

<Service Function Chaining>  
Internet Draft  
Intended status: Informational  
Expires: April 2016

Truong-Xuan Do  
Younghan Kim  
Soongsil University, Korea  
Oct 20, 2015

**High Availability mechanism for Service Function Chains**  
**draft-xuan-sfc-chain-high-availability-00**

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## Abstract

This document describes mechanisms to achieve the high availability of the service function chains. This document considers the high availability in the perspective of entire chain. This means the SFC control plane needs to take into account some metrics related service chain in addition to individual service functions. This document covers both stateless and stateful service functions as well.

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## **1. Introduction**

Service function chaining currently is redesigned with the support of the software-defined network (SDN) and network function virtualization (NFV) which provide more flexible and dynamical end-to-end services.

In order to ensure the high availability of service function chains, some traditional mechanisms for individual service function are reused (e.g. Active/Standby or Active/Active). These mechanisms are based on the deployment of the backup or redundant service functions. The recovery of whole service chain relies on the recovery of individual service function.

This document describe a mechanism which ensure the high availability of service chain based on some metrics of whole chain. The mechanism also considers both stateless and stateful service functions in the chain.

## **2. Conventions used in this document**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC-2119](#) [[RFC2119](#)].

The terms about SFC are defined in [[RFC7498](#)] and [[I-D.ietf-sfc-architecture](#)]

### 3. High availability architecture of SFC

Figure 1. shows the architecture for achieving the high availability of the SFC. We make assumptions that each service function has several instances which are connected to different service function forwarders (SFF). Each service function path (SFP) is created by the combination of different service instances of different service functions. We propose a new entity called SFC HA manager which is responsible for monitoring metrics which belong not only to the individual service functions, such as fail-over, load condition, but also the whole service chain, such as, latency, total load, and traffic engineering. The SFC HA Manager takes responsibilities of making the backup SFPs. SFC HA manager should be located in the control plane part [[I-D.ietf-sfc-control-plane](#)] of SFC architecture

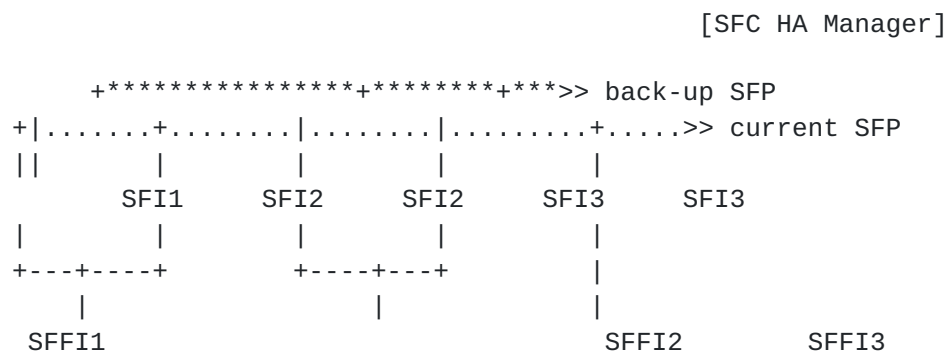


Figure 1. High availability architecture of SFC

### **3.1. Metrics for back-up SFPs**

Some metrics for whole service function chain are listed below:

Fail-over: a back-up SFP with the replacement of failed service functions

Total latency: a back-up SFP with better latency

Total bandwidth: a back-up SFP with highest bandwidth

Total path: a back-up SFP with shortest path

Total load: a back-up SFP with the lowest load

Traffic engineering: a back-up SFP with the pre-defined traffic engineering goals

### **3.2 SFP with all stateless service functions**

Procedures for making a back-up service function path

- + Gather and monitor the states of current service function paths
- + Evaluate the current SFPs based on collected data and above metrics
- + HA manager makes back-up SFPs for current SFP
- + When a critical event occurs, the back-up SFP can be invoked and replace the current SFP.
- + The information about new SFP (back-up) is updated to all corresponding SFFs.

### **3.3 SFP with stateful service funtions**

Procedures for making a back-up service function path

- + Gather and monitor the states of current service function paths
- + Evaluate the current SFPs based on collected data and above metrics
- + HA manager makes back-up SFPs for current SFP
  - For stateful service functions in the SFP, internal state management for each service function is required and synchronized with the same kind of service function when creating a back-up SFP
  - State synchronization can be handled by the direct communication between two same kind service functions
- + When a critical event occurs, the back-up SFP can be invoked and replace the current SFP.
- + The information about new SFP (back-up) is updated to all corresponding SFFs.

#### **4. Security Considerations**

TBD.

#### **5. IANA Considerations**

TBD.

#### **6. References**

##### **6.1. Normative References**

[RFC7498]

Quinn, P. and T. Nadeau, "Problem Statement for Service Function Chaining", [RFC 7498](#), April 2015.

##### **6.2. Informative References**

[I-D.ietf-sfc-architecture]

Halpern, J. and C. Pignataro, "Service Function Chaining (SFC) Architecture", [draft-ietf-sfc-architecture-11](#) (work in progress), July 2015.

[I-D.ietf-sfc-control-plane]

H. Li, Q. Wu, O. Huang, etc. al., "Service Function Chaining (SFC) Control Plane Components & Requirements",  
[draft-ietf-sfc-control-plane-00](#), Aug 2015



Authors' Addresses

Truong-Xuan Do  
Soongsil University  
4F Hyungnam Engineering Bldg. 424,  
(156-743) 511 Sangdo-Dong, Dongjak-Gu, Seoul, Korea

Phone: +82 10 4473 6869  
Email: xuan@dcn.ssu.ac.kr

Younghan Kim  
Soongsil University  
4F Hyungnam Engineering Bldg. 424,  
(156-743) 511 Sangdo-Dong, Dongjak-Gu, Seoul, Korea

Phone: +82-2-820-0904  
Email: younghak@ssu.ac.kr