service function chain
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Redundancy Mechanism for Service Function Chains
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Abstract

This document discusses about hot standby analysis of service function instances (SFIs) under different scenarios. The document provides requirement and use cases and also describes the suitable scenarios that each solution may be deployed in.

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1. Introduction

The object of Service Function Chains (SFC) is trying to unload services from nodes in traditional network and deal with such services through service function chains. As a result of this, redundancy of service function instances needs to be standardize, rather than maintain as an internal mechanism in a traditional network device.

Many SFs might be located in large-scale networks, such as ISP networks or enterprise ones, where exist a large number of customers. In each service function, these customers which is served by a single service function instance (SFI) may experience service degradation in case of the presence of the single point of exceptional failure. Therefore, redundancy of the SFI will be strongly desired in order to deliver highly available services.

This memo describes some use cases of redundancy among SFIs under typical scenarios.

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 about SFC are defined in [I-D.ietf-sfc-problem-statement].

3. Redundancy Mechanisms

As illustrated in Figure 1, two SFIs (SFI1 and SFI1') are deployed for redundancy purposes. This is the reference architecture for the mechanisms we describe in this memo.

```
          ,---.
         /     \
--------(  SFI1 |-
         \     /  \
          `-^-'    \     ,---.
            |       \-- /     \------->  Master Service Function Path
 Backup --> |          (  SFI2 )
          ,-v-.    .... \     /.......>  Backup Service Function Path
         /     \  .      `---'
........( SFI1' ).
         \     /
          `---'
```

Figure 1: Reference Model

3.1. Homogeneous Backup

Figure 2 illustrates a homogeneous backup cases. In this scenario, each of those master SFIs will have a corresponding backup SFI.

```
           ,---.       ,---.       ,---.
          /     \     /     \     /     \
         (  SFI1 |   (  SFI2 |   (  SFI3 |
          \     /     \     /     \     /
           `-^-'       `-^-'       `-^-'
             |           |           |
             |           |           |
             |           |           |
           ,-v-.       ,-v-.       ,-v-.
          /     \     /     \     /     \
         ( SFI1' )   ( SFI2' )   ( SFI3' )
          \     /     \     /     \     /
           `---'       `---'       `---'
```

Figure 2: Homogeneous Backup Model

3.2. Heterogeneous Backup

Figure 3 illustrates a heterogeneous backup cases. In this scenario, each of those master SFIs might have more than one corresponding backup SFIs.

```
                ,---.             ,---.
               /     \           /     \
              (  SFI1 |         (  SFI2 |
               \     /         / \     / \
                `-^-'         /   `---'   \
                  |           |             |
                  |           |             |
                  |           |             |
                ,-v-.       ,-v-.        ,-v-.
               /     \     /     \      /     \
              ( SFI1' )   ( SFI2' )    ( SFI2'')
               \     /     \     /      \     /
                `---'       `---'        `---'
```

Figure 3: Heterogeneous Backup Model

3.3. Internal Backup

Figure 4 illustrates a internal backup cases. In this scenario, both sides of backup are located in a same Service Function Node.

```
+----------------------------------------+
|     ,---.       ,---.        ,---.     |
|    /     \     /     \      /     \    |
|   (  SFI1 <---> SFI1' |    (  SFI2 |   | <-- Service Function Node
|    \     /     \     /      \     /    |
|     `---'       `---'        `---'     |
+----------------------------------------+
```

Figure 4: Internal Backup Model

3.4. External Backup

Figure 5 illustrates a external backup cases. In this scenario, each side of backup is located in its own Service Function Node.

```
+---------------------------------------+
|     ,---.       ,---.       ,---.     |
|    /     \     /     \     /     \    |
|   (  SFI1 |   ( SFI2  |   (  SFI3 |   | <-- Service Function Node 1
|    \     /     \     /     \     /    |
|     `-^-'       `-^-'       `-^-'     |
+-------|-----------|-----------|-------+
        |           |           |   <------- Network
+-------|-----------|-----------|-------+
|     ,-v-.       ,-v-.       ,-v-.     |
|    /     \     /     \     /     \    |
|   ( SFI1' |   ( SFI2' |   ( SFI3' |   | <-- Service Function Node 2
|    \     /     \     /     \     /    |
|     `---'       `---'       `---'     |
+---------------------------------------+
```

Figure 5: External Backup Model

4. Redirect Service Function Paths

As described in [draft-quinn-sfc-arch], a Service Function Path is the instantiation of the defined SFC.

In case of planned maintenance operations or exceptional failure of Service Function Node, The SFP MUST be changed to prevent disrupting the normal traffic.

5. Control Plane Considerations

TBD

6. Data Plane Considerations

TBD

7. Load Balancing Considerations

TBD

8. Normative References

[I-D.ietf-sfc-problem-statement]
Quinn, P. and T. Nadeau, "Service Function Chaining Problem Statement", draft-ietf-sfc-problem-statement-07 (work in progress), June 2014.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2865] Rigney, C., Willens, S., Rubens, A., and W. Simpson, "Remote Authentication Dial In User Service (RADIUS)", RFC 2865, June 2000.

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