
NFV ISG PoC Proposal

Subscriber Aware - SGi/Gi-LAN Virtualization

1 NFV ISG PoC proposal

1.1 PoC Team Members

- PoC Project Name: **Subscriber Aware SGi/Gi-LAN Virtualization**
- Network Operator/Service Provider:
 - **Telenor** Contact: Pål Grønsund (Pal.Gronsund@telenor.com)
- Manufacturer A:
 - **ConteXtream** Contact: Ajay Sahai (Ajay.Sahai@Contextream.com)
- Manufacturer B:
 - **SkyFire Networks** Contact: Jason Guesman (jguesman@skyfire.com)
- Manufacturer C:
 - **Guavus** Contact: Sandeep Bajaj (Sandeep.Bajaj@guavus.com)
- Manufacturer D:
 - **Redhat** Contact: Nicolas Lemieux (nlemieux@redhat.com)
- Manufacturer E:
 - **Hewlett Packard** Contact: Srikanth Kilaru (srikanth.kilaru@hp.com)

1.2 PoC Project Goals

- PoC Project Goal #1 – The PoC will verify a subscriber aware method for service chaining intrinsically provided by the NFVI
- PoC Project Goal #2 – The PoC will demonstrate how the use of a subscriber aware service chaining method applied in the NFVI can enable virtualization of functions on the SGi/Gi interface of a 3GPP mobile network and provide elasticity to VNFs.
- PoC Project Goal #3 – The POC will show how each subscriber's specific service function element chain will be selected and will be composed from a catalog of individual functions, where the said set of functions can be hosted within a NFVI-PoP or across NFVI-PoPs
- PoC Project Goal # 4 – The POC will show by example how virtualization can enable
 - (a) programmability of network driven functions that are selected by subscribers on a self service portal
 - (b) rapid introduction of new functions in the form of VNF's greatly increasing service deployment velocity

1.3 PoC Demonstration

The PoC will be demonstrated at Telenor ASA facilities in Norway in May/June 2014. A second demonstration will be organized at NFV#7 meeting location (or an alternate location if required).

1.4 Publication

The PoC results will be published on ConteXtream's web site at www.contextream.com by June 2014.

1.5 PoC Project Timeline

The PoC is based on work that is well progressed, and a lot of the functionality in this PoC was already demonstrated at MWC 2014 in Barcelona.

- PoC start date May 19, 2014
- First Demonstration target date May 27, 2014
- Second Demonstration target date July 29-Aug 1, 2014
- PoC Report target date Aug 8, 2014
- PoC completion date Aug 20, 2014

2 NFV PoC Technical Details

2.1 PoC Overview

The Gi/SGi interface is the “reference point” defined by 3GPP between the mobile packet core and packet data networks (PDN). Specifically the Gi refers to the point between GGSN and PDN while SGi is the point between P-GW and a PDN. In the context of this proposal the term Gi-LAN or SGi-LAN refers to the functions deployed by mobile operators on this reference point (i.e. between the two networks). Typically functions deployed at this point are middle-boxes and do not use the traditional client-server, destination based forwarding paradigm of IP and Ethernet. Rather, traffic flows through them in a sequence. They are often implemented as logical or physical “rails” with all bearer traffic going through all of them. This is illustrated in Figure 1 below

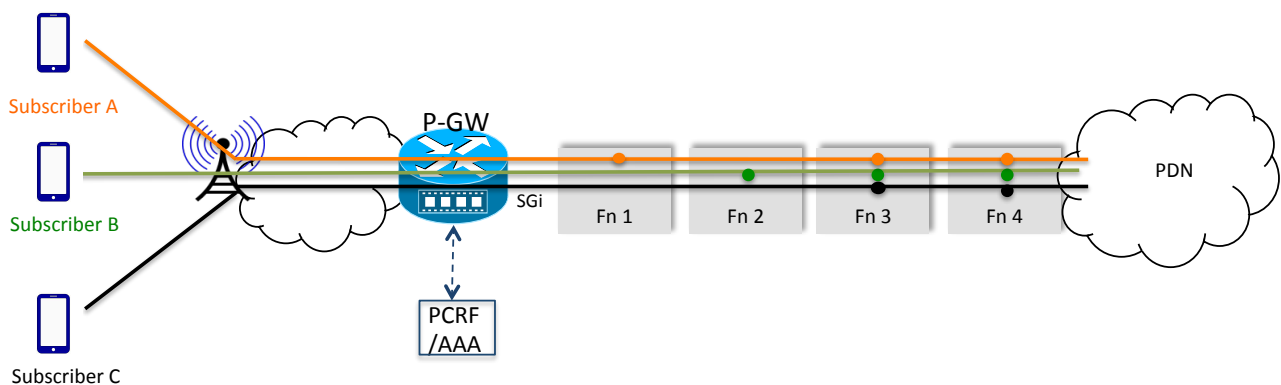


Figure 1 - Gi/SGi-LAN interface and middle boxes

Mobile operators are currently experiencing large growth in traffic on the SGi/Gi-LAN. Increased adoption of smartphones, faster access networks are factors that have contributed to this increase in traffic. Today operators typically deploy functions like Deep Packet Inspection, Caches, Video optimization, TCP optimization, NAT and Firewall on the SGi/Gi-LAN for subscribers accessing Internet based content/services. Currently these functions are deployed on dedicated hardware components.

Virtualizing these elements, in an elastic environment, also implies that the underlying network can provide the needed connectivity. The POC will show:

- a) The provision of subscriber (endpoint) aware steering across VNF instances using a virtual network infrastructure based on ETSI NFV MAN work
- b) Instantiation of VNFs (Elastic capacity of functions – Video Optimization, TCP Optimization and Analytics)
- c) Mix of best of breed function providers and open source software

As shown in Figure 2 the subscriber aware steering capability is intended to enhance the capability of the Virtual Network Infrastructure that can create a Virtual Network where the forwarding graph (i.e. VNF type + VNF instance) is subscriber and flow aware. This type of virtual network can scale efficiently and simplify the orchestration and management functionality.

The Virtual Network on a per subscriber and session basis will dynamically manage the forwarding graph, so for instance one subscriber could have a path:

Subscriber #1: VNF#1-1 → VNF 2-2 → VNF 3-1→...

While the next subscriber needing the same set of VNF functions can have a path:

Subscriber #2: VNF#1-2 → VNF 2-1 → VNF 3-1→ ..

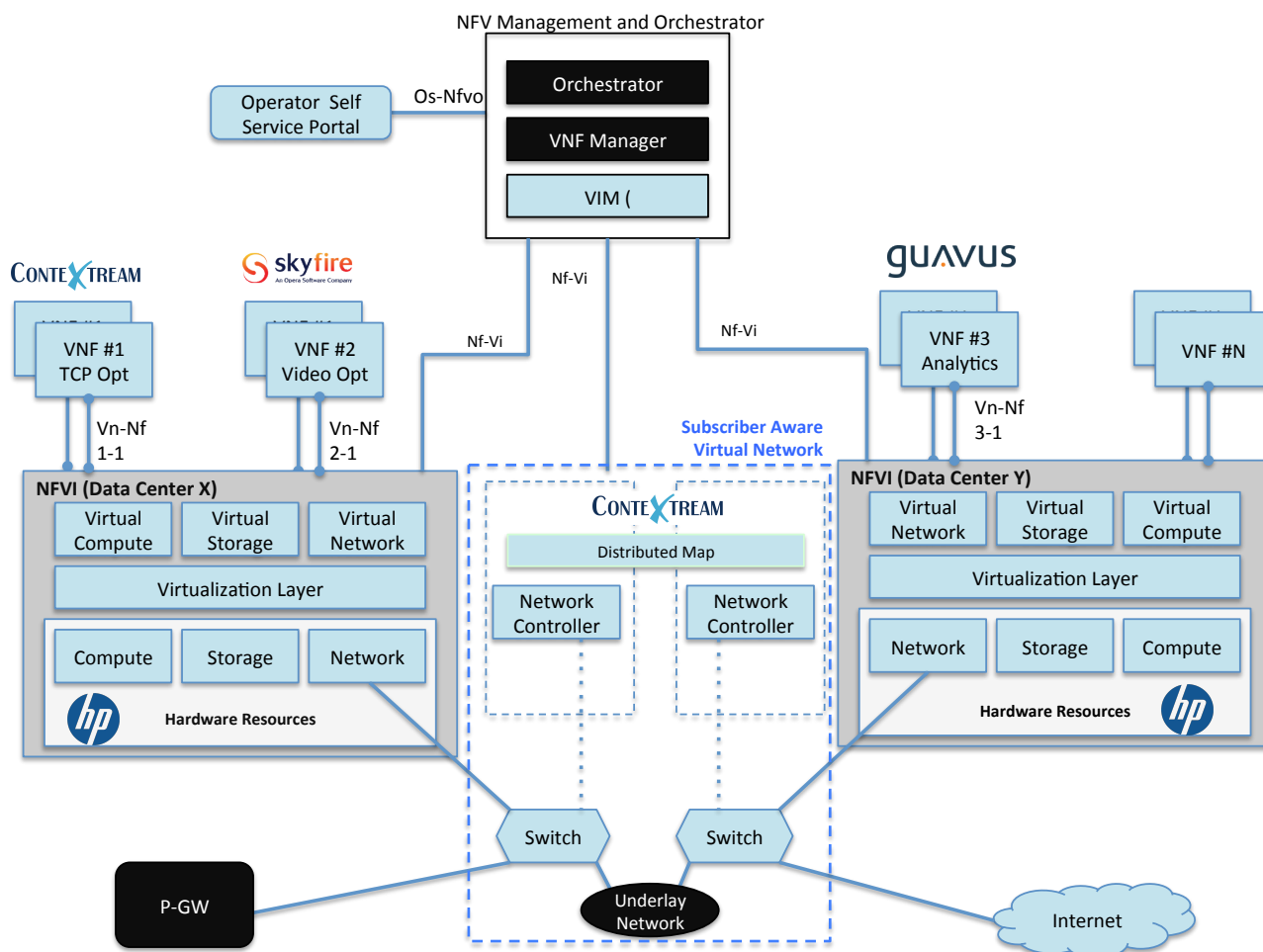


Figure 2: Subscriber aware virtual network

The E2E PoC setup for SGi is illustrated in

Figure 3. It is assumed for the purpose

of this PoC that PGW and GGSN coexist. The Software Switch used is an Open Flow (OF) compatible switch and complements an off the shelf OF switch.

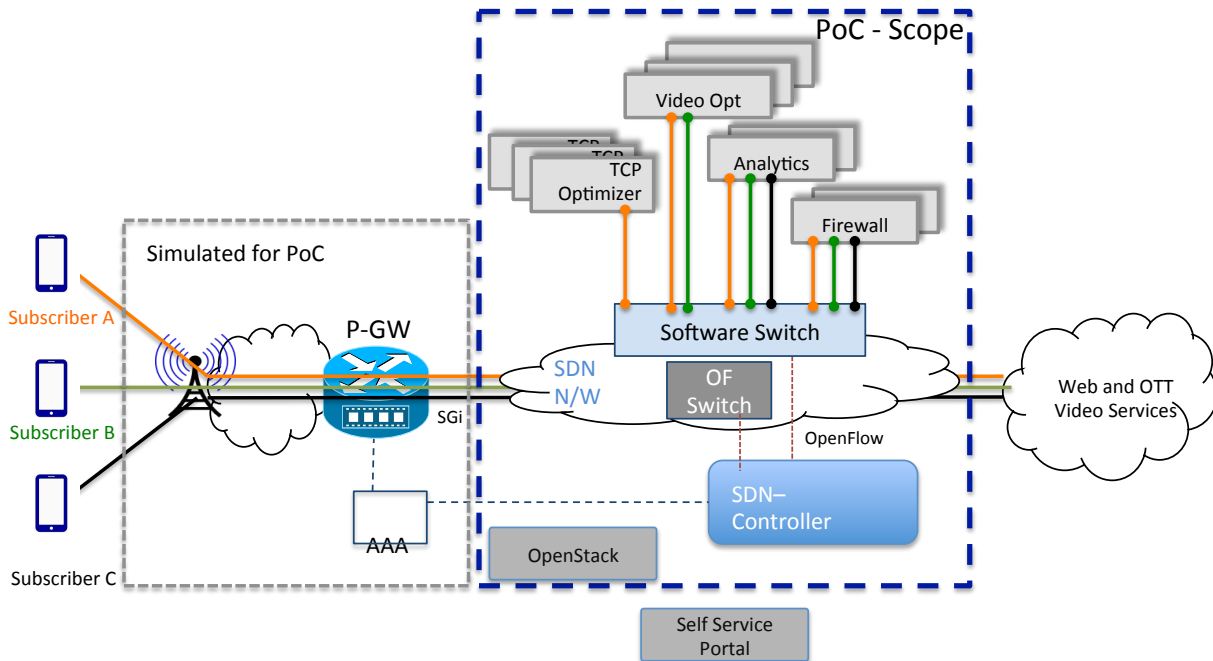


Figure 3 – SGi-LAN PoC Scenario

2.2 PoC Scenarios

The elements to be used in the PoC are:

- NFVO/VIM Virtual Network Infrastructure - SDN Controller and Open Flow compatible software switch – ConteXtream
- NFVI/VIM – Redhat Enterprise Linux RHEL, RHEL KVM and RHEL OpenStack
- VNF – TCP-Only Optimizer – ConteXtream
- VNF – TCP plus Video Optimizer – VNFC – ConteXtream VNFC – Skyfire
- VNF - Analytics - Guavus
- VNF – HTTP Content Filter, Cache, Firewall – All based on Open source
- High Performance Carrier-Grade Hardware Resources – Hewlett Packard

For PoC purposes there will be a Self Service Portal to illustrate how subscriber choice can deliver network programmability within the ETSI framework when a subscriber aware chaining method is implemented within the NFVO/VIM Network Infrastructure.

The scenarios to be demonstrated are:

- Scenario 1 - Add/remove a VNF instance and see the virtual network get programmed via. OpenFlow
- Scenario 2 - Subscriber aware steering to functions – will be driven from a self service portal
- Scenario 3 - Auto steering by Virtual Network Infrastructure to load balance across instances of VNFs
- Scenario 4 - Examples of new services that can be created within NFV framework

2.3 Mapping to NFV ISG Work

This section describes how this PoC relates to the NFV ISG work:

- 1) Summarized in table below the most relevant NFV ISG end-to-end concept from the NFV Use Cases [GS NFV 001 – NFV Use Cases], Requirements, and Architectural Framework functional blocks or reference points addressed by the different PoC scenarios:

Scenario	Use Case	Requirement	E2E Arch	Comments
Scenario 1	Use Case#4 (GS NFV 001 v1.1.1; use case VNFG)	GS NFV 004 v1.1.1 Gen.1-4 Port 1-3 Elas 1-2		
Scenario 2	Use Case#4 (GS NFV 001 v1.1.1; use case VNFG)	GS NFV 004 v1.1.1 Gen.1-4 Per 2		
Scenario 3	Use Case#4 (GS NFV 001 v1.1.1; use case VNFG)	GS NFV 004 v1.1.1 Gen.1-4 Per 2 Res 1		Scenario will demonstrate benefits of subscriber aware virtualization in load balancing
Scenario 4	Use Case#4 (GS NFV 001 v1.1.1; use case VNFG)	GS NFV 004 v1.1.1 Gen.1-4		

- 2) This PoC intends to validate and further ongoing work in NFV ISG working groups according to the table below:

Scenario	INF	SWA	MAN	REL	PER	Comments
Scenario 1	INF-005 NFV Control plane based on SDN Controller	SWA-001 Openflow and LISP based control	MAN-001 Interaction between SDN controller and NFVO/VIM			Will demonstrate interaction between virtual network control plane (SDN Controller) and agent entities. Also shows OpenFlow and IETF concepts like LISP in an NFV environment
Scenario 3		SWA-001 VNF Load balancing models				Demonstrates a realization of VNF load balancing models, policy integration for elasticity, scaling

2.4 PoC Success Criteria

The success of the PoC will be demonstrated by service function chaining, traffic based steering (load balancing) and elasticity of the adding and removing of VNFs on the SGi/Gi-LAN.

A.2.5 Expected PoC Contribution

One of the intended goals of the Subscriber Aware Gi-LAN Virtualization PoC is to support the

various groups within the NFV ISG.

- 1) PoC Project Contribution #1: Description of a subscriber aware method for service chaining.
NFV Group : MAN
- 2) PoC Project Contribution #2: Description of subscriber aware network infrastructure. NFV
Group : INF
- 3) PoC Project Contribution #3: Recommendation on how VNF can leverage a subscriber aware
infrastructure. NFV Group : SWA