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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.

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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..)

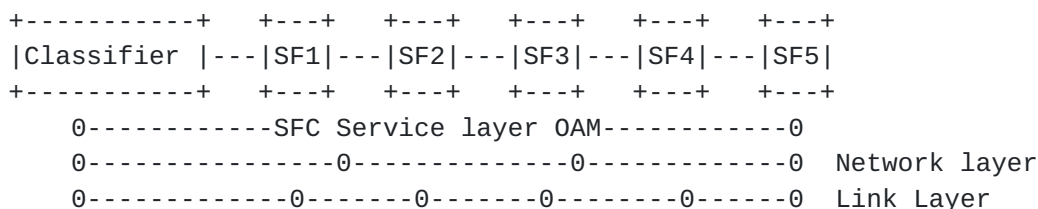


Figure 1: SFC Layering model

4. Requirements for SFC OAM multi-layering model

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 SFFs or SFFs which go through the path along the SFP/RSP, to improve the efficiency when diagnosing.

With regard to how to use this proposal and 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 Classifier, SFF, SF, etc, and the relationship between them like this: several SFs may share the same SFF. In some circumstances, one SFP1(one service) includes two RSPs(two differentiated services), such as RSP1(SF1--SF3--SF5) and RSP2(SF2--SF4--SF6) in Figure 2. As illustrated, SFFs make the decision whether forwarding the traffic to RSP1 or RSP2.

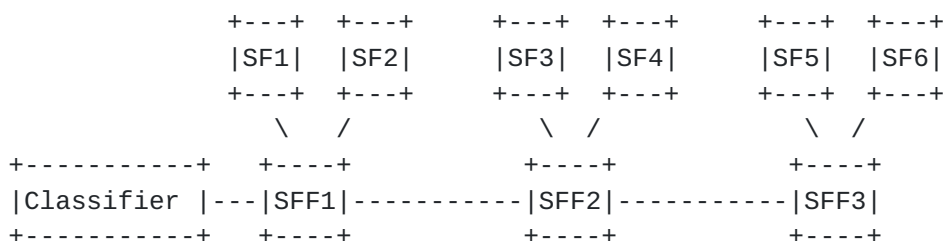


Figure 2: different RSPs share the same SFFs path

As for customers who want to diagnose, troubleshoot a set of RSPs which share the same SFP, here can diagnose or troubleshoot the SFFs path along the SFP first without forwarding the traffic to the SFs. Once the connectivity between the SFFs are all OK, then diagnose or troubleshoot the separated RSP one by one. Otherwise, we know clearly that the connectivity of two RSPs are failure.

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 along the SFP where the SFs connecting 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 failure location.

5. SFC OAM multi-layering model

Figure 3 is a possible architecture for SFC OAM multi-layering model. In this figure, it tries to figure out two possible layers information. The layer 1 outlines the SFFs path along the SFP. The layer 2 outlines the SFs path along the RSP. 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 sending these packets to next SFFs directly without being processed by SFs for layer 1 process or sending to SFs for layer 2 process.

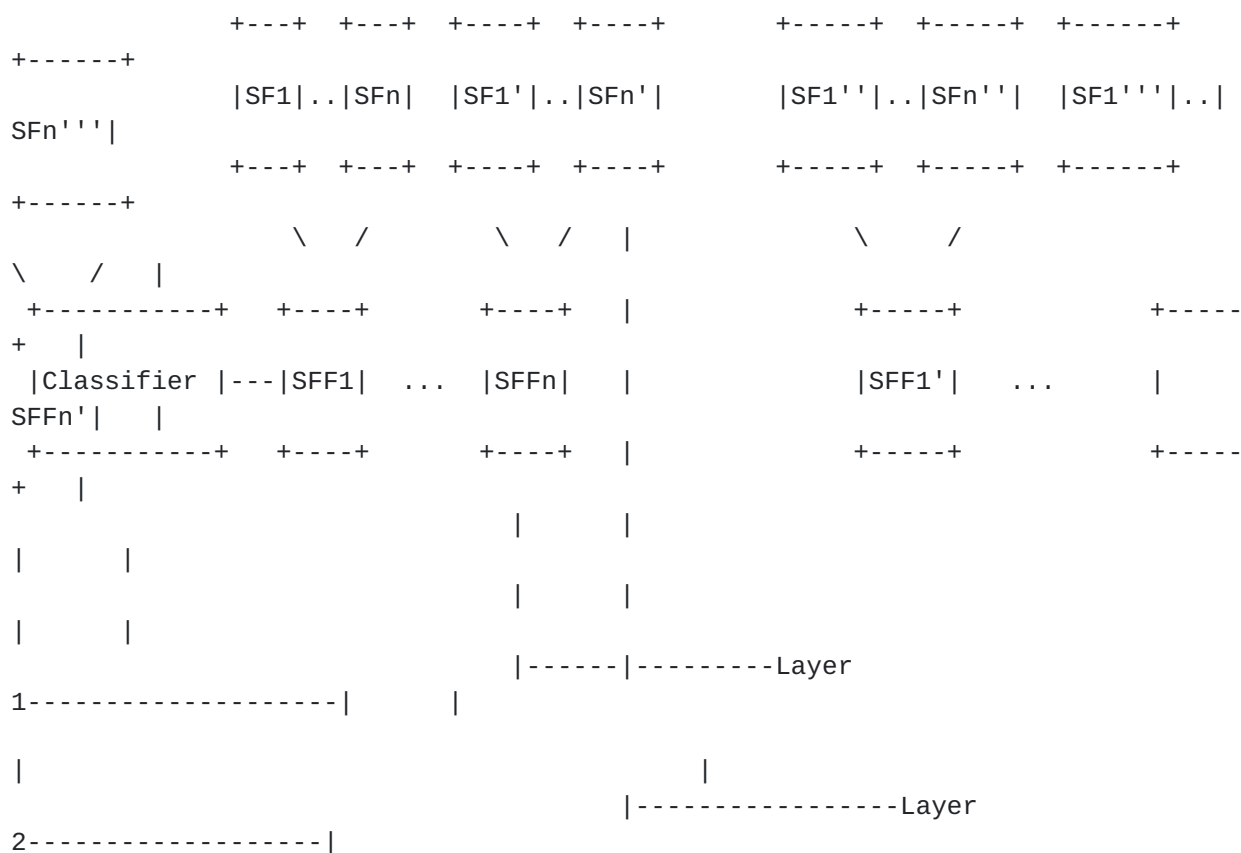


Figure 3: SFC OAM multi-layering model

6. Gap analysis

This document tries to complement the SFC OAM framework and all the SFC OAM functions are accordance with the SFC OAM framework. But this proposal may be more applicable for connectivity check and continuity check.

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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