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Multi-Layering OAM for Service function Chaining
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Abstract

This document tries to discuss some problems in SFC OAM framework document and proposes the SFC OAM multi-layering requirements in SFC domain to improve the troubleshooting efficiency.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on December 24, 2016.

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1. Introduction

In [SFC-arch], it defines several requisite components to implement SFC, including classifier, which performs classification for incoming packets, and Service Function Forwarder/SFF, which is responsible for forwarding traffic to one or more connected service functions according to the information carried in the SFC encapsulation, as well as handling traffic coming back from the SF and transporting traffic to another SFF and terminating the SFP. And what!_s more, another significant component is Service Function/SF, which is responsible for specific treatment of received packets.

Based on these SFC components, there are different notions for differentiated level of service chains, such as fully abstract notion named SFC, which defines an ordered set of service functions that must be applied to packets selected as a result of classification. But, SFC doesn!_t define the exactly SFFs/SFs. And another notion is half-fully abstraction notion named SFP, which is the instantiation of a SFC in the network and provides a level of indirection between the fully abstract SFC and a fully specified RSP. The mean is that SFP defines some SFFs/SFs, not every SFFs/SFs. As well, there is a fully specific notion named RSP, which defines exactly which SFFs/SFs the packet will visit when it actually traverses the network. The main difference between SFP and RSP is that whether delegate the SFF/SF selection authority to the network or not.

This document tries to discuss some problems in basic SFC OAM framework document and proposes the SFC OAM multi-layering requirements to improve the troubleshooting efficiency.

2. Convention and Terminology

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 [RFC2119].

The terms are all defined in [RFC7665].

3. SFC Layering model

As described in [I-D.ietf-sfc-oam-framework], multiple layers come into play for implementing the SFC, including the Service layer at SFC layer and the underlying Network layer, Transport layer, as well as Link layer, which are depicted in Figure 1.

As for the Service layer in Figure 1, it consists of classifiers and/or service functions/SFs.

Concerning Network layer and Transport Layer in Figure 1, it leverages various overlay network technologies interconnecting service functions and allows establishing of service function paths.

As for the Link layer in Figure 1, it is dependent on the physical technology used. Such as, Ethernet, POS etc..)

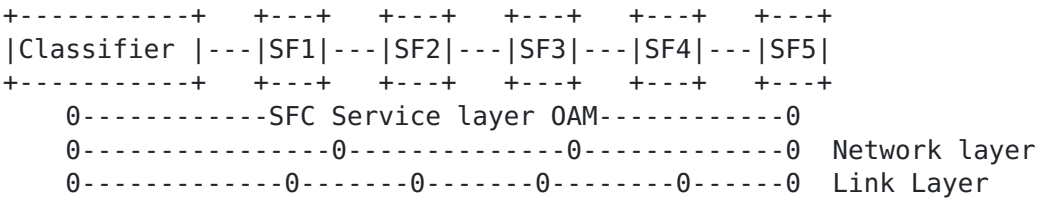

Figure 1: SFC Layering model

4. Requirements for SFC OAM multi-layering model

In fact, besides the Link layer OAM, the Network layer and/or the Transport layer OAM for implementing SFC OAM must detect the network forwarders/NFs which the service function forwarders/SFFs connecting to directly along the service function paths. As for how to steer detection messages along these NFs is determined by the service function paths information in the Network Service Header.

As for the SFC service layer OAM, except the service layer defined in Figure 1 which focuses on the SFC OAM between classifier and/or SFs, here tries to propose the SFC OAM between classifier and/or SFFs, to improve the efficiency when diagnosing.

With regard to how to diagnose efficiently, here is an example illustrated as follow.

Currently, according to the latest SFC architecture, we know that there are several components defined in the SFC architecture, such as NF, SFF, SF, etc, and the relationship between them like this: several SFs may share the same SFF, and furthermore, several SFFs may share the same NF(e.g, different SFFs belong to different VPNs may residence in one network forwarder). As a result of that, multiple RSPs, such as RSP1(SF1--SF3--SF5) and RSP2(SF2--SF4--SF6) in Figure 2, not share the same transmitting path, but they may share the same SFFs path.

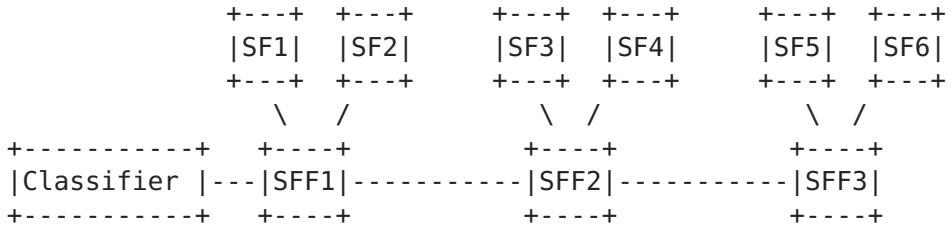

Figure 2: different RSPs share the same SFFs path

And also, multiple SFPs, such as SFP1(SFF1--SFF3--SFF5)(e.g, VPN1) and SFP2(SFF2--SFF4--SFF6)(e.g, VPN2) in Figure 3,not share the same SFFs, but they may share the same NFs path.

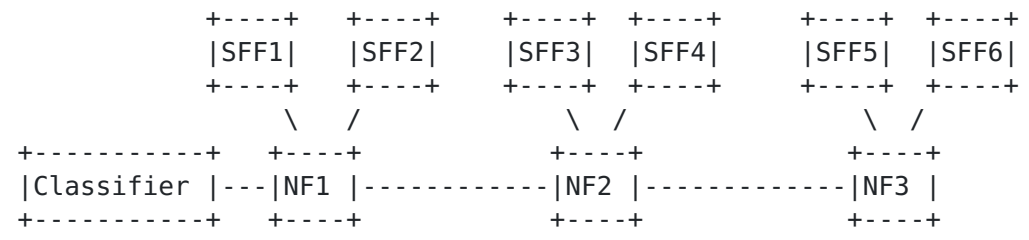

Figure 3: different SFPs share the same NFs path

As for users who want to diagnose, troubleshoot a set of RSPs which may transmit the same SFFs, or a set of SFPs which may transmit the same NFs because of similar service type , there is an aggregative method which can aggregate this set of RSPs into one SFFs path or this set of SFPs into one NFs path, then, users only need to diagnose, troubleshoot the aggregative one, rather than the separated one by one.

And also, for example, if users are willing to or have to diagnose and troubleshoot every one, once the connectivity between different SFs is not OK, users can detect the connectivity between different SFFs where the SFs connecting to instead to narrow the failure coverage. In other words, if the connectivity between the detected SFFs is not OK, then the connectivity problem is located. If the connectivity between the detected SFFs is OK, then the connectivity problem should be between the detected SFs and the detected SFFs, which can help to improve the efficiency remarkably of target location.

5. SFC OAM multi-layering model

Figure 4 is a possible architecture for SFC OAM multi-layering model. In this figure, it tries to figure out three possible layers information. The layer 1 sketches the NFs path along the service function paths. The layer 2 outlines the SFFs path along the service function paths. The layer 3 outlines the SFs path along the service function paths. When trying to do SFC OAM, classifier or service nodes select and confirm which SFC OAM layering they plan to do, then encapsulate the layering information in the SFC OAM packets, and send the SFC OAM packets along the service function paths to the destination. When receiving the SFC OAM packets, service nodes analyze the layering information and then decide whether send these packets to NFs or SFFs or SFs to process and response.

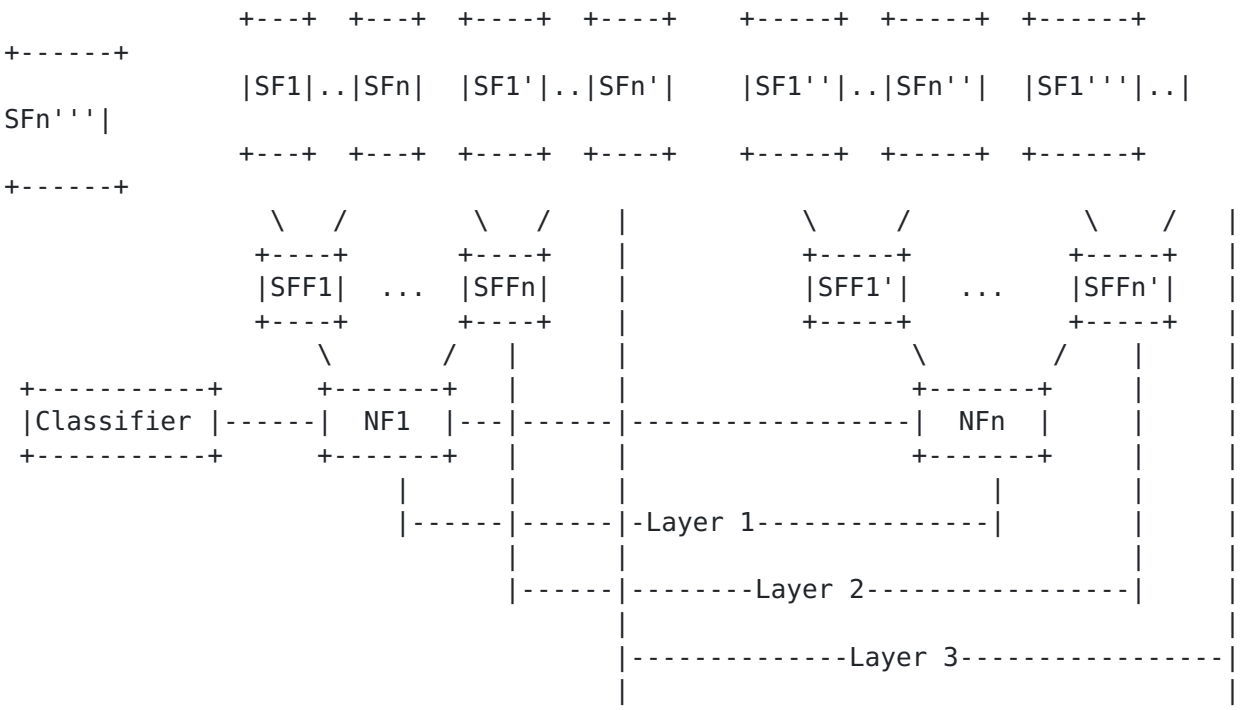

Figure 4: SFC OAM multi-layering model

6. Gap analysis

This document tries to complement the SFC OAM framework and all the SFC OAM functions are the same with the SFC OAM framework.

7. Security Considerations

It will be considered in a future revision.

8. IANA Considerations

It will be considered in a future revision.

9. References

9.1. Normative References

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[RFC7665] Halpern, J., Ed. and C. Pignataro, Ed., "Service Function Chaining (SFC) Architecture", RFC 7665, DOI 10.17487/RFC7665, October 2015, <http://www.rfc-editor.org/info/rfc7665>.

9.2. Informative References

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