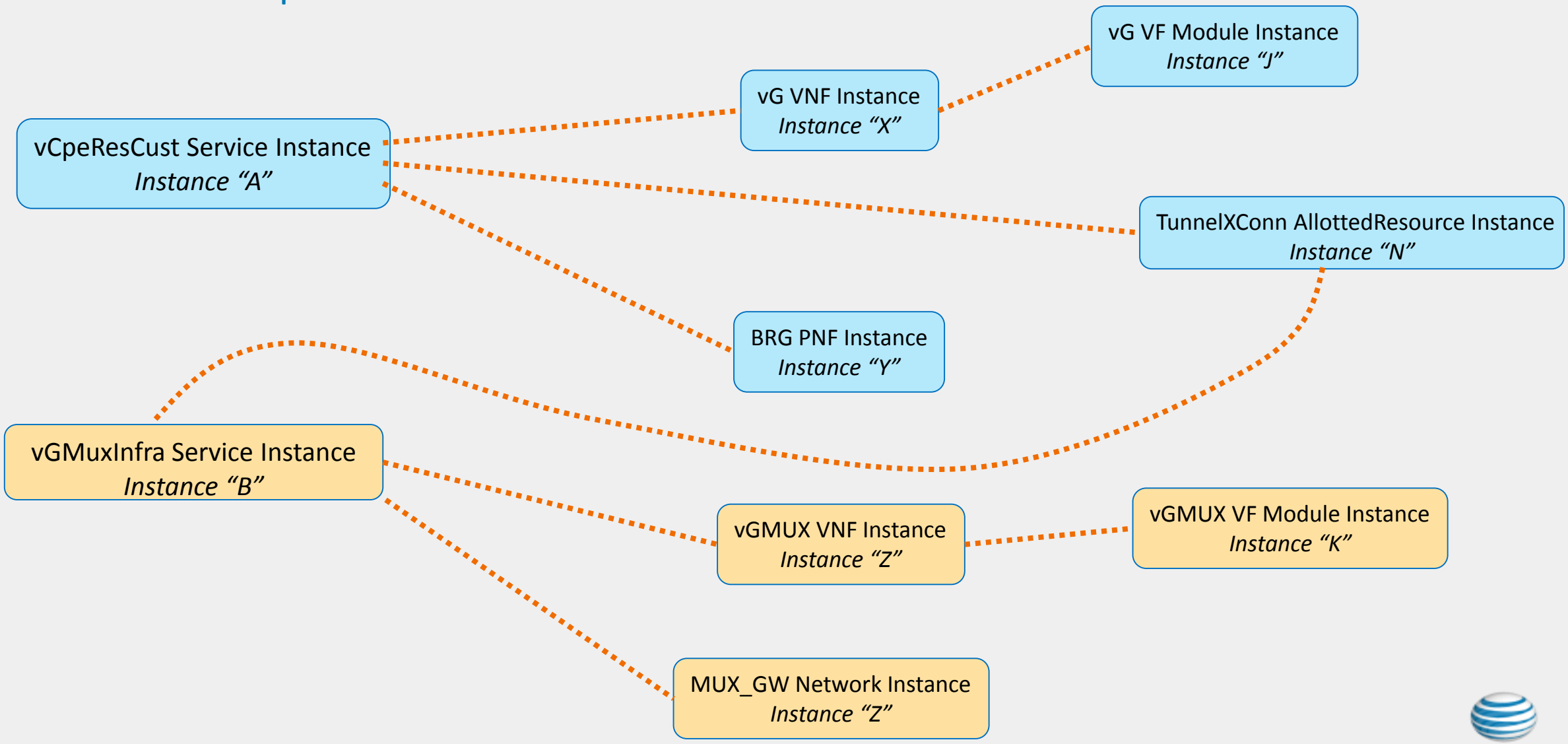
Residential Broadband vCPE Use Case Model: Infrastructure Instantiation Sequencing



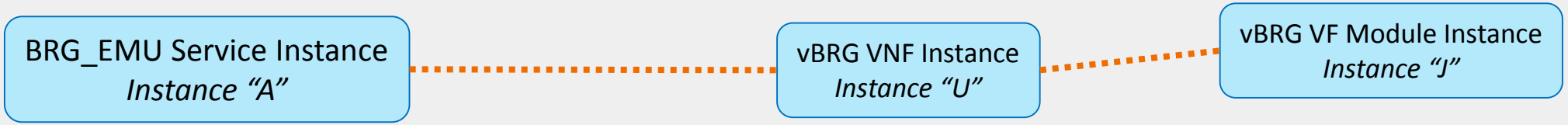
Residential Broadband vCPE Use Case Model: Instantiation Sequencing



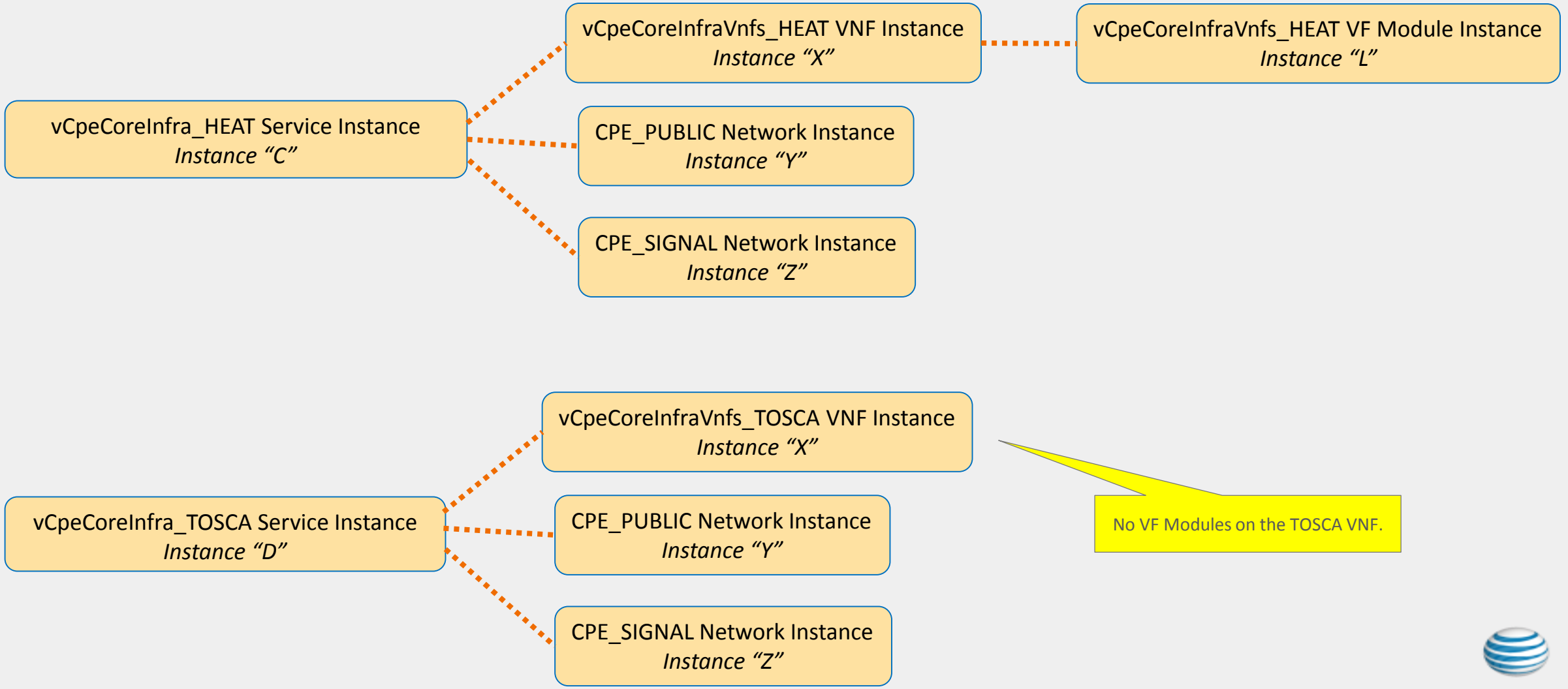
Residential Broadband vCPE Use Case Model: vCpeResCust & vGMuxInfra Inventory Instance Example



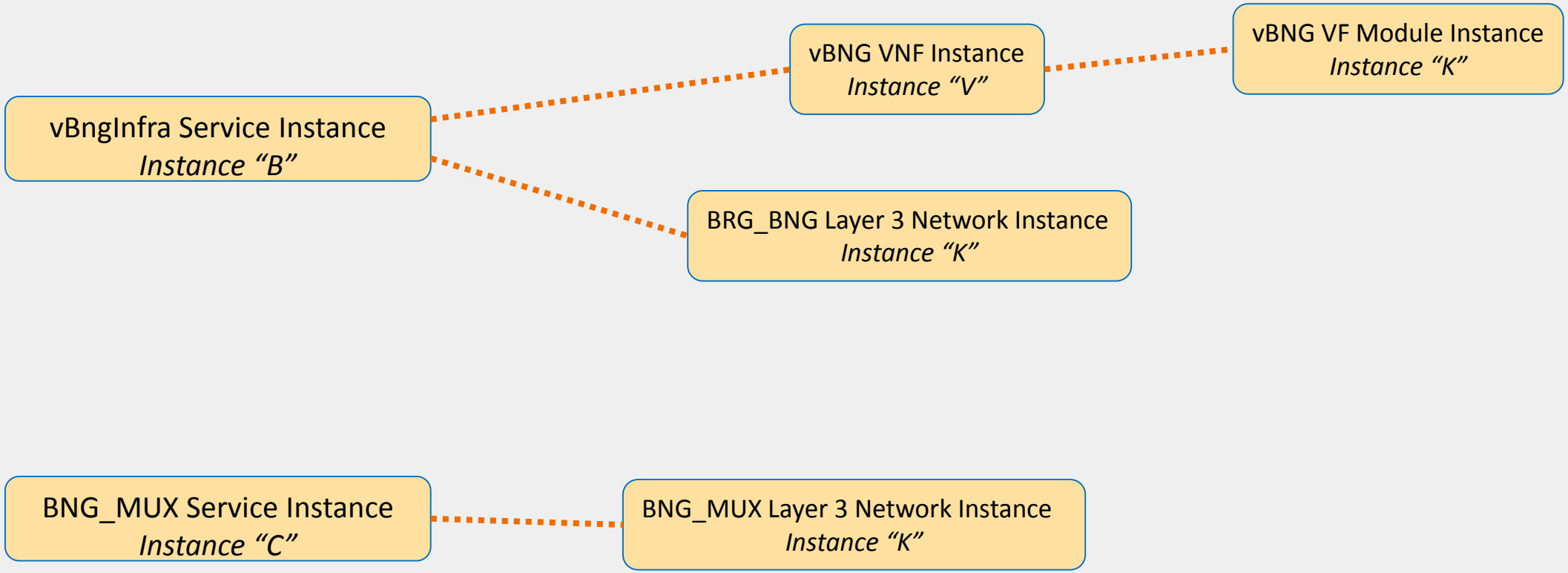
Residential Broadband vCPE Use Case Model: BRG_EMU and vCpeCoreInfra Inventory Instance Example



Residential Broadband vCPE Use Case Model: BRG_EMU and vCpeCoreInfra Inventory Instance Example



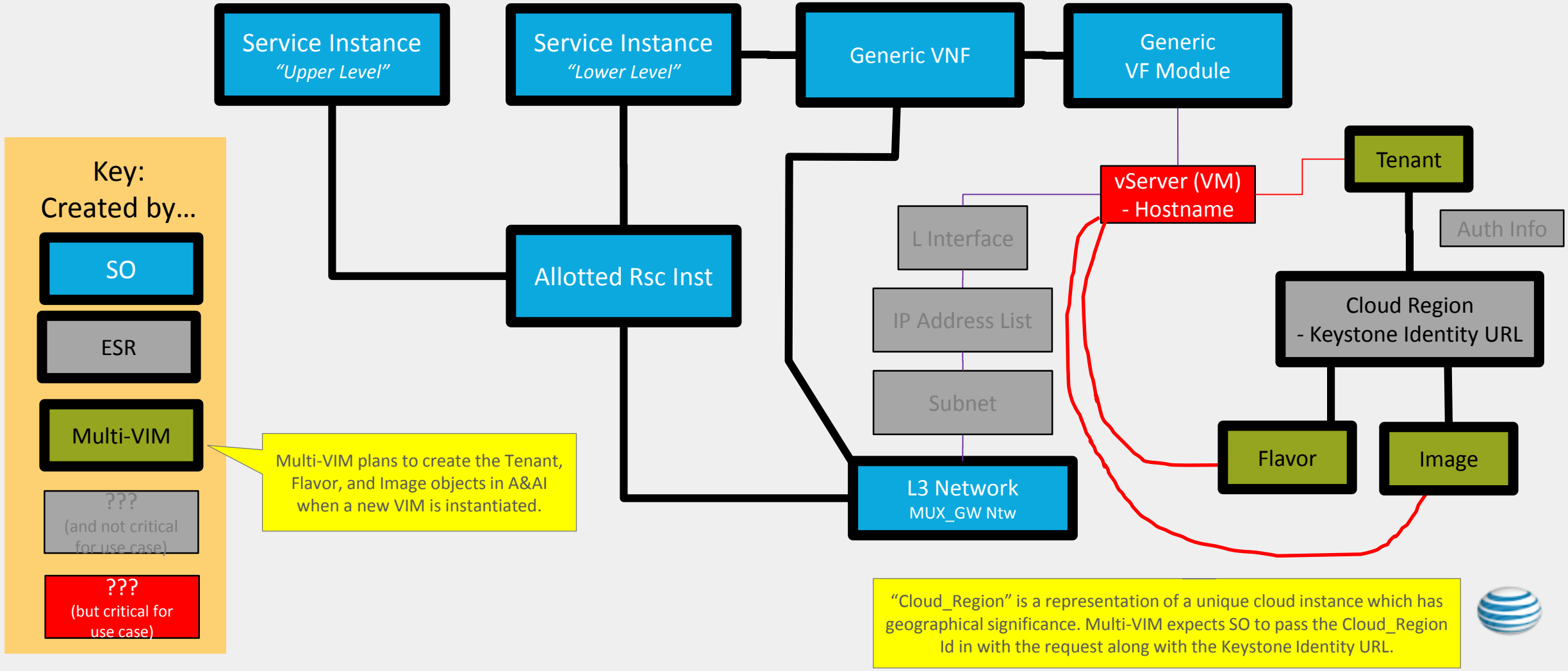
Residential Broadband vCPE Use Case Model: vCpeResCust & vGMuxInfra Topology



A&AI Detail Example

The Cloud Region object in A&AI is created via the ESR (A&AI) portal

- User inputs backend Cloud information into ESR portal
- ESR stores the backend Cloud information as auth model into AAI, key is cloudowner_cloudregion
- User triggers VIM register service exposed by Multi VIM which will trigger registry implements in different VIM plugins to fill in VIM Model information into AAI
- Each plugin handles AAI query about the backend Cloud information for backend Cloud operations



Residential Broadband vCpeCoreInfra_X Data

Service Level

The Generic Service flow doesn't call "homing". Rather it works off of separate (non-TOSCA) fielded attributes in the Svc Instantiation API for Cloud Configuration Data, which includes Cloud_Region and Cloud_Tenant.

Generic Service Flow [Existing]

1

vCpeCoreInfra_X Service:
topology_template:
node_templates:
CPE_PUBLIC (Network)
CPE_SIGNAL (Network)
vCpeCoreInfraVnfs_X (VNF)
Input Attributes:
{NULL Set}

Resource Level

2

CPE_PUBLIC Network:
Input Attributes:
{NULL Set}
Assignable Attributes:
Subnet

As part of the Network-level "Assign" operation, SDNC assigns the network name and the "10.2" subnet to this network instance.

3

CPE_SIGNAL Network:
Input Attributes:
{NULL Set}
Assignable Attributes:
Subnet

As part of the Network-level "Assign" operation, SDNC assigns the network name and the "10.4" subnet to this network instance.

4

vCpeCoreInfraVnfs_X VNF:
Input Attributes:
{NULL Set}
Assignable Attributes:
Ext_Conn_Pt (CPE_PUBLIC)
Ext_Conn_Pt (CPE_SIGNAL)
Ext_Conn_Pt (ONAP_OAM)
Configuration Attributes:
{NULL Set}

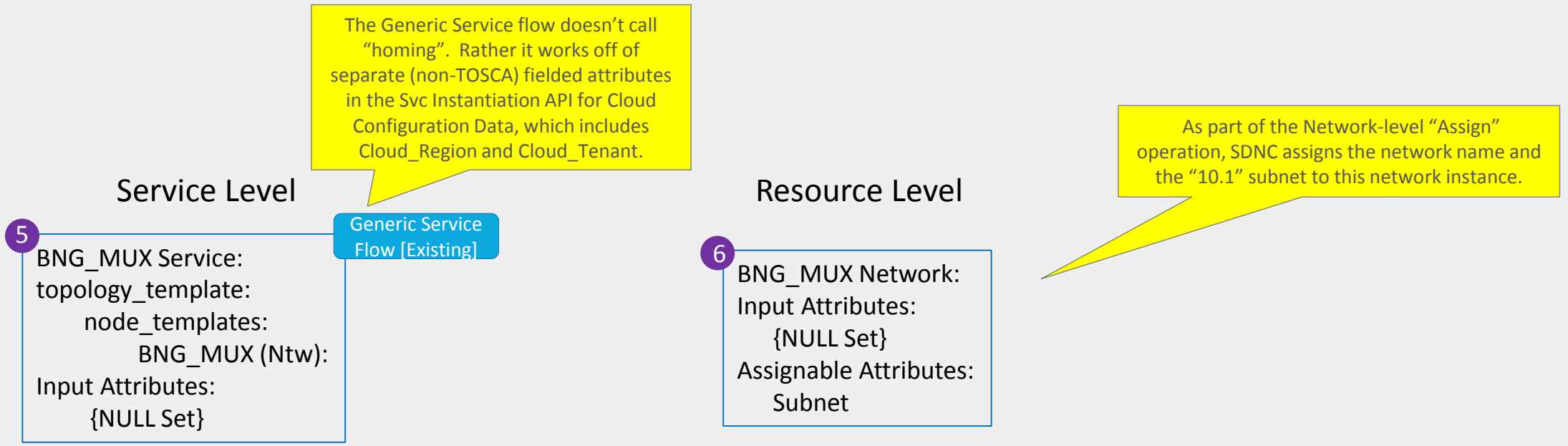
As part of the VNF-level "Assign" operation, SDNC determines that this VNF must connect to three network types. There is no infrastructure-level configuration of the VNFs needed.

VF Module Level (HEAT)

vCpeCoreInfraVnfs _HEAT VF Module:
Input Attributes:
{NULL Set}
Assignable Attributes:
CPE_PUBLIC_IP
CPE_SIGNAL_IP_DHCP
CPE_SIGNAL_IP_AAA
OAM_IP_DHCP
OAM_IP_AAA
OAM_IP_DNSnDHCP

As part of the VF Module-level "Assign" operation, SDNC assigns the IPs on each of the networks

Residential Broadband vCPE Use Case Model: BRG_EMU Service Data Mappings



Residential Broadband vCPE Use Case Model: vGMuxInfra Service Data Mappings

Service Level

Resource Level

VF Module Level

As part of the Network-level "Assign" operation, SDNC assigns the "10.5" subnet to this network instance.

The Generic Service flow doesn't call "homing". Rather it works off of separate (non-TOSCA) fielded attributes in the Svc Instantiation API for Cloud Configuration Data, which includes Cloud_Region and Cloud_Tenant.

As part of the VF Module-level "Assign" operation, SDNC assigns the IPs "10.1.0.20", "10.5.0.20" and "10.0.101.20" on these three networks

7

Generic Service Flow [Existing]

vGMuxInfra Service:
topology_template:
node_templates:
vGMux (vGMUX):
MUX_GW (Network):
Input Attributes:
{NULL Set}

8

MUX_GW Network:
Input Attributes:
{NULL Set}
Assignable Attributes:
Subnet

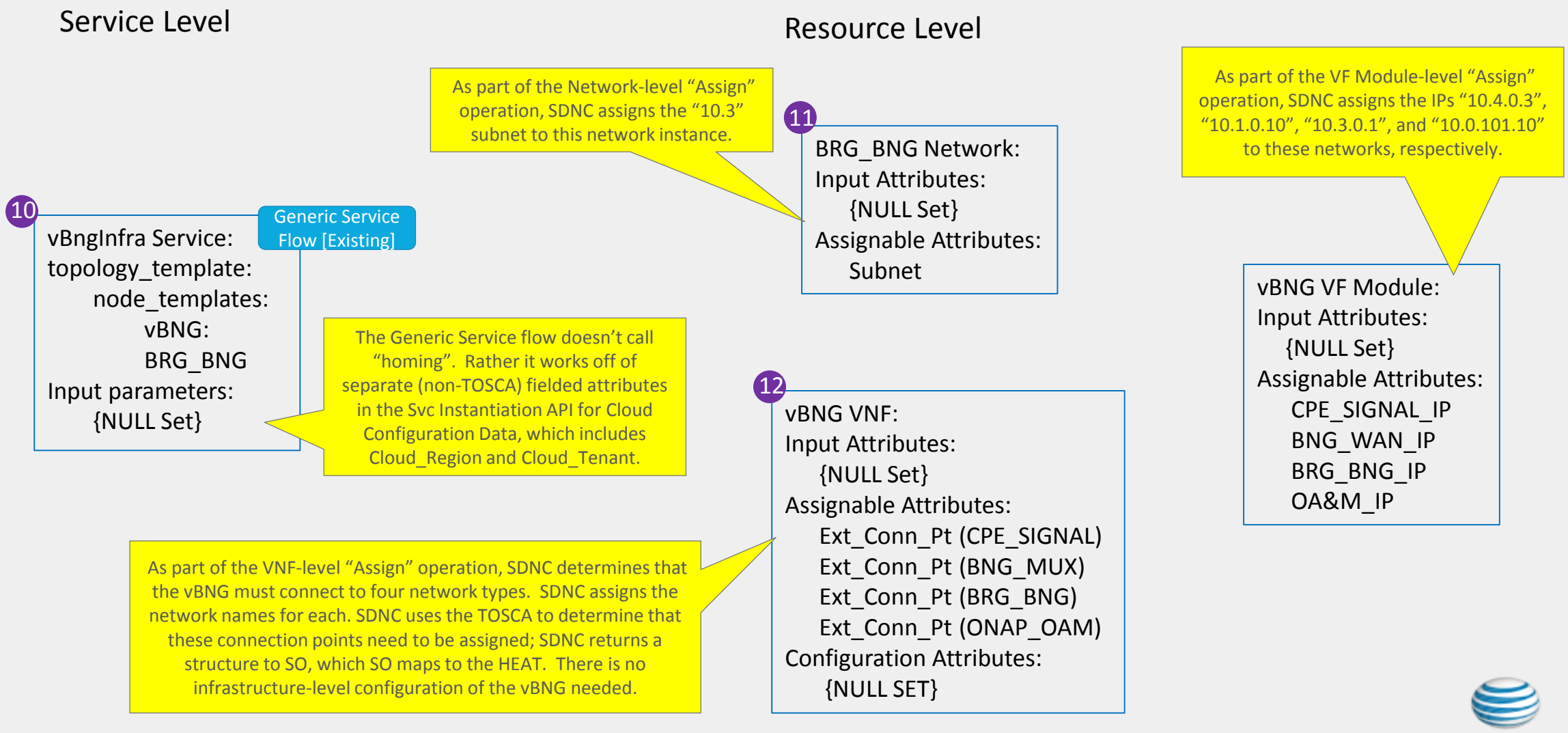
9

vGMUX VNF:
Input Attributes:
{NULL Set}
Assignable Attributes:
Ext_Conn_Pt (BNG_MUX)
Ext_Conn_Pt (MUX_GW)
Ext_Conn_Pt (ONAP_OAM)
VNI Pool
Configuration Attributes:
{NULL Set}

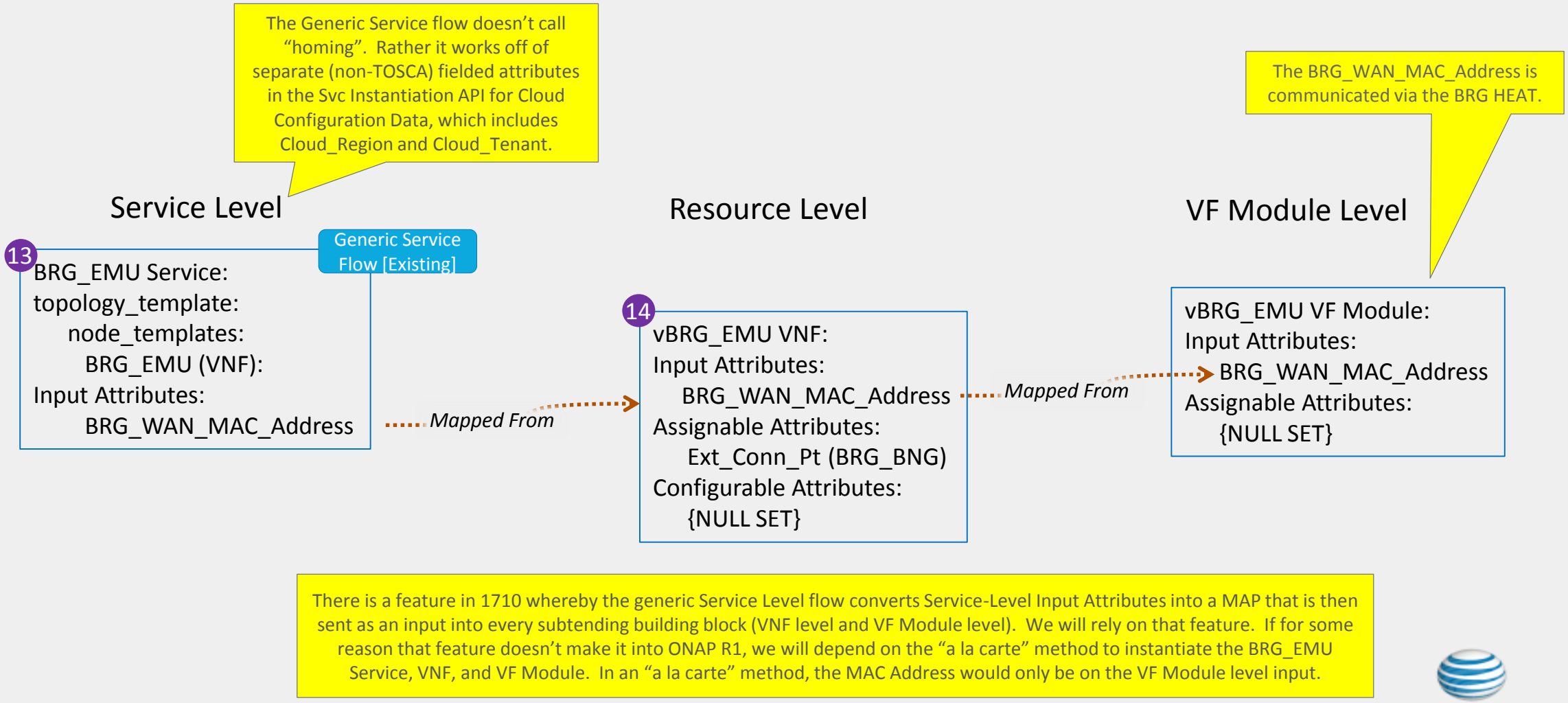
vGMUX VF Module:
Input Attributes:
{NULL Set}
Assignable Attributes:
vGMUX_WAN_IP (BNG_MUX)
vGMUX_LAN_IP (MUX_GW)
OA&M_IP (ONAP_OAM)

As part of the VNF-level "Assign" operation, SDNC determines that the vGMUX must connect to three network types. SDNC assigns the network names for each. SDNC uses the TOSCA to determine that these connection points need to be assigned; SDNC returns a structure to SO, which SO maps to the HEAT. There is no infrastructure-level configuration of the vGMUX needed.

Residential Broadband vCPE Use Case Model: vBNG Service Data Mappings

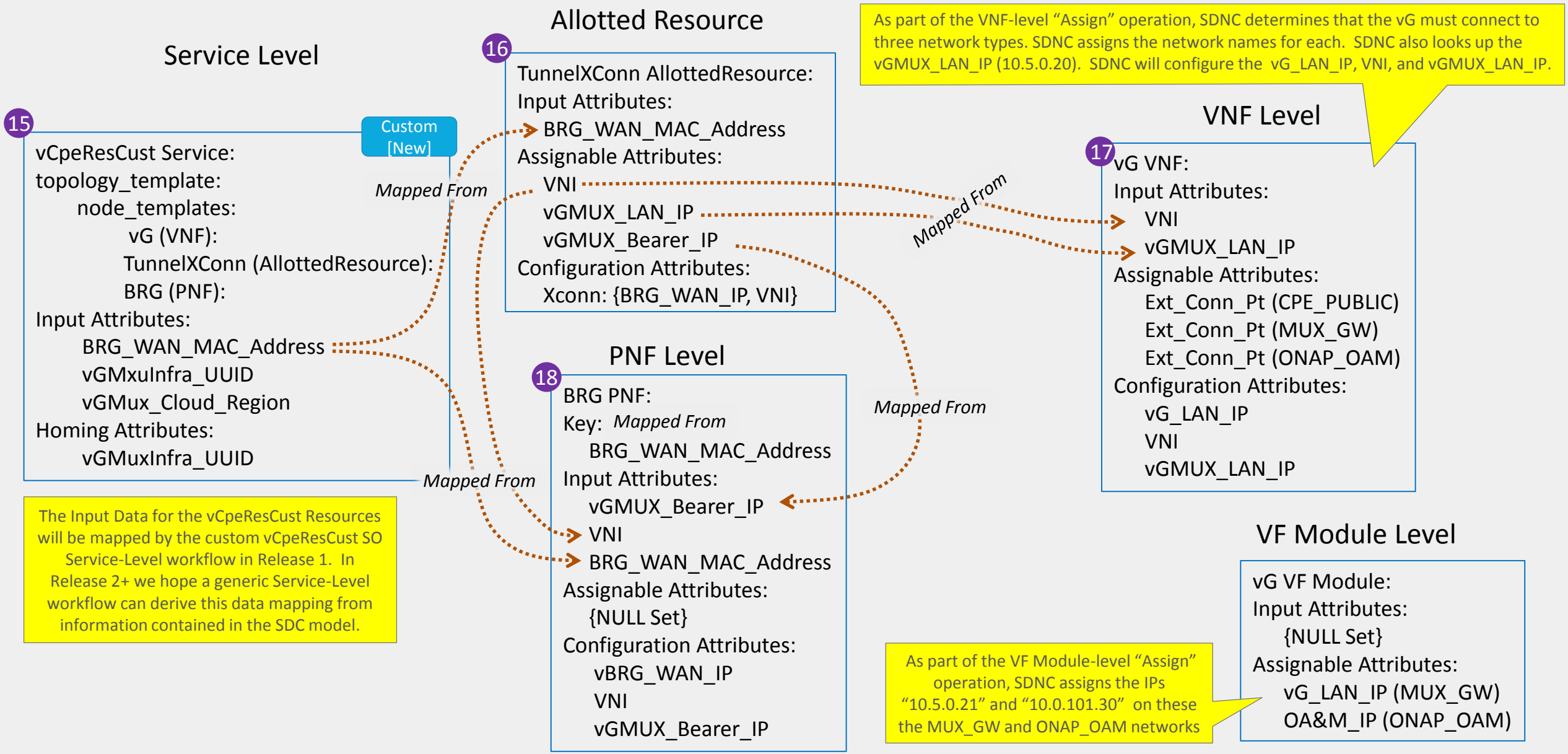


Residential Broadband vCPE Use Case Model: BRG_EMU Service Data Mappings

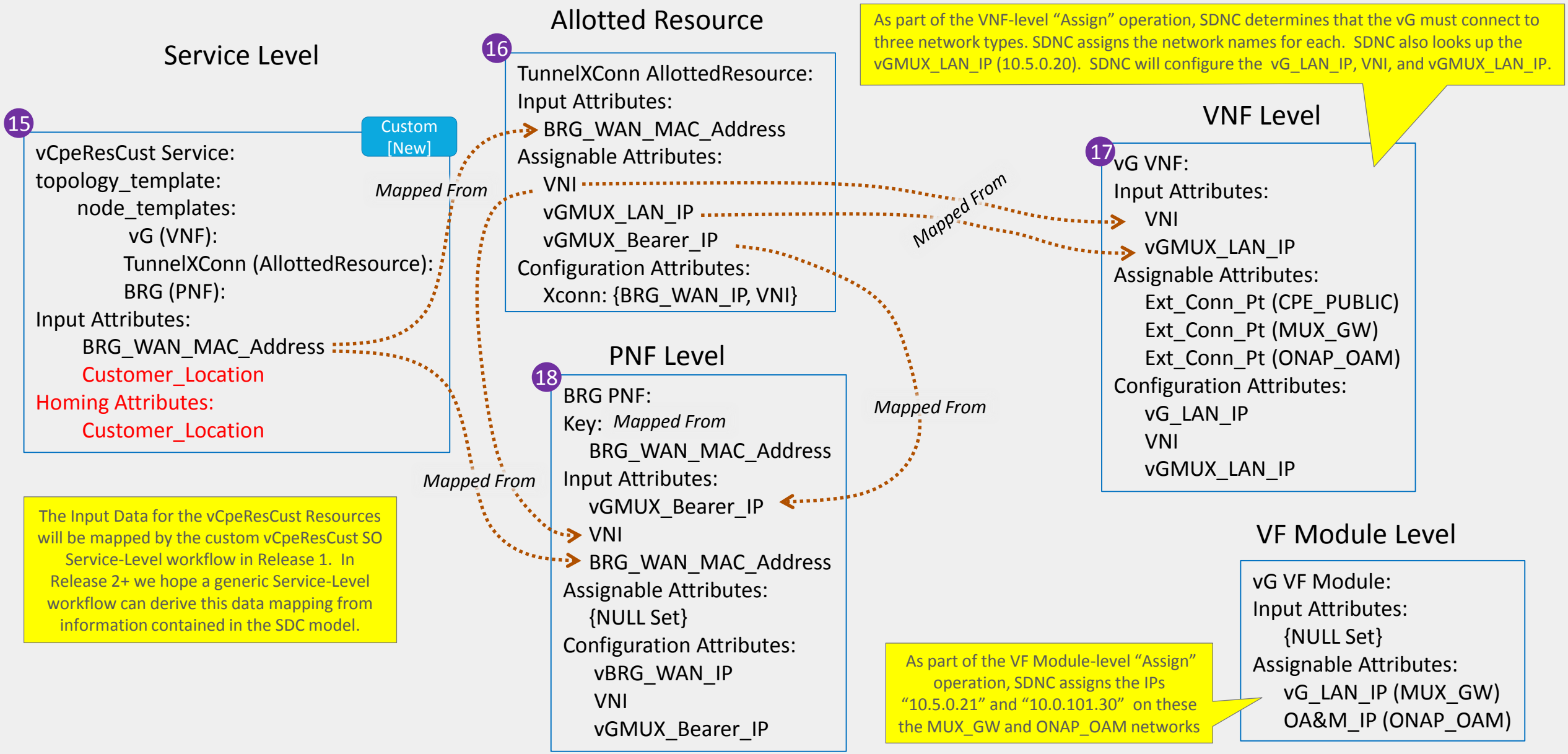


There is a feature in 1710 whereby the generic Service Level flow converts Service-Level Input Attributes into a MAP that is then sent as an input into every subtending building block (VNF level and VF Module level). We will rely on that feature. If for some reason that feature doesn't make it into ONAP R1, we will depend on the "a la carte" method to instantiate the BRG_EMU Service, VNF, and VF Module. In an "a la carte" method, the MAC Address would only be on the VF Module level input.

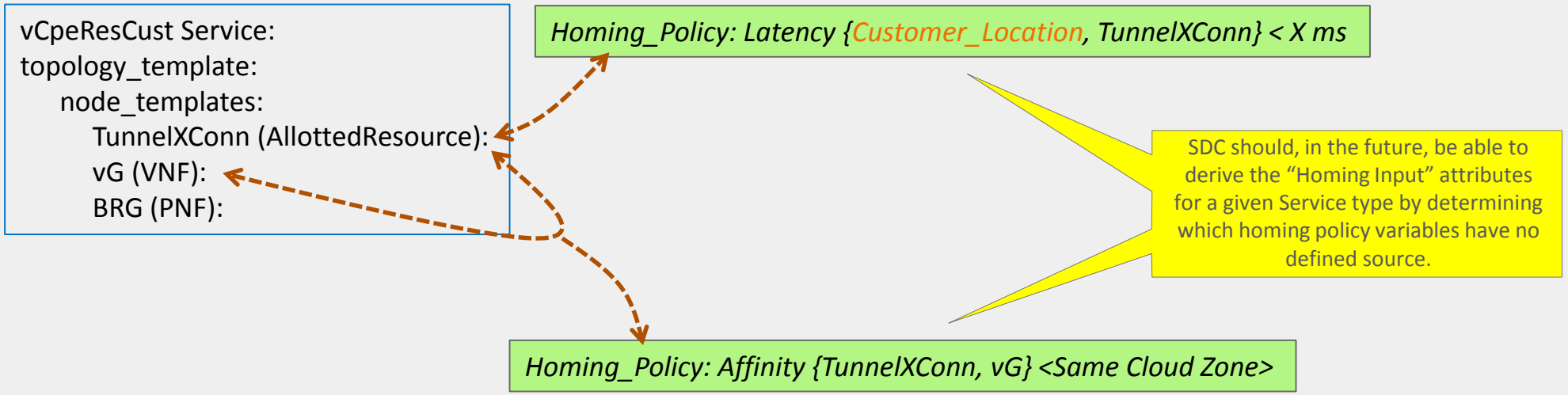
Residential Broadband vCPE Use Case Model: vCpeResCust Input Data Mappings (R1)



Residential Broadband vCPE Use Case Model: vCpeResCust Input Data Mappings (R1)

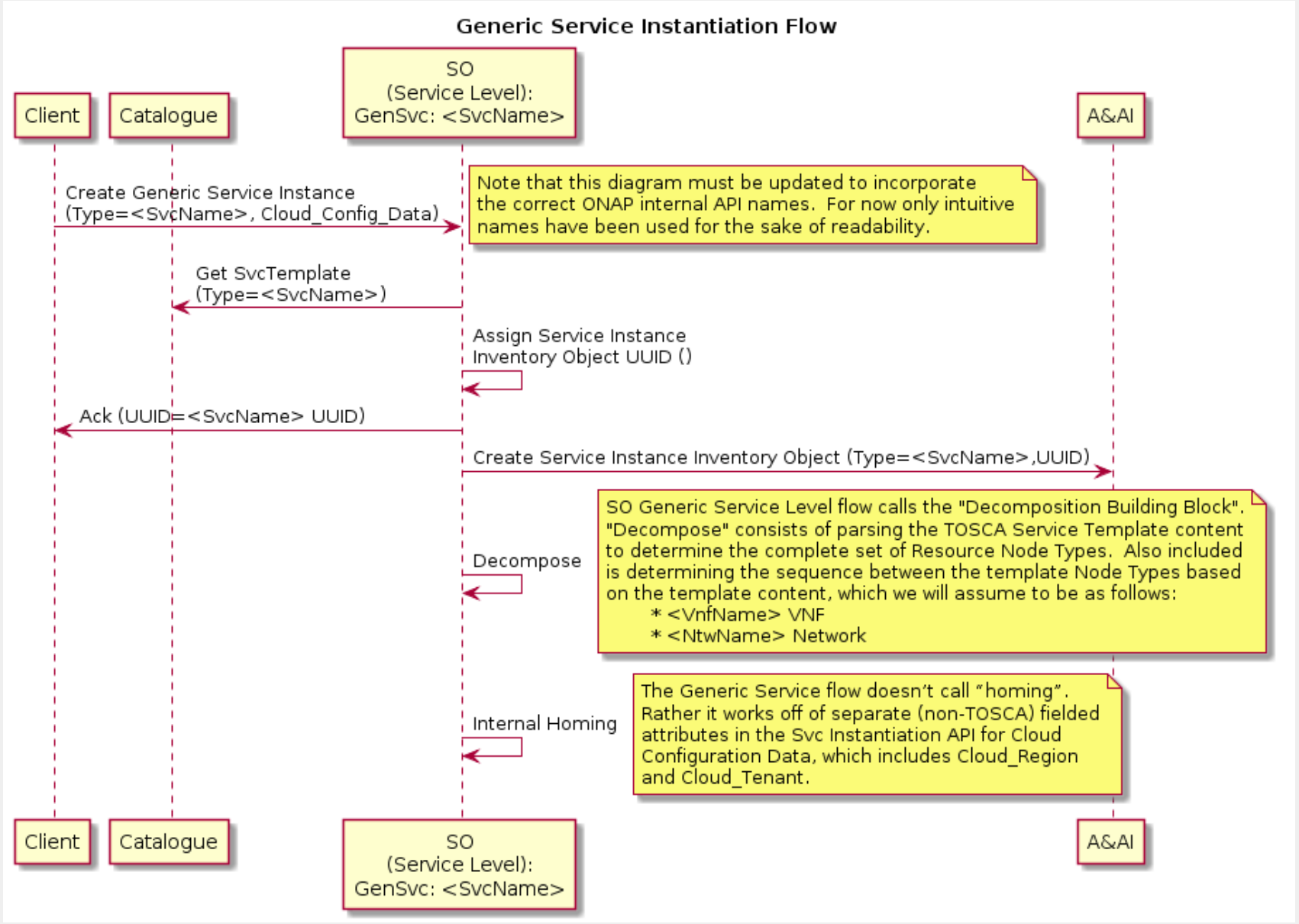


Residential Broadband vCPE Use Case Model: Homing Policies (Release 2)



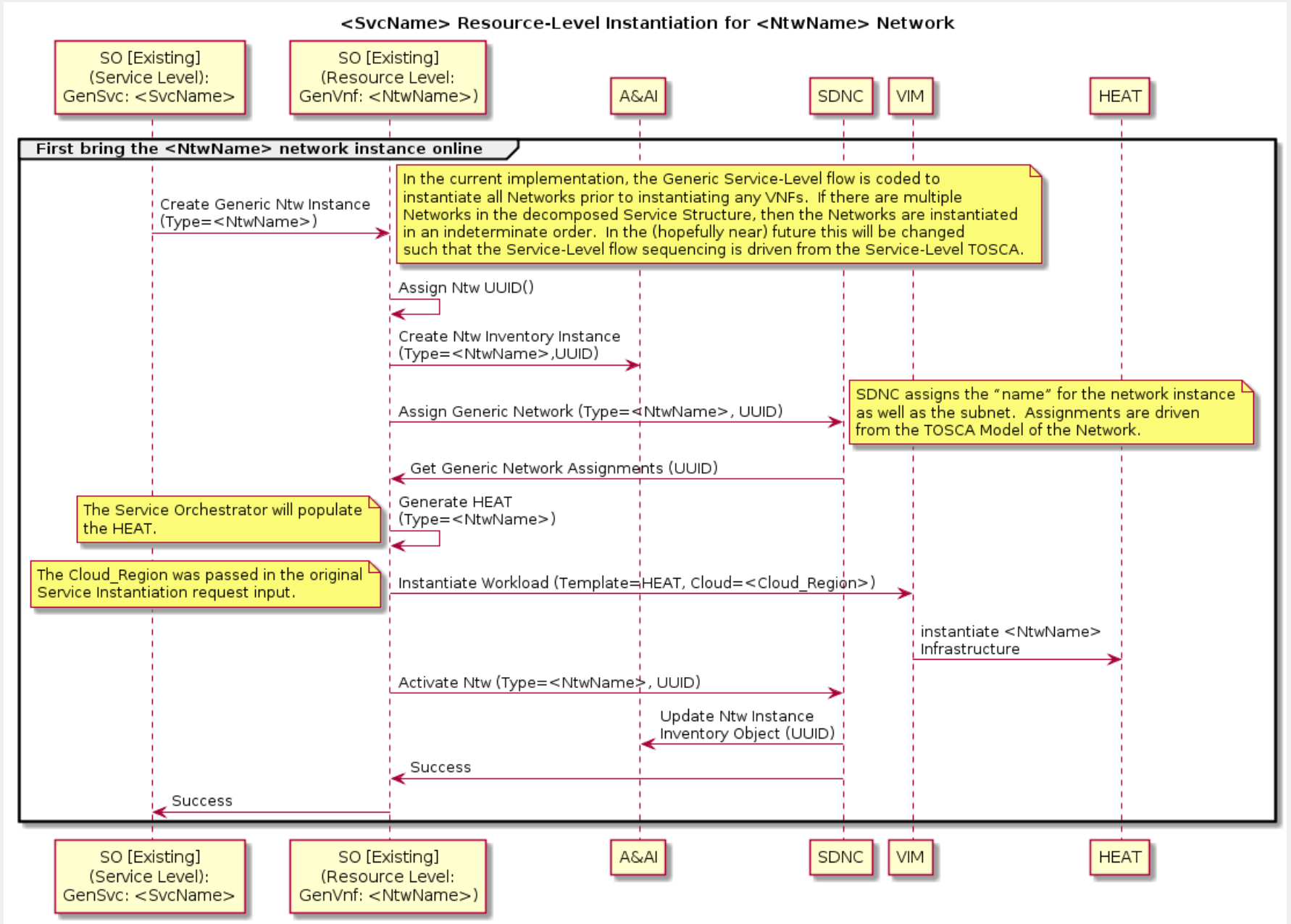
Generic Service Level Processing

onap_uc_Generic_Service.html



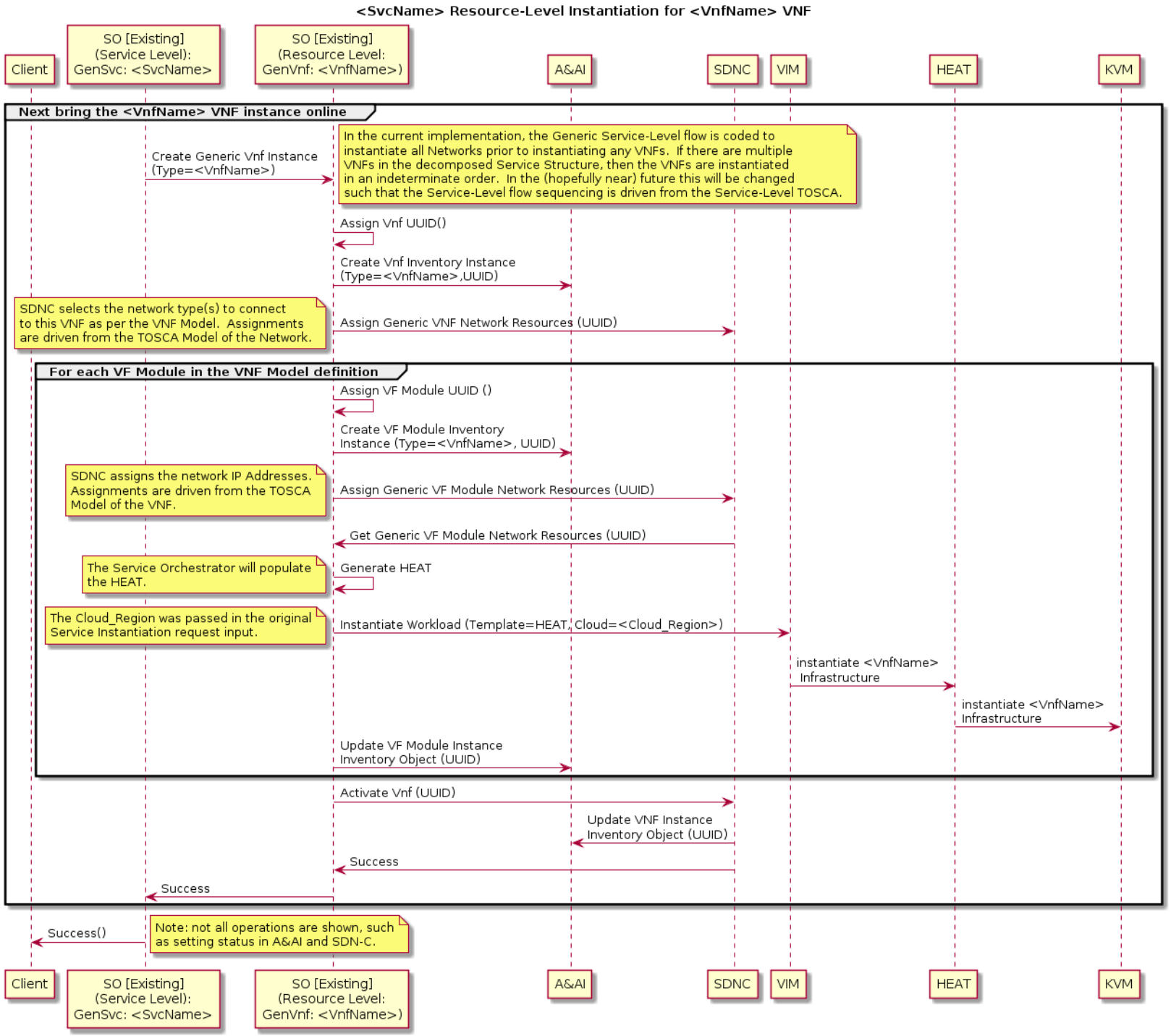
Generic Resource Level Processing: Networks

onap_uc_Generic_Resource_Ntw.html



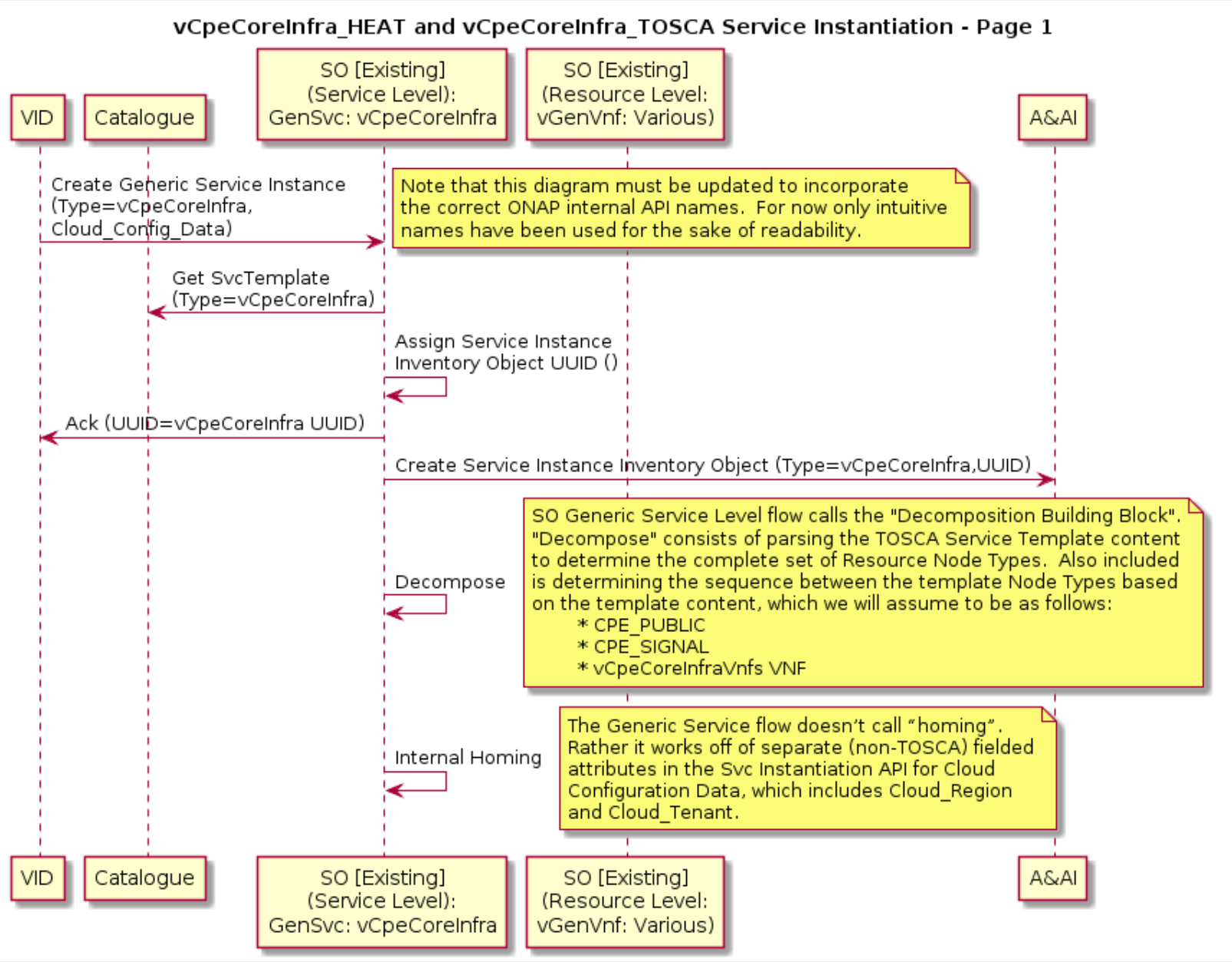
Generic Resource Level Processing: VNFs

onap_uc_Generic_Resource_VNF.html

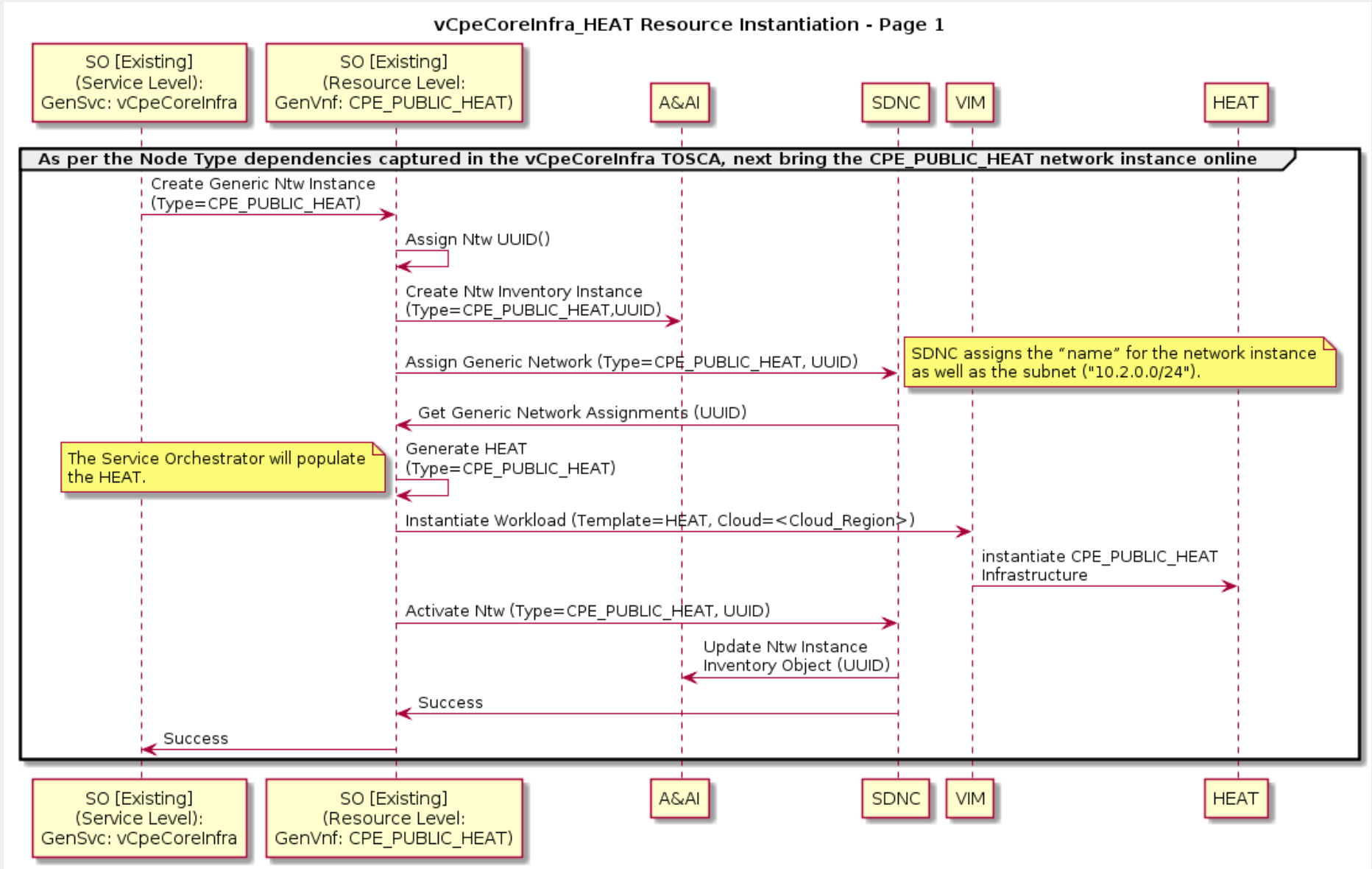


vCpeCoreInfra_HEAT And vCpeCoreInfra_TOSCA Service Level Processing

onap_uc_vCPE_CoreInfra.html



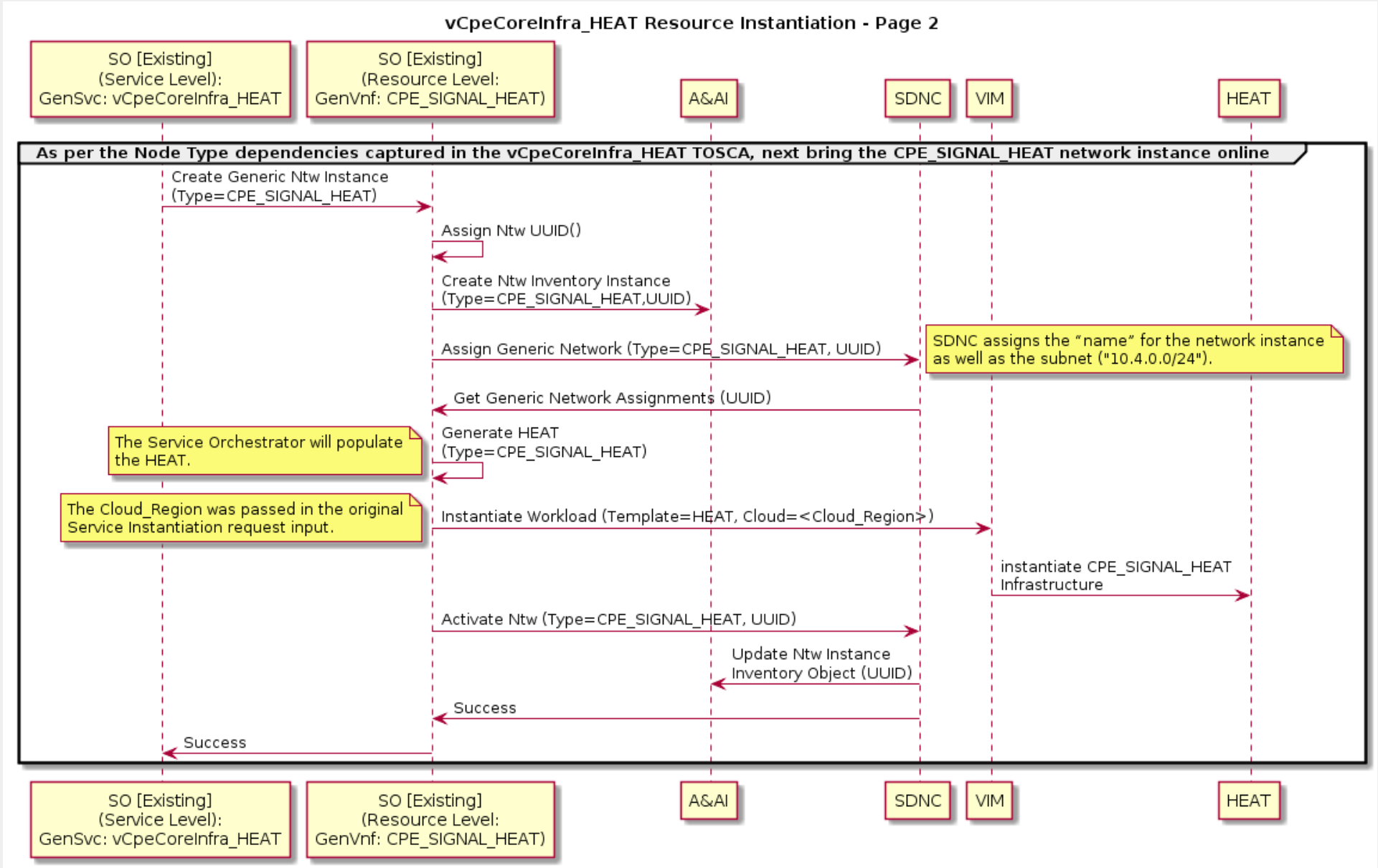
vCpeCoreInfra_HEAT Resource Level Processing (CPE_PUBLIC_HEAT)



onap_uc_vCPE_CoreInfra_p2.html

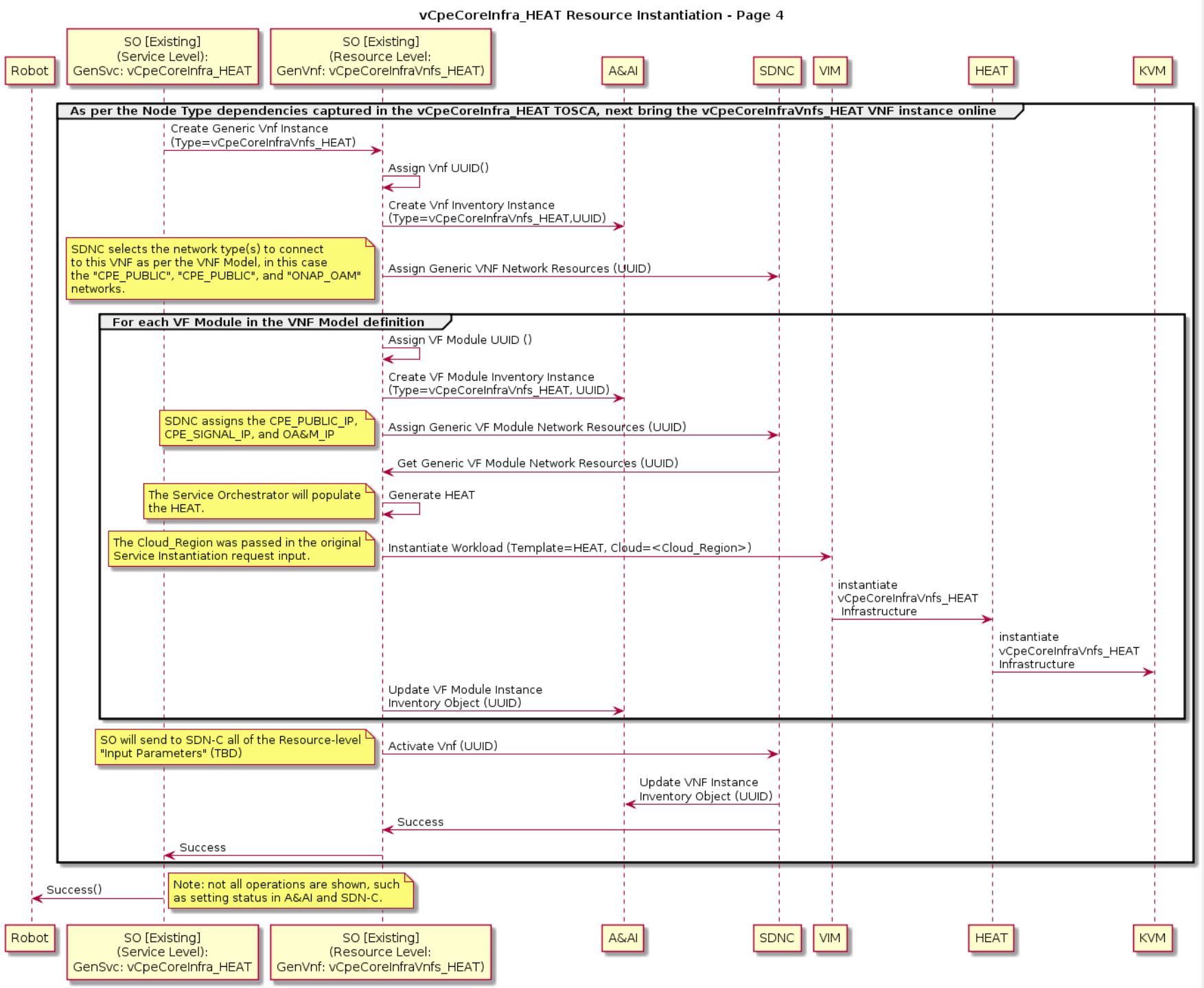
vCpeCoreInfra_HEAT Resource Level Processing (CPE_SIGNAL_HEAT)

onap_uc_vCPE_CoreInfra_p3.html



vCpeCoreInfra_HEAT Resource Level Processing (vCpeCoreInfraVnfs_HEAT)

onap_uc_vCPE_CoreInfra_p4.html



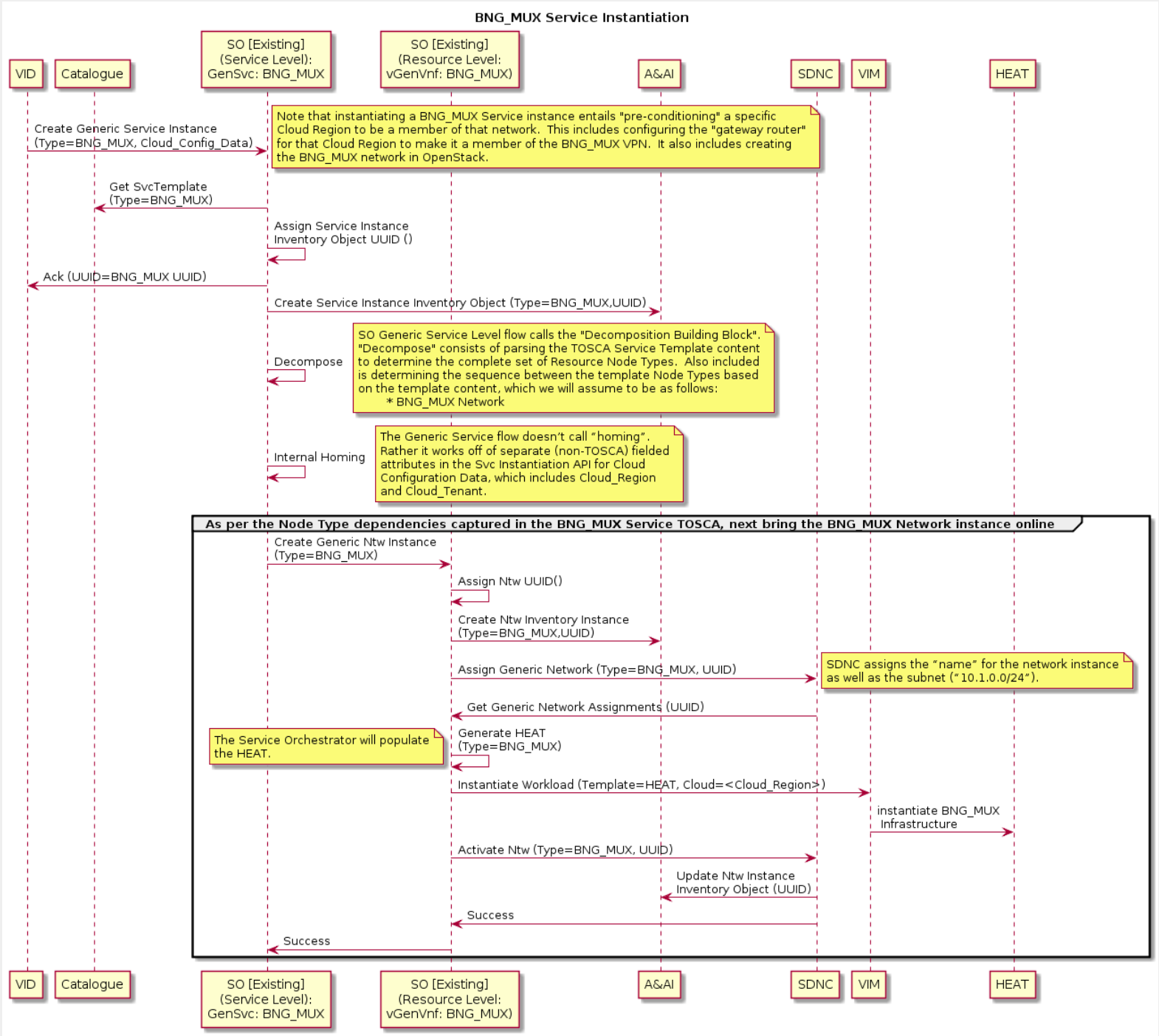
vCpeCoreInfra_TOSCA Resource Level Processing (vCpeCoreInfraVnfs_TOSCA)

To incorporate ARIA option, need to show that the SO Adaptor determines from the SDC Model that the VNF is described using TOSCA versus HEAT. In the former case the Adaptor will generate a TOSCA document to forward to ARIA, rather than what is shown here.

Need to flesh out the interactions between HEAT and OS and ARIA and OS

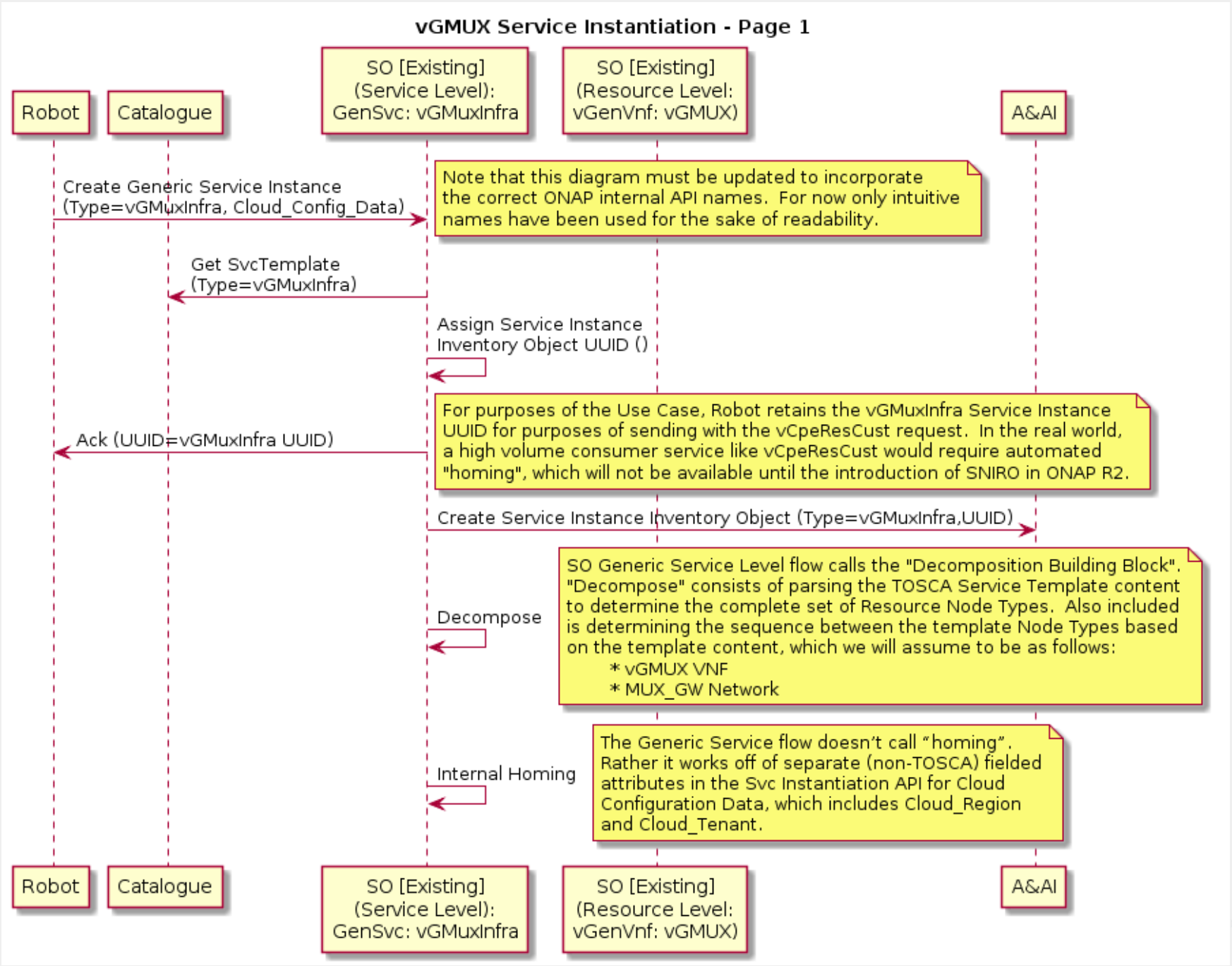
BNG_MUX Service and Resource Level Processing

onap_uc_vBNG_WAN.html



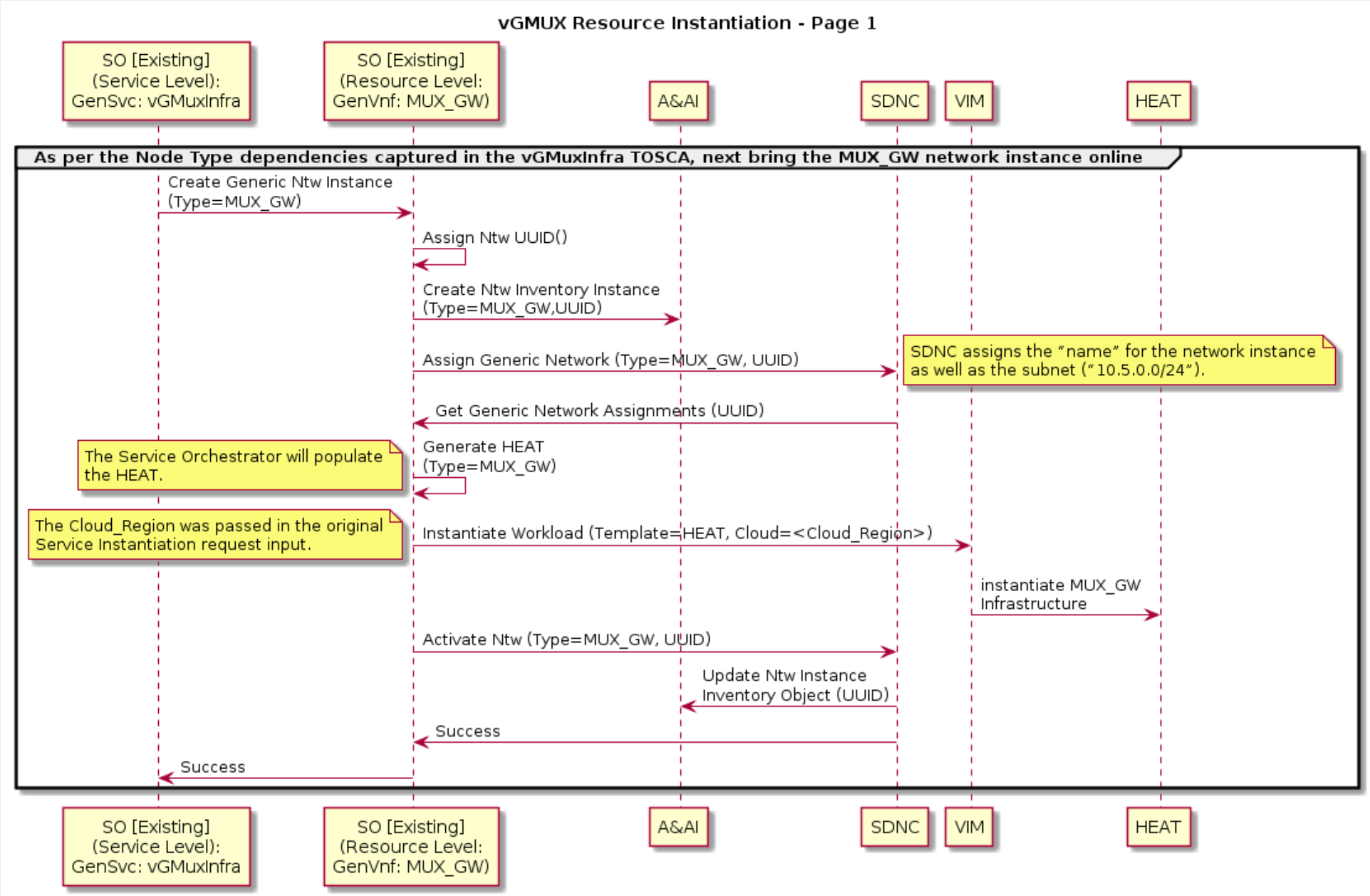
vGMuxInfra Service Level Processing

onap_uc_res_vcpe_vgmux_p1.html



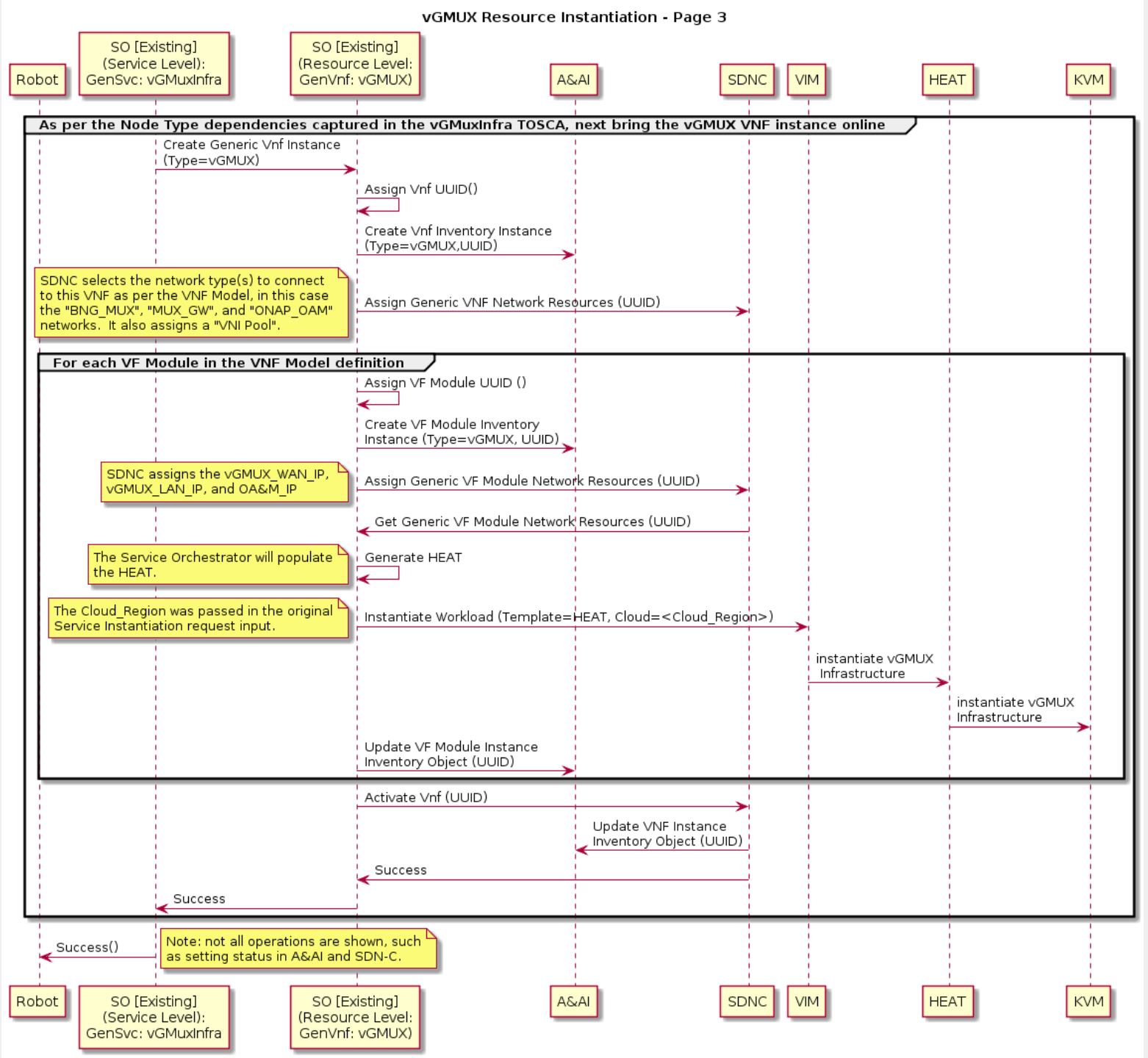
vGMuxInfra Resource Level Processing (MUX_GW Network)

onap_uc_res_vcpe_vgmux_p2.html



vGMuxInfra Resource Level Processing (VNF)

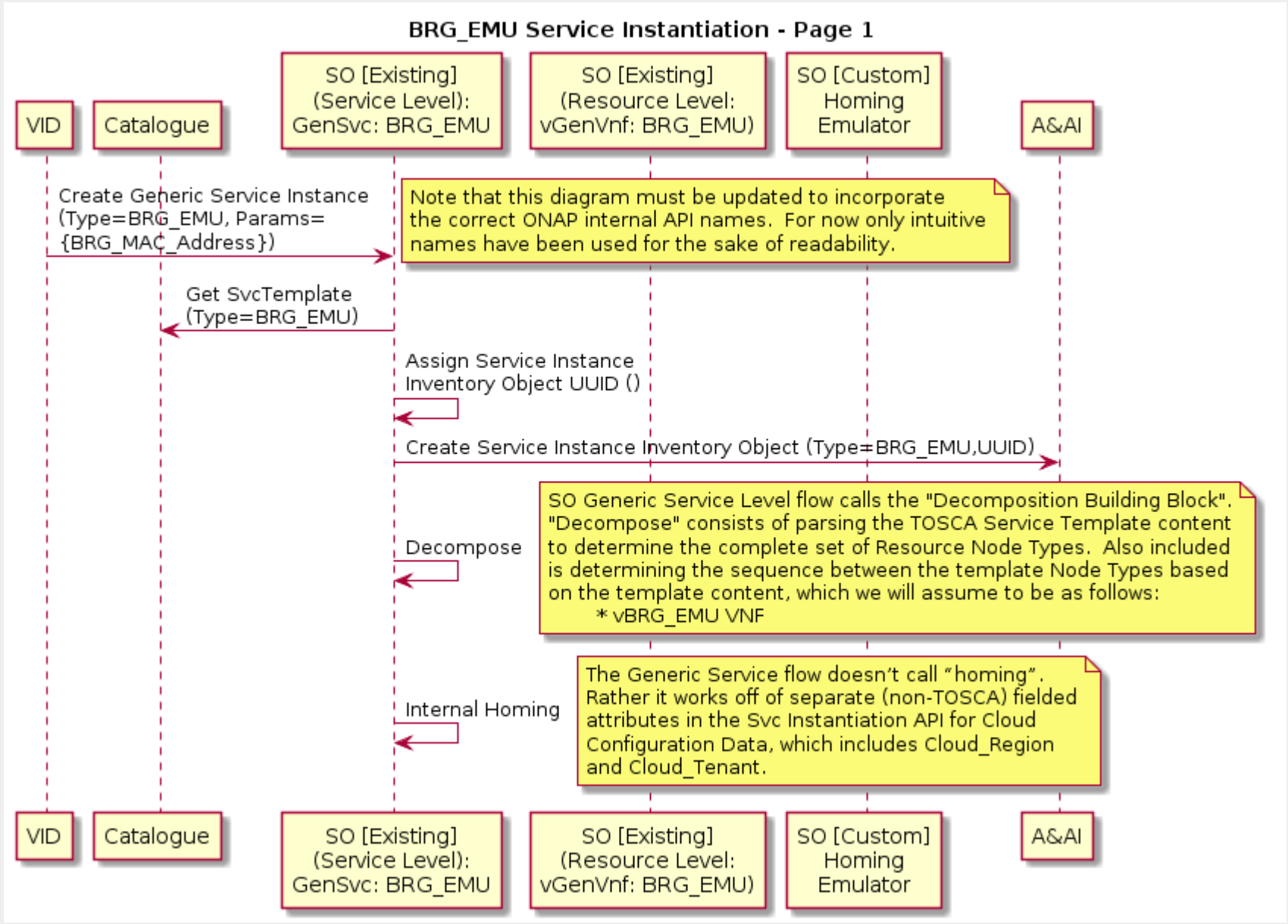
onap_uc_res_vcpe_vgmux_p3.html



BRG_EMU Service Level Processing

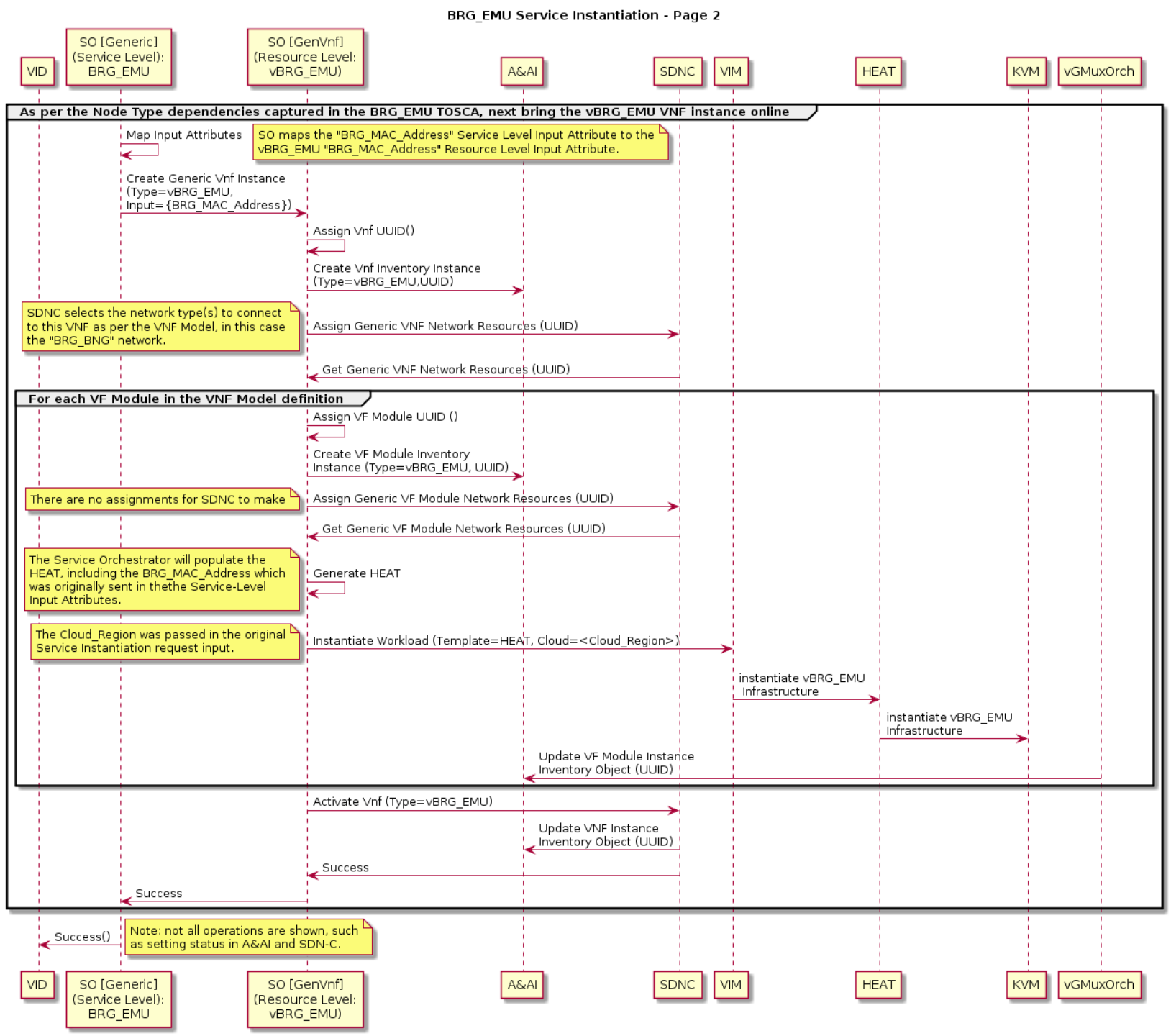
Note that because the BRG_EMU Service is an artificial construct, this orchestration flow would have no analogue in the "real world".

onap_uc_res_vcpe_brg_emu_r1.html



BRG_EMU Service Resource Level Processing

onap_uc_res_vcpe_brg_emu_r1_p2.html



Assumptions

Once the BRG_EMU VNF Controller configures the vBRG_EMU VNF (see prior slide), that VNF will initiate DHCP interactions. This will result in an event being generated, which will be intercepted by the BRG PNF Controller. Note that the BRG_EMU VNF Controller shown in the prior sequence diagram is a *different* Controller function, and hence may be a different Controller instance, than the BRG PNF Controller which receives this event.

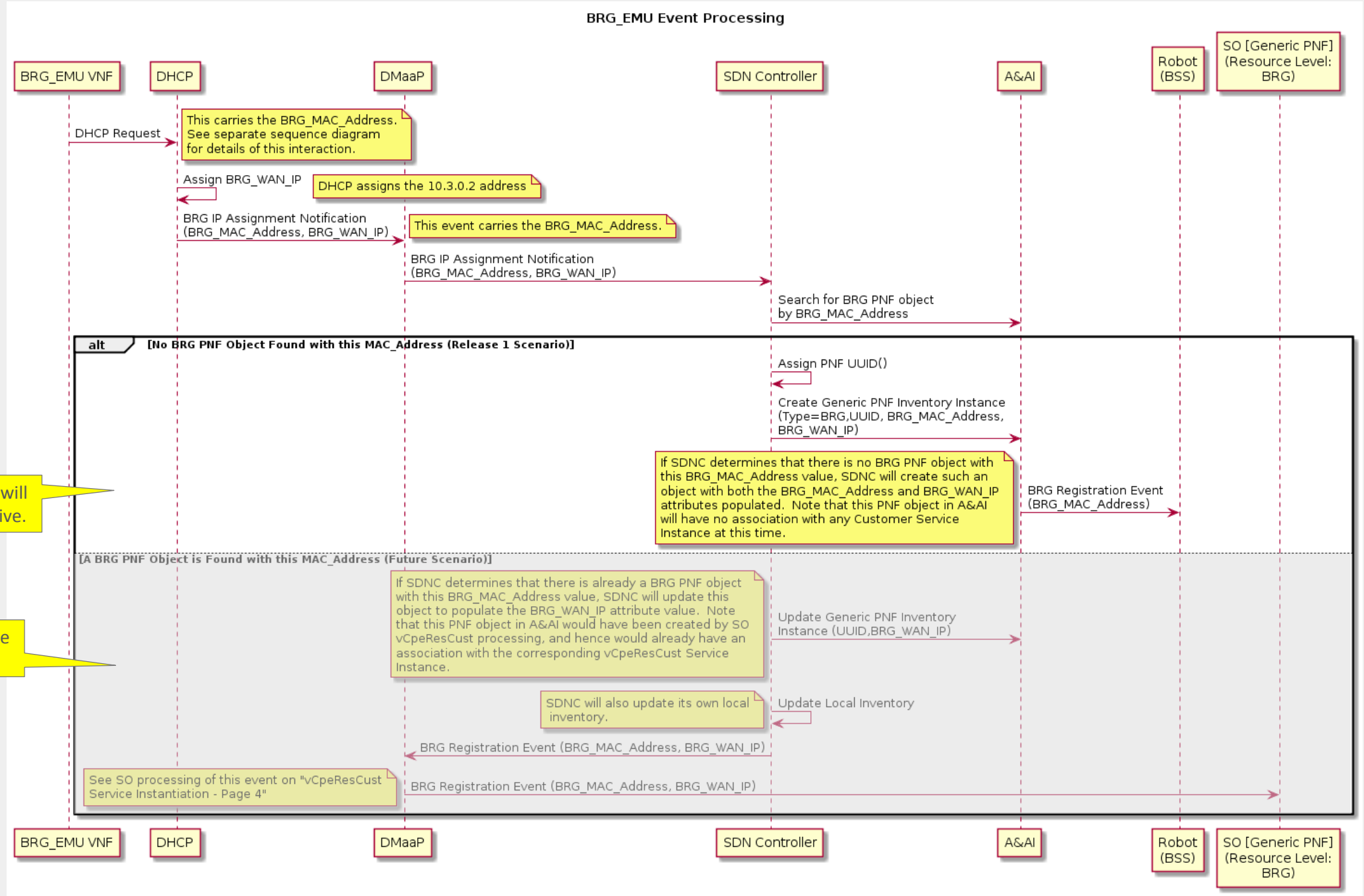
Being independent of each other, the vCpeResCust service instantiation request may be received in ONAP before the BRG PNF Controller receives this event notification, or it may be received after. The following sequence diagrams show both possibilities. However, in Release 1, only the latter will be supported.

BRG_EMU Event Processing

onap_uc_res_vcpe_r1_brg_event.html

In Release 1 Use Case we will support only this alternative.

We will defer this alternative until Release 2 or beyond.

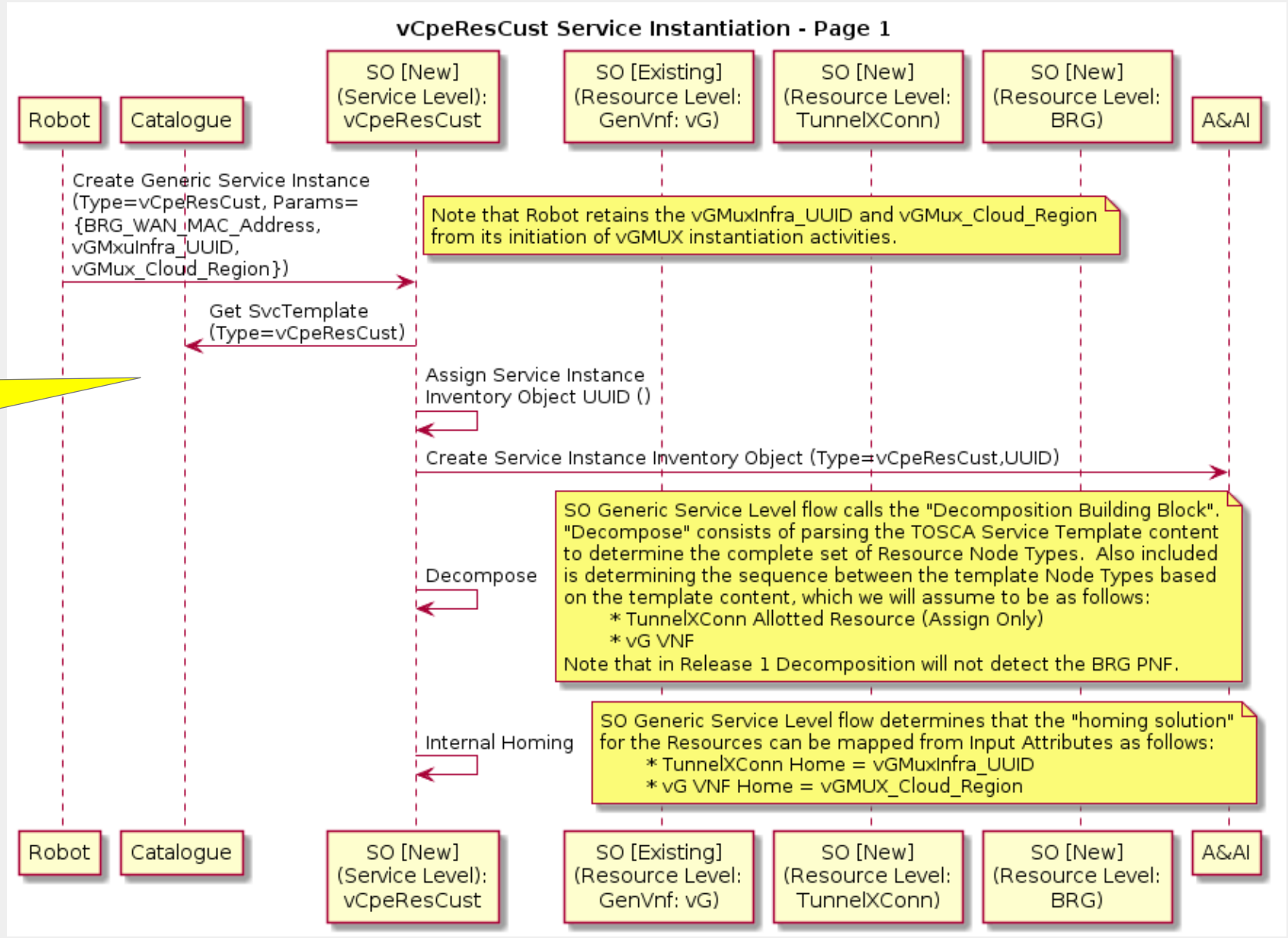


Release 1 View

vCpeResCust Service Level Processing

Because the vCpeResCust service involves an Allotted Resource and a PNF, the generic Service Level ("top level") SO flow will not support this Service. So in Release 1 we either need to extend the generic Service Level flow to support Allotted Resources/PNFs or build a Custom flow for vCpeResCust.

onap_uc_res_vcpe_r1_p1.html

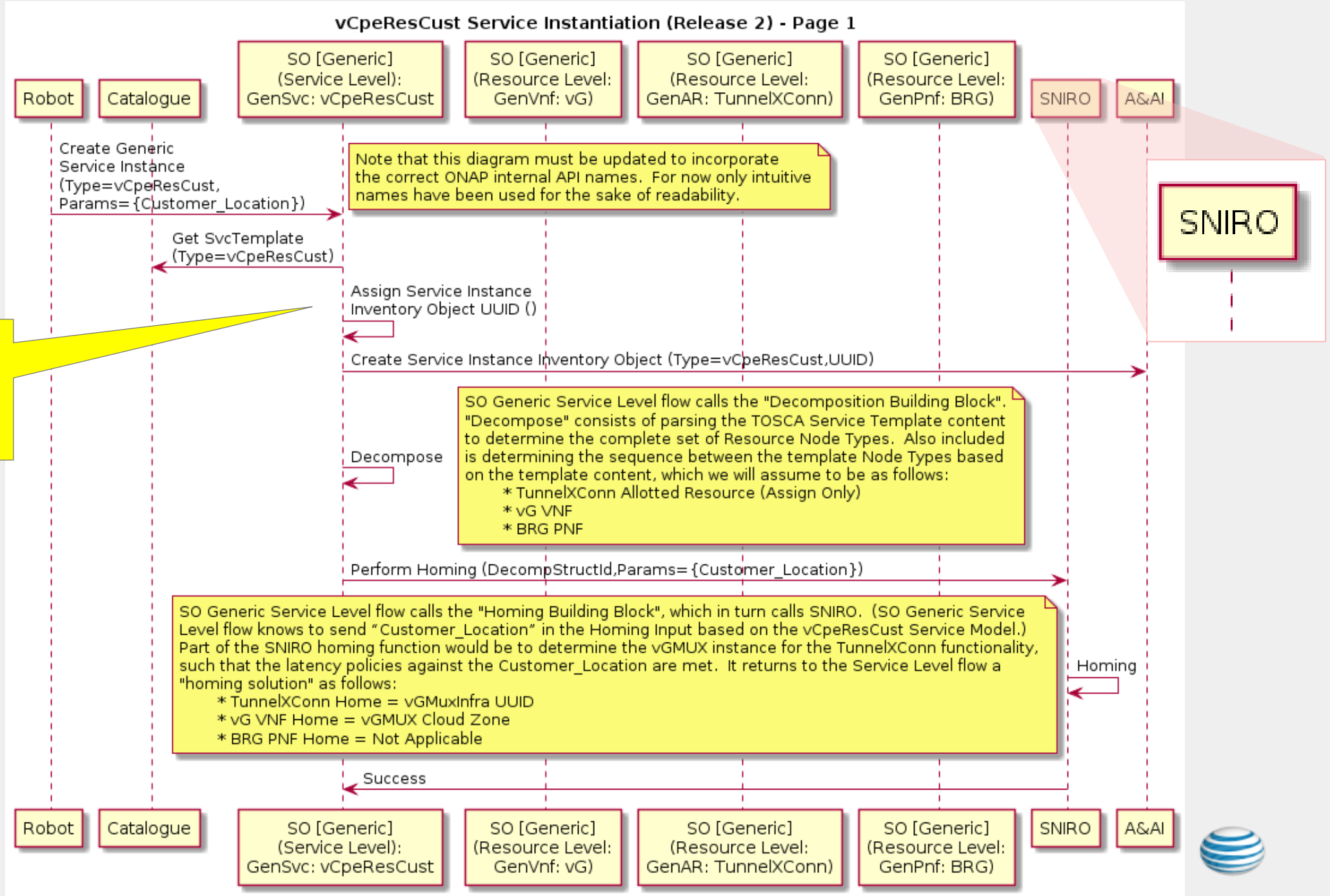


Release 2 View

vCpeResCust Service Level Processing

Aspirational goal: In Release 2 we will have support for a Generic Service-Level ("top level") flow that handles both Allotted Resources and PNFs, as well as integration with SNIRO.

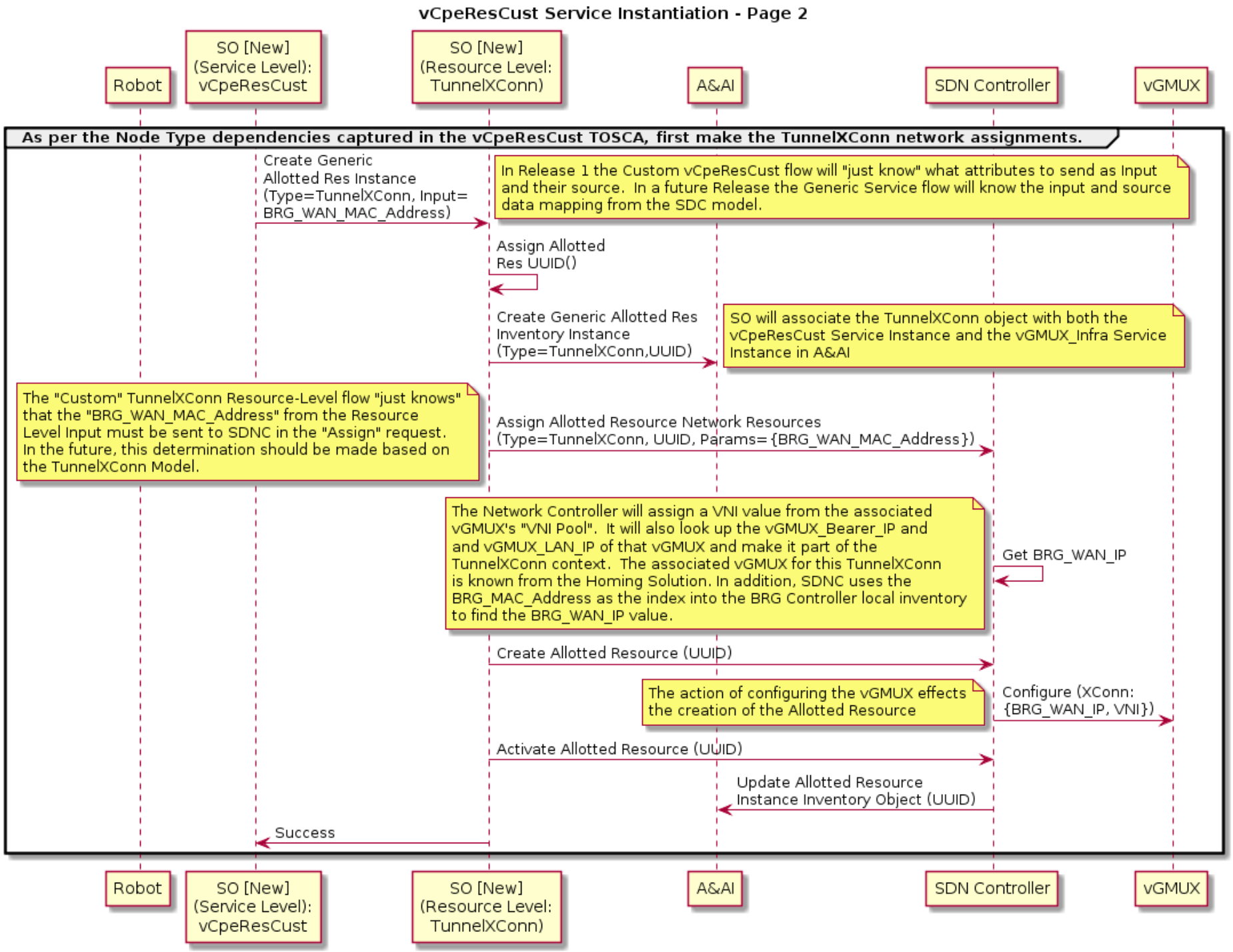
onap_uc_res_vcpe_r2_p1.html



vCpeResCust Resource Level Processing:

- *TunnelXConn Allotted Resource*

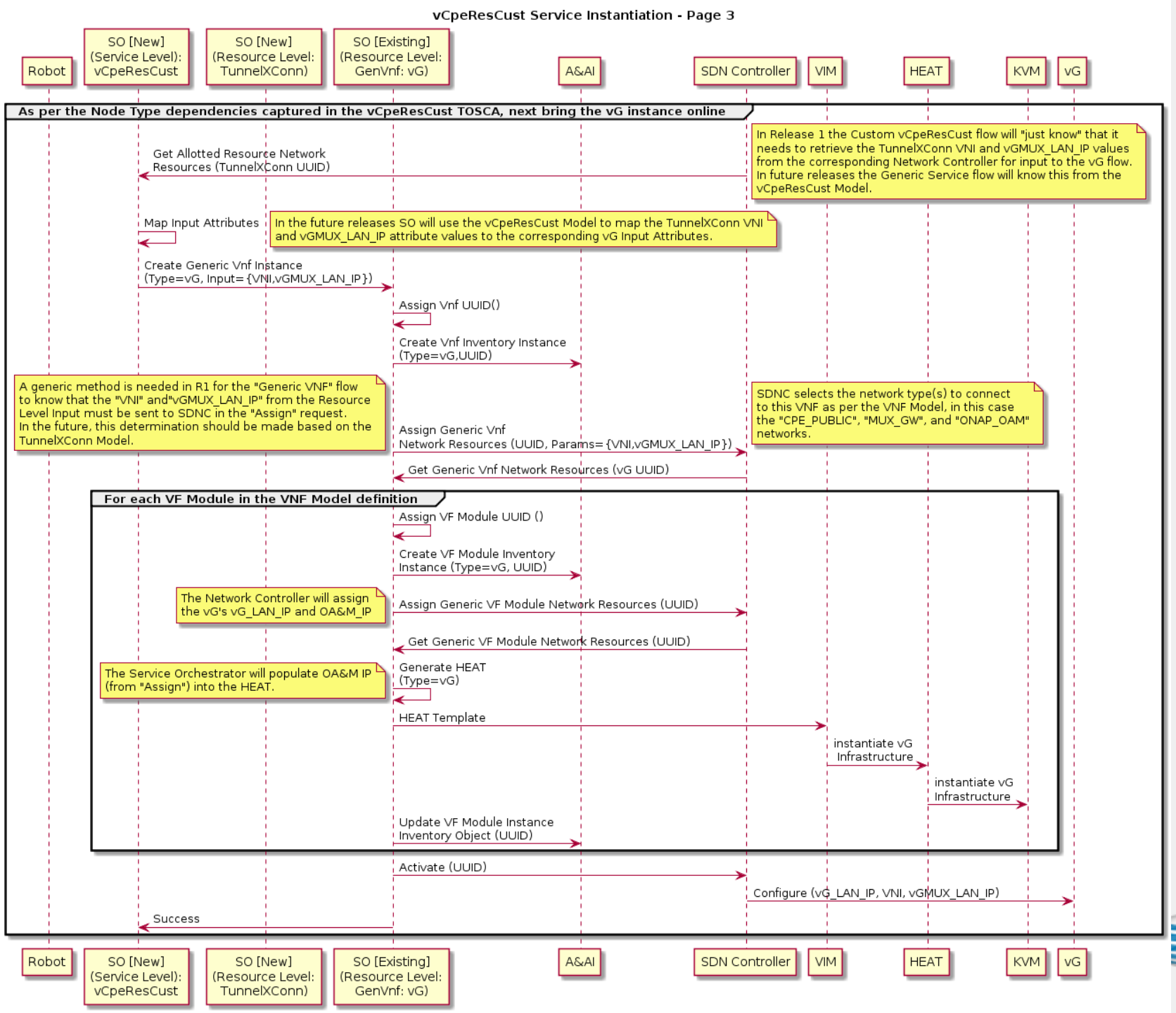
onap_uc_res_vcpe_r1_p2.html



vCpeResCust Resource Level Processing:

- *vG VNF*

onap_uc_res_vcpe_r1_p3.html



vCpeResCust Resource Level Processing:

- *BRG PNF*

onap_uc_res_vcpe_r1_p4.html

We will defer this alternative until Release 2 or beyond.

In Release 1 Use Case we will support only this alternative.

Future:

- Add step to get monitoring in place at the Service and Resource level (via REST call)
- Add step to get Security in place
- Add step to notify turn up to Ops; need to define a REST call to an external system.