

Manual Scale-Out (Addition of SF) Feature of VPC-DI from Element Manager

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Introduction

This document describes how to do manual scale-out (addition of one new Service Function card) to a running VPC-DI (Virtual Packet Core - Dual Instance) setup without the need to reload or redeploy VPC gateway, This feature is to support the requirement of new capacity expansion of gateway.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco Ultra Virtual Packet Core solutions components
- Ultra Automation Services(UAS)
- Elastic Service Controllers (ESC)
- Openstack

Other than that you need these as prerequisites:

- VPC-DI full-stack instance running with the proper configuration in a healthy environment
- All required network configurations are in place related to DI (Dual Instance) and service networks of targetted new SF(Service Function) cards
- Required resources & permissions are available at Openstack level (Cloud) example, host, CPU RAM, and quota, etc.
- ESC is in a healthy condition.

- Any other dependency based on your cloud setup design like additional interface, networks or resource.
- Cloud status is healthy and there are no warnings or alarms.

Components Used

The information in this document is based on these software and hardware versions:

- USP 6.6
- ESC: 4.4.0(88)
- StarOS : 21.12.0 (71244)
- Cloud - CVIM 2.4.16
- UCS M4 C240 servers - 4pc

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

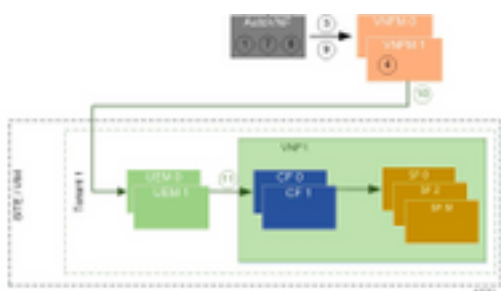
Background Information

The setup is called a standalone AutoVNF deployment setup where there are no NSO solutions. With this article, in an existing running VPC-DI setup, a person can add SF card from EM flawlessly to support additional capacity requirement,

It consists of these VMs types.

- AutoVNF VM - 1 instance
- Element Manager VM - 2 instance
- Control Function VM - 2 instance
- Session Function VM - 2 instance
- ESC (VNF) - 2instance (IN HA)

Currently, in VPC-DI gateway, you have one SF VM in running state i.e one SF card 3 is active at application levels, One more card (SF card 4) is added here as part of the scale-out activity.



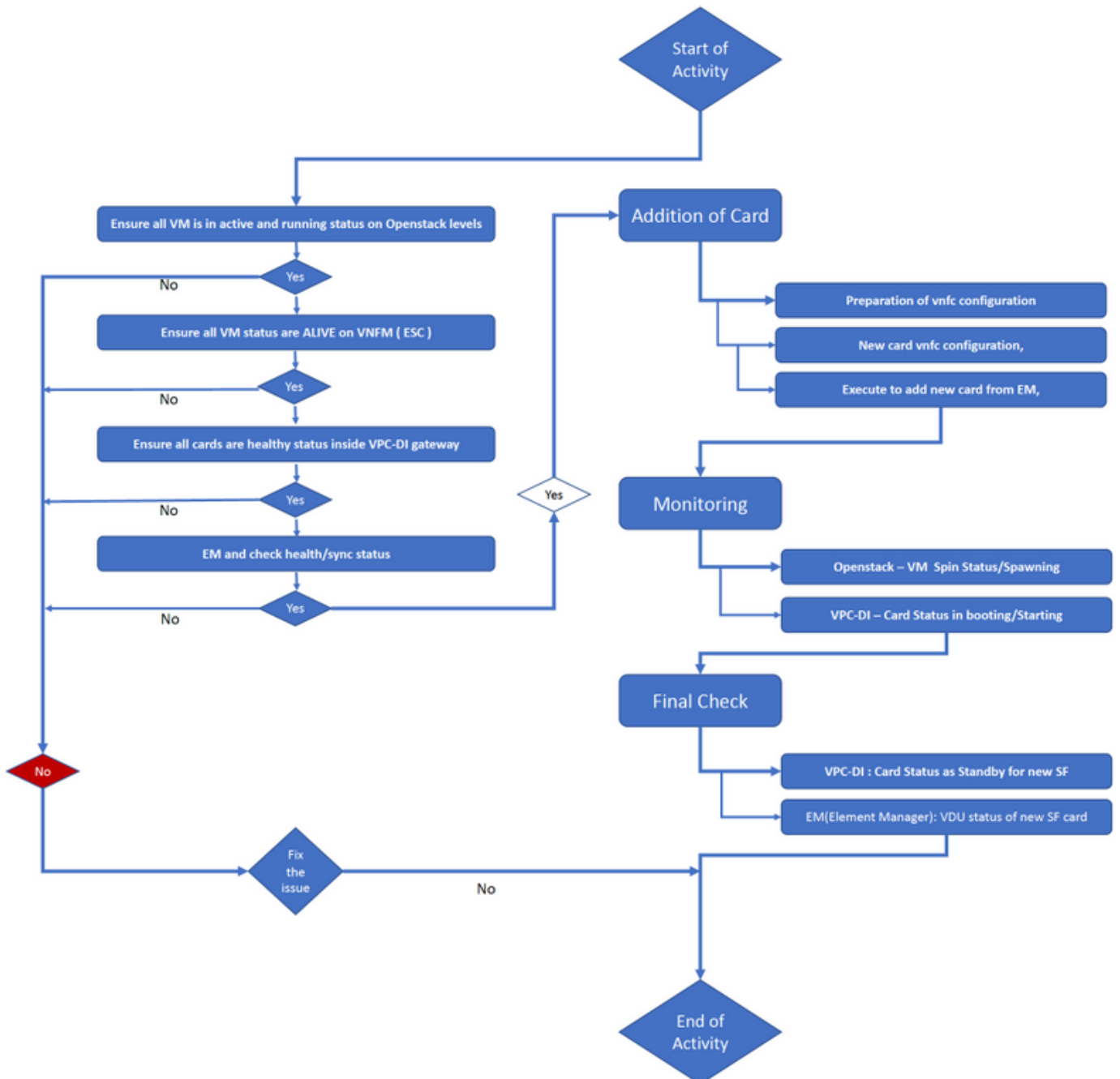
High level setup architecture

Abbreviations

HA	High Availability
VNF	Virtual Network Function
CF	Control Function
SF	Service Function
ESC	Elastic Service Controller
MOP	Method of Procedure

OSD	Object Storage Disks
HDD	Hard Disk Drive
SSD	Solid State Drive
VIM	Virtual Infrastructure Manager
VM	Virtual Machine
EM	Element Manager
UAS	Ultra Automation Services
UUID	Universally Unique Identifier

Workflow of the MoP



Procedure

Step 1. Ensure all VM is in an active and running status on Openstack levels.

```

nova list --tenant f35c8df20d6713430eda5565f241d74a399 --field
name,status,task_state,power_state
+-----+-----+-----+-----+-----+
| ID | Name | Status | Task State | Power
State |
+-----+-----+-----+-----+
| f5e2e048-f013-4b17-b2af-c427bbafd043 | lab-saegw-spgw-em-1 | ACTIVE | None |
Running |
| 6a9a391a-e23c-4c1b-9d92-cdc3ed991c71 | lab-saegw-spgw-em-2 | ACTIVE | None |
Running |
| ab08e077-aec7-4fa5-900c-11f5758998eb | lab-saegw-spgw-vdu-cf1-0 | ACTIVE | None |
Running |
| 09524fd3-20ea-4eda-b8ff-4bd39c2af265 | lab-saegw-spgw-vdu-cf1-1 | ACTIVE | None |
Running |
| ed6f7010-dabc-44ac-ae49-f625d297f8ad | lab-saegw-spgw-vdu-sf1-0 | ACTIVE | None |
Running |
+-----+-----+-----+-----+
-----+

```

Step 2. Ensure all VM status are ALIVE on VNFM (ESC) monitoring. If any VM is in error, it has to fix it before proceeding with this activity.

```

DEPLOYMENT NAME          VM NAME
STATE
-----
lab-saegw-spgw-em       lab-saegw-spgw-e_lab-sa_0_2a70c6b5-b9c7-4382-82a6-f1ad052bb824
VM_ALIVE_STATE
lab-saegw-spgw-em       lab-saegw-spgw-e_lab-sa_0_ea3113bc-7582-4b49-8876-a70bf1b74634
VM_ALIVE_STATE
lab-saegw-spgw-usp-em-6.6.0 lab-saegw-spgw-u_cf1_0_a7d8d54b-2d02-415e-93f8-907f90999e2b
VM_ALIVE_STATE
lab-saegw-spgw-usp-em-6.6.0 lab-saegw-spgw-u_cf2_0_3a4f9330-2481-4178-94e3-a656dfa45bdd
VM_ALIVE_STATE
lab-saegw-spgw-usp-em-6.6.0 lab-saegw-spgw-u_sf1_0_9cf03821-08bf-4ef3-b6bc-471d9bf869fc
VM_ALIVE_STATE

```

Step 3. Ensure all cards are healthy status inside VPC-DI gateway, and emctrl status is Alive.

```

[local]ugp-saegw# show card table
Slot      Card Type                               Oper State   SPOF  Attach
-----
1: CFC    Control Function Virtual Card           Active       Yes
2: CFC    Control Function Virtual Card           Standby      -
3: FC     6-Port Service Function Virtual Card    Active       Yes
[local]ugp-saegw#

```

```

[local]ugp-saegw# show emctrl status
emctrl status:
emctrl in state: ALIVE
[local]ugp-saegw#

```

Step 4. Log in to EM and check health/sync status.

```

ubuntu@lab-saegw-spgw-em-1:~$ ncs_cli -u admin -C
admin@scm# show ems
EM          VNFM
ID  SLA  SCM  PROXY  VERSION

```

21 UP UP UP 6.6.0

```
admin@scm#  
admin@scm# show ncs-state ha  
ncs-state ha mode master  
ncs-state ha node-id AVNTSwpVTwABHAdV  
ncs-state ha connected-slave [ AVNTSwpVTwABHAdW ]  
admin@scm#
```

There are a few more lists of health checkups meant for EM which are out of the scope of this article. Hence, a suitable action must be taken accordingly if any other errors are observed.

Step 5. Addition of new SF Card 4 from EM.

Preparation of vnfc Configuration

Note: You must be careful in making vnfc configuration. It must not conflict with the existing vnfc cards. Hence ensure to do changes on top of your last vnfc. For example, if in gateway you have 5 cards in sf vdu, you have to pick and consider 5th vnfc card configuration for preparation of new card vnfc configuration. Get the existing last card vnfc configuration and target the highlighted variables to be changed to the next numbers for new cards on top of it as per this example. In our examples, the last card number is 3 and the new card number is 4.

```
admin@scm# show running-config vnfdservice:vnfd lab-saegw-spgw element-group ugp constituent-vdu  
vdu-sf1  
vnfdservice:vnfd lab-saegw-spgw  
element-group ugp  
constituent-vdu vdu-sf1  
vnfc sf1 >>>>>>>>>> has to change to "sf2"  
vim-id lab-saegw-spgw-vdu-sf1-0 >>>>>>>>>> has to change to "lab-saegw-spgw-vdu-sf1-1"  
vnfc-ref sf-vnfc-ugp  
host host-3 >>>>>>>>>> has to change to "host-4"  
lifecycle-event-initialization-variable staros_param.cfg  
destination-path-variables CARD_TYPE_NUM  
value 0x42070100  
!  
destination-path-variables SLOT_CARD_NUMBER  
value 3 >>>>>>>>>> has to change to "value 4"  
!  
destination-path-variables VNFM_PROXY_ADDRS  
value 172.20.20.21,172.20.20.22,172.20.20.23  
!  
!  
!  
!  
!
```

Copy the same vnfc configuration with change vnfc, vim-id, host, SLOT_CARD_NUMBER value variables to the suite to activate new card 4 as indicated above,

New card vnfc Configuration

After the above changes are performed to variables, vnfc, vim-id, host, SLOT_CARD_NUMBER , the final new card vnfc configuration is ready for activation.

```

vnfdservice:vnfd lab-saegw-spgw
element-group ugp
  constituent-vdu vdu-sf1
    vnfc sf2
      vim-id lab-saegw-spgw-vdu-sf1-1
      vnfc-ref sf-vnfc-ugp
      host host-4
      lifecycle-event-initialization-variable staros_param.cfg
      destination-path-variables CARD_TYPE_NUM
        value 0x42070100
      !
      destination-path-variables SLOT_CARD_NUMBER
        value 4
      !
      destination-path-variables VNFM_PROXY_ADDRS
        value 172.20.20.21,172.20.20.22,172.20.20.23
      !
      !
      !
      !
      !

```

Execute to Add a New Card from EM

Execute the new vnfc prepared as shown for card 4 and do not forget to commit the execution at last.

```

admin@scm(config)#vnfdservice:vnfd lab-saegw-spgw element-group ugp constituent-vdu vdu-sf1
vnfc sf2
admin@scm(config-constituent-vdu-vdu-sf1)# vnfc sf2 vim-id lab-saegw-spgw-vdu-sf1-1 vnfc-ref sf-
vnfc-ugp host host-4 lifecycle-event-initialization-variable staros_param.cfg destination-path-
variables CARD_TYPE_NUM value 0x42070100
admin@scm(config-destination-path-variables-CARD_TYPE_NUM)# exit

admin@scm(config-lifecycle-event-initialization-variable-staros_param.cfg)# destination-path-
variables SLOT_CARD_NUMBER value 4
admin@scm(config-destination-path-variables-SLOT_CARD_NUMBER)# exit

admin@scm(config-lifecycle-event-initialization-variable-staros_param.cfg)# destination-path-
variables VNFM_PROXY_ADDRS value 172.20.20.21,172.20.20.22,172.20.20.23
admin@scm(config-destination-path-variables-VNFM_PROXY_ADDRS)# commit
Commit complete.
admin@scm(config-destination-path-variables-VNFM_PROXY_ADDRS)#

```

Monitoring Card addition Progress

At CVIM/Openstack:

```

[root@PNQVFIBULD01 ~]# nova list --tenant f35c8f206713430ea5565f241d74a399 --field
name,status,task_state,power_state
+-----+-----+-----+-----+-----+
| ID | Name | Status | Task State | Power |
| State | | | | |
+-----+-----+-----+-----+-----+
| f5e2e048-f013-4b17-b2af-c427bbafd043 | lab-saegw-spgw-em-1 | ACTIVE | None | |
Running | | | | |
| 6a9a391a-e23c-4c1b-9d92-cdc3ed991c71 | lab-saegw-spgw-em-2 | ACTIVE | None | |

```

```

Running      |
| ab08e077-aec7-4fa5-900c-11f5758998eb | lab-saegw-spgw-vdu-cf1-0 | ACTIVE | None      |
Running      |
| 09524fd3-20ea-4eda-b8ff-4bd39c2af265 | lab-saegw-spgw-vdu-cf1-1 | ACTIVE | None      |
Running      |
| ed6f7010-dabc-44ac-ae49-f625d297f8ad | lab-saegw-spgw-vdu-sf1-0 | ACTIVE | None      |
Running      |
| ba7edb9a-eba9-4e96-845b-6bb9041dfcfb | lab-saegw-spgw-vdu-sf1-1 | BUILD | spawning |
NOSTATE    |

```

```

+-----+-----+-----+-----+-----+
-----+
[root@PNQVFIBULD01 ~]#

```

At VPC-DI Gateway:

```

[local]ugp-saegw# show card table
Slot          Card Type                               Oper State   SPOF  Attach
-----
1: CFC        Control Function Virtual Card             Active       Yes
2: CFC        Control Function Virtual Card             Standby      -
3: FC         6-Port Service Function Virtual Card     Active       Yes
4: FC         6-Port Service Function Virtual Card     Starting     -
[local]ugp-saegw#
[local]ugp-saegw#

```

Check Card Status

VPC-DI:

```

[local]ugp-saegw# show card table
Slot          Card Type                               Oper State   SPOF  Attach
-----
1: CFC        Control Function Virtual Card             Active       Yes
2: CFC        Control Function Virtual Card             Standby      -
3: FC         6-Port Service Function Virtual Card     Active       No
4: FC         6-Port Service Function Virtual Card     Standby      -
[local]ugp-saegw#

```

EM (Element Manager):

```
admin@scm# show vnfmpoxy:vnfd vdus
```

NAME	ID	CARD TYPE	ID	CPU	UTILS	MEMORY	STORAGE	GROUP	GROUP	ELEMENT	IS	CONSTITUENT
												DEVICE
INFRA	INITIALIZED	VIM ID	DEVICE NAME	USAGE	BYTES	BYTES	BYTES					
lab-saegw-spgw	true	vdu-cf1	control-function	cf1	lab-saegw-spgw-cf-nc	-	-	cf-nc	ugp	ugp	true	
		ab08e077-aec7-4fa5-900c-11f5758998eb		cf2	lab-saegw-spgw-cf-nc	-	-	cf-nc	ugp	ugp	true	
	true	09524fd3-20ea-4eda-b8ff-4bd39c2af265				-	-			ugp	true	
	false	ed6f7010-dabc-44ac-ae49-f625d297f8ad	vdu-sf1	session-function	sf1	-	-			ugp	true	
				sf2	-	-	-			ugp	true	
	false	ba7edb9a-eba9-4e96-845b-6bb9041dfcfb				-	-					

Note: Manual scale-out(addition) of SFs is fully supported in 6.3 release.