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Purpose: Information

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Keywords: mobile service function chaining; heterogeneous service index;

Abstract: This document is the initial output of draft Supplement Q.Suppl.heter_SI "Signalling Requirements of SFC based on heterogeneous service index in mobile scenarios". It includes the discussion results in the Q4/11 meeting held by Virtual, 17-26, March 2021.

This document is the initial output of draft supplement Q.Suppl.heter_SI "Signalling Requirements of SFC based on heterogeneous service index in mobile scenarios".

The following table shows discussion results for contributions.

Document Number	Source	Title	Meeting results
C0591	China Telecom China Unicom Ministry of Industry and Information Technology (MIIT) China	Proposal to start a new work item - ITU-T Q.heter_SI "Signaling Requirements of Service Function Chaining based on heterogeneous SI in mobile scenarios"	Accepted with modifications for initiating a new Supplement

Draft Supplement ITU-T Q.Suppl.heter_SI

Signalling Requirements of SFC based on heterogeneous service index in mobile scenarios

Summary

This supplement describes the signalling requirements of service function chaining based on heterogeneous SI. This supplement focuses on the signalling among the SFFs(Service Function Forwarder).

Keywords

mobile service function chaining; heterogeneous service index;

Introduction

Table of Contents

Draft Supplement ITU-T Q.Suppl.heter_SI

Signalling Requirements of SFC based on heterogeneous service index in mobile scenarios

1 Scope

The scope of this Supplement consists of:

(1) Overview for Heterogeneous SI assignment mechanism in Mobile Scenarios;

(2) Interface Si reference model;

(3) Signalling requirements for interfaces Si.

2 References

IETF RFC 7665 "Service Function Chaining (SFC) Architecture"

3 Definitions

3.1 Terms defined elsewhere

SFC Service Function Chaining

SI Service Index

3.2 Terms defined in this Supplement

4 Abbreviations and acronyms

5 Conventions

6 Overview

6.1 SFC in mobile scenarios

Service function chaining is defined in RFC 7665 "Service Function Chaining (SFC) Architecture". The definition quoted from RFC 7765 is as follows:

"The delivery of end-to-end services often requires various service functions. These include traditional network service functions such as firewalls and traditional IP Network Address Translators (NATs),as well as application-specific functions. The definition and instantiation of an ordered set of service functions and subsequent "steering" of traffic through them is termed Service Function Chaining (SFC)."

In mobile scenarios, to meet the requirements of the shifting environment, the node(service function) names or their sequence need to be changed frequently and rapidly.

6.2 Existing SI assignment mechanism of SFC and its drawbacks in mobile scenario

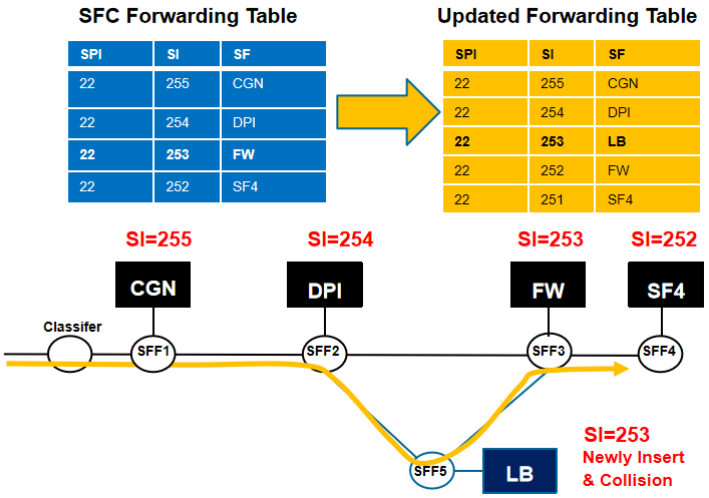

Fig-1 Existed SI assignment mechanism of SFC in mobile scenario

Fig-1 describes the existed SI assignment mechanism of SFC in mobile scenario. The SI in the SFC forwarding table starts from 255 and decrease 1 for each SF in sequence. It is no problem in fixed network scenarios because there is no requirement for SFC to change the service function in real time. But in mobile scenario, any service function could be required to add to/remove from the chain in any time immediately. This addition and removing of service function are usually triggered by local service functions and not triggered by commands populated from centralized controllers. For example, the packets uses SPI 22 have already pass through SI =255(CGN) and SI=254(DPI), in SFF2, “DPI” function is immediately followed by “load balancing” function in the current environment. So when the packet plans to steer to SI=253(FW), another service function(LB) is cutting in line to meet the real time service requirements. . It will cause wrong forwarding for the sake of the reasons that:

(1) If newly inserted service function (Load Balancing) is just behind the current service function (DPI),because the cutting in line was happened after the SFC forwarding table downloading to SFF2,the SFF2 will apparently steer the packets to FW according to the obsoleted forwarding table.

(2) If new inserted service functions are interweaving in the following service functions, for example, “Load Balancing” is behind the “FW” and “SF4”.

A) If there is a centralized controller, the communication speed between the centralized controller and distributed SFFs is too slow and cannot catch up the changing frequency in mobile scenarios.It is great possibility that SFF3 may not be able to receive the updated forwarding table in time and thus steer the packets to the wrong destination(SF4).

B) If there is no centralized controller, all the SFC forwarding table along the path won’t be updated in any time. So the SFF3 will steer packets to the wrong place with no doubts.

6.3 Heterogeneous SI assignment mechanism of SFC solves the problem

To solve the problem mentioned above, the most intuitive solution is updating the SFC forwarding table in each SFF along the path in real time. However, because the accidental inserts are triggered by local service function, the local SFFs should inform the controller this event and then controller sends the updated SFC forwarding tables to the SFFs along the path. This solution places a great pressure on the centralized controller and consume too much time especially if the environment is changing rapidly and unpredictable. To change the chain in real time and release the workload of the centralized controller, certain workload could be distributed to local nodes.

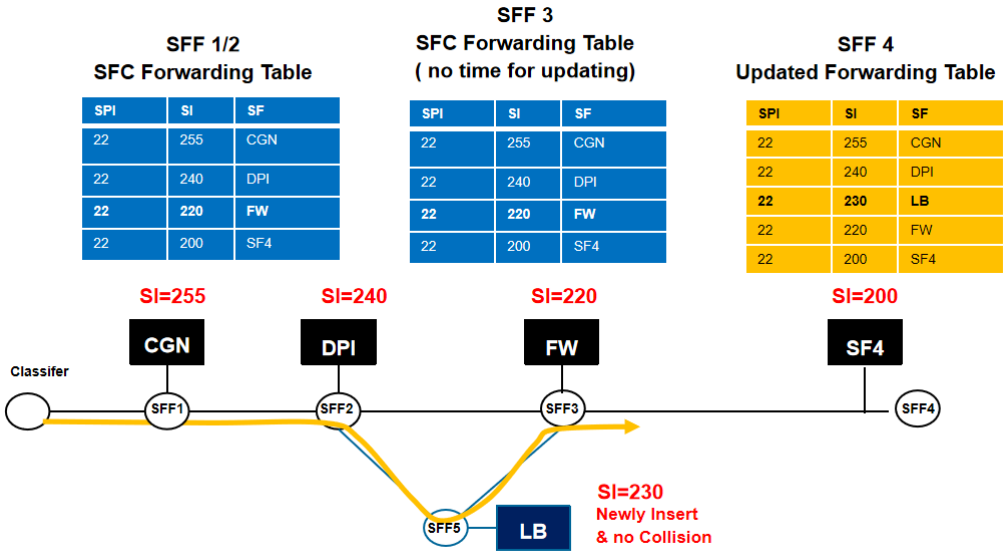

Fig-2 Heterogeneous SI assignment mechanism of SFC in mobile scenario

In traditional solution, the SI starts from 255 and decrease 1 when one service function is finished. In heterogeneous SI assignment solution, the space between the SI number is not 1 and it length is different according to different scenarios. In this case, the space between the first SI and second SI is 15, the second SI and third SI is 30 and etc. So when accidentally a service function is cut in line, there is a space to assign a new SI for this service function based on the premise that the existing service function in the SFC forwarding table won't be overlapped. For example, the SI of the newly inserted "Load Balancing" service function is 230 which is between 240~220 and wont' be conflicted with "Fire Wall"(SI=220).

The information carried by SFC packets and the SI decreasing mechanism will do a slight changing in this heterogeneous SI assignment mechanism.

Consequently, the heterogeneous SI assignment mechanism eliminates the drawbacks of traditional SI assignment of SFC in mobile scenarios.

7 Interface Si reference model

The reference model of interface Si is shown as below:

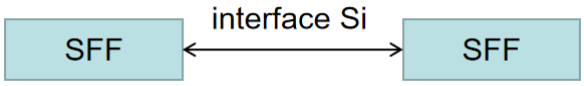

Figure 7-1 The reference model of interface Si

The interface Si is between SFFs and SFFs.It is responsible for exchange message between SFFs including SFP,SI and service function message.

8 Signalling procedure of interface Si

9 Signalling requirements of interface Si