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CONTRIBUTION

Source: Editors

Title: Output - draft baseline of new work item Q.SFCP "Monitoring parameters for service function orchestration based on service function chaining" (Geneva, 17-26 November 2025)

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Abstract: This document is the baseline text of draft new work item Q.SFCP “Monitoring parameters for service function orchestration based on service function chaining”. This document includes the results of discussion at Q13/11 meeting (Geneva, 17-26, November, 2025).

The following table shows discussion results for input documents.

No.	Source	Title	Discussion
SG11-C222-R1	Proposal to start a new work item - Q.SFCP "Monitoring parameters for service function orchestration based on service function chaining"	China Unicom	Accepted with modifications： 1. Add ITU-T Q.3914 as reference; 2. Move IETF RFC 7665 from reference to bibliography; 3. Modify content in clause 11.2 refers to ITU-T Q.3914.

- Meeting results

The meeting agreed to accept this contribution with modifications, and the liaison should be sent to ITU-T SG13 and IETF Spring WG.

Draft new Recommendation ITU-T Q. SFCP

Monitoring parameters for service function orchestration based on service function chaining

1. Scope

This draft new Recommendation provides monitoring parameters for service function orchestration based on service function chaining to ensure availability and service experience, specifically including:

-Monitoring parameters for service layer

-Monitoring parameters for service function orchestration layer

-Monitoring parameters for control layer

-Monitoring parameters for infrastructure layer

2. References

[Editor's Note] This clause provides References. TBD

The following ITU-T Recommendations and other references contain provisions, which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T Y.2346] Recommendation ITU-T Y.2346 (2023), *Requirements and framework of service function orchestration based on service function chaining.*

[ITU-T Q.3914] Recommendation ITU-T Q.3914 (2018), *Set of parameters of cloud computing for monitoring.*

3. Definitions

3.1. Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 service function [b-IETF RFC 7665]: A function that is responsible for the specific treatment of received packets. As a logical component, a service function can be realized as a virtual element or be embedded in a physical network element. One or more service functions can be involved in the delivery of added-value services. A non-exhaustive list of abstract service functions includes firewalls, wide area network (WAN) and application acceleration, deep packet inspection (DPI), lawful intercept (LI), server load balancing, and so on.

3.1.2 SFC (service function chaining) [b-IETF RFC 7665]: SFC is used to describe the definition and instantiation of an ordered list of instances of such service functions, and the subsequent "steering" of traffic flows through those service functions.

3.2. Terms defined in this Recommendation

This Recommendation defines the following terms:

TBD

4. Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

TBD

5. Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted, if conformance to this Recommendation is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option, and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with this Recommendation.

6. Overview of service function orchestration based on SFC

With the emergence of new application scenarios, network service demands have become increasingly diverse and complex. In the traditional static network service model, the tight coupling between network services and dedicated hardware devices makes resource sharing difficult and limits the ability to meet rapidly changing business requirements. Service Function Chaining (SFC) leverages network virtualization and Software-Defined Networking (SDN) technologies to abstract originally discrete and fixed network functions (such as firewalls, intrusion detection, and load balancing) into programmable Virtual Network Functions (VNFs). These VNFs can be flexibly composed and orchestrated according to service requirements, enabling on-demand deployment and dynamic adjustment of network functions.

As shown in Figure 6-1, ITU-T Y.2346 describes the functional architecture of service function orchestration based on SFC, which supports end-to-end automated service deployment, dynamic adjustment, and optimization through cross-layer collaboration. Since service functions are often distributed across different virtualized environments or physical nodes, the service orchestration system tends to have high complexity and numerous dependencies, which can easily lead to issues such as unbalanced resource allocation, abnormal service paths, or performance bottlenecks. In addition, the degradation of user experience based on SFC involves multiple factors, such as insufficient resources at the infrastructure layer and unreasonable orchestration strategies. Therefore, it is necessary to monitor the components involved in service function orchestration to evaluate its deployment effectiveness and provide support for the operation, maintenance, and fault localization of SFCs.

This Recommendation provides monitoring parameters for service function orchestration based on service function chaining, and ensures the availability and service experience of SFCs through joint monitoring of the service layer, orchestration layer, control layer, and infrastructure layer.

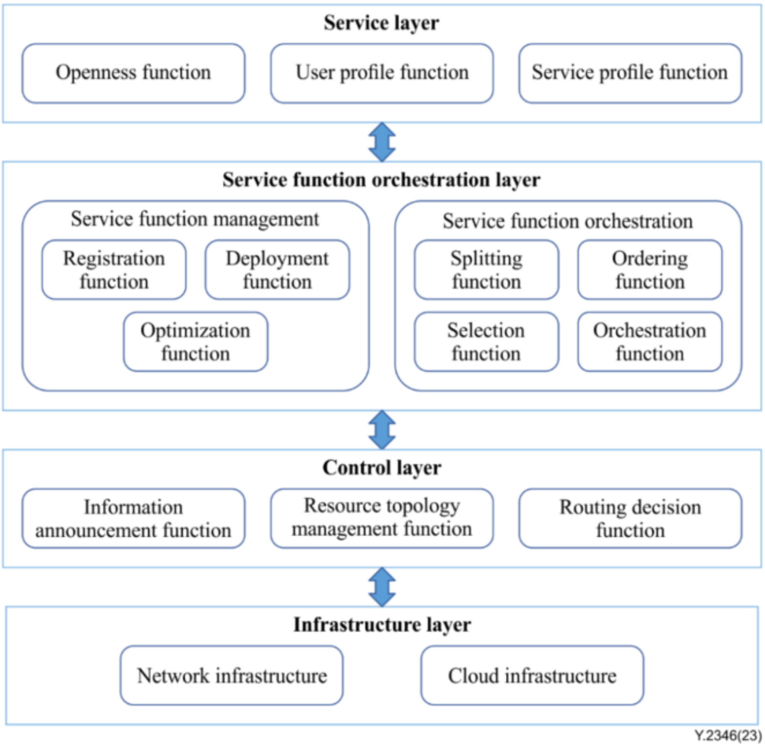

Figure 6-1 − Functional architecture of service function orchestration based on SFC [ITU-T Y.2346 Figure 10-1]

7. Reference model of monitoring service function orchestration based on SFC

Editor's note: This clause will describe the reference model of monitoring service function orchestration based on SFC.

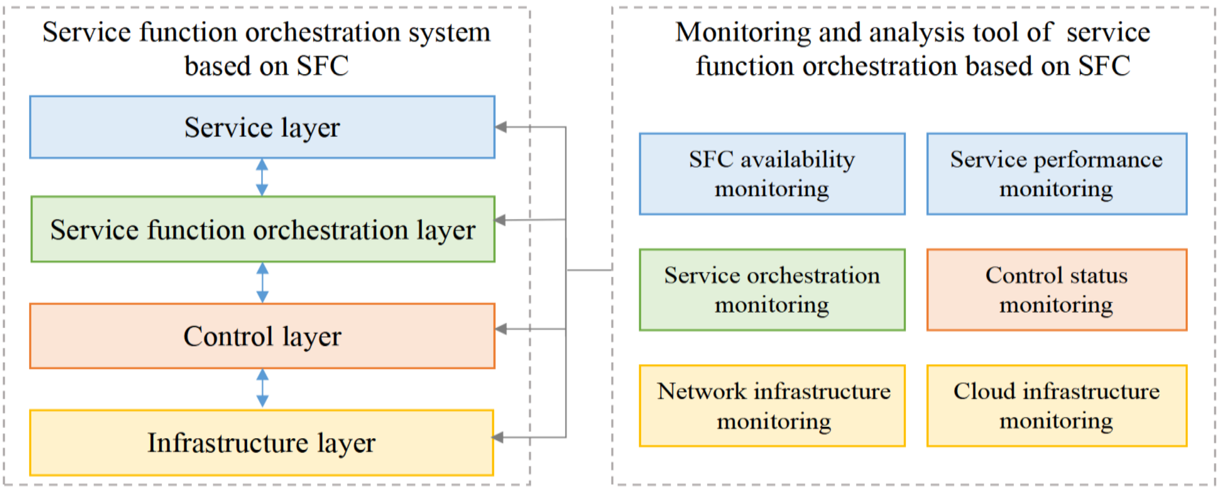

Figure 7-1 − Reference model for monitoring service function orchestration based on SFC

The service function orchestration of SFC aims to achieve flexible provisioning and intelligent collaboration of network services through resource pool selection, dynamic adjustment of service functions, and service scheduling. Unlike traditional network management approaches, the SFC orchestration process must coordinate computing, storage, and network resources across multi-layer and multi-domain complex environments to meet the differentiated requirements of various services.

Therefore, monitoring and analysis tools need to collect and integrate multidimensional information to comprehensively evaluate the effectiveness of SFC orchestration and deployment, help identify performance bottlenecks and strategy imbalances, and thereby provide support for operation and maintenance decision-making as well as fault localization. As shown in Figure 7-1, the monitoring of SFC-based service function orchestration includes the following aspects:

(1) Monitoring service layer: Reflects service delivery performance and user experience status, enabling timely detection of service performance degradation or service anomalies. It includes SFC availability monitoring and service performance monitoring.

(2) Monitoring service function orchestration layer: By monitoring the orchestration process of service functions, it helps evaluate the rationality and response efficiency of orchestration strategies while identifying potential issues such as strategy conflicts and orchestration delays.

(3) Monitoring control layer: By monitoring control status, it ensures orchestration strategies can be accurately and efficiently delivered to the infrastructure layer.

(4) Monitoring infrastructure layer: Reflects the operational status and utilization of underlying resources, providing reliable data for upper-layer orchestration. It enables timely identification of resource bottlenecks and node failures, including network infrastructure monitoring and cloud infrastructure monitoring.

8. Monitoring parameters for service layer

Editor's note: Monitoring parameters for service layer will be described in this clause.

As defined in [ITU-T Y.2346], service layer is responsible for managing user and service information, which is used to receive service function orchestration requirements, send service requirement information to the service function orchestration layer. Monitoring parameters for service layer are mainly used to reflect the availability of the SFC, while also measuring service performance and user experience.

8.1 SFC availability

Service providers need to continuously monitor the operational status of the SFC to determine whether it can consistently deliver continuous and stable service capabilities. By continuously monitoring changes in availability, network optimization and fault prevention can be carried out proactively. The monitoring parameters of SFC availability are required to include the parameters which are shown in Table 1.

Table 1 – Monitoring parameters of SFC availability

Metric name	Description	Unit
Service Request Failure Rate	The proportion of service requests that fail to be successfully completed within a defined observation period	%
Mean Time Between Failures	The average duration of normal operation of SFCs between two consecutive failures	ms

TBD

8.2 Service performance

Monitoring the service performance of SFC is of great importance and necessity. On one hand, it reflects the real-time status of the system when handling service requests, helping operation and maintenance personnel promptly identify performance bottlenecks or resource shortages. On the other hand, service performance monitoring is also an essential means for evaluating SLA compliance and ensuring a high-quality user experience. The monitoring parameters of service performance are required to include the parameters which are shown in Table 2.

Table 2 – Monitoring parameters of service performance

Metric name	Description	Unit
Concurrent Request Count	The maximum number of service requests that the system can sustainably handle concurrently	Number
Service Request Queue Length	The number of service requests waiting to be processed	Number
Service Response Time	Time from a user's request submission to the activation of the service	ms
SLA Compliance Rate	The proportion of service requests that meet the defined SLA criteria within the statistical period, relative to the total number of service requests	%

TBD

9. Monitoring parameters for service function orchestration layer

Editor's note: Monitoring parameters for service function orchestration layer will be described in this clause.

After analyzing the service requests and policy constraints (such as latency and bandwidth) from the service layer, the service function orchestration layer performs the tasks of decomposing, sequencing, selecting, deploying, and managing service functions, thereby dynamically constructing a service chain that meets business objectives. By monitoring the operational status of the service function orchestration layer, one can intuitively reflect the computational complexity and orchestration algorithm efficiency of the orchestrator when processing service requests. The monitoring parameters of service function orchestration layer are required to include the parameters which are shown in Table 3.

Table 3 – Monitoring parameters of service function orchestration layer

Metric name	Description	Unit
Service Function Splitting Time	The time taken to split a service request into individual service function components	ms
Service Function Ordering Time	The time required to determine the execution order of service functions based on dependencies or policies	ms
Service Function Selection Time	The time taken to select the optimal service function instances that meet latency, bandwidth, and resource constraints	ms
Service Orchestration Time	The total time for the orchestration function to generate a service function path (SFP) based on the results of function splitting, ordering, and selection	ms
Orchestration Rollback Rate	The proportion of orchestration processes that trigger a rollback due to deployment failures or conflicts	%

TBD

10. Monitoring parameters for control layer

Editor's note: Monitoring parameters for control layer will be described in this clause.

The control layer is responsible for aggregating infrastructure resources and topology information, performing information announcements and routing decisions, and delivering SFC configurations to network devices. It is necessary to monitor the timeliness of resource and topology information, as well as the status of policy configuration delivery, to ensure service stability and assist in fault diagnosis. The monitoring parameters of control layer are required to include the parameters which are shown in Table 4.

Table 4– Monitoring parameters of control layer

Metric name	Description	Unit
Topology Information Update Interval	The time interval at which the control layer updates and refreshes network topology information	ms
Resource Information Update Interval	The time interval at which the control layer collects and updates resource status information	ms
Information Announcement Time	The time taken for topology or resource updates to be propagated and synchronized within or across control domains	ms
Routing Computation Time	The time required by the control layer to translate a SFP into specific routing information within the network	ms
Configuration Delivery Time	The time taken for the control layer to deliver configuration commands or policies to network devices and receive confirmation of successful deployment	ms
Configuration Failure Rate	The proportion of configuration or policy delivery attempts that fail due to errors, conflicts, or device response issue	%

TBD

11. Monitoring parameters for infrastructure layer

Editor's note: Monitoring parameters for infrastructure layer will be described in this clause.

Monitoring the infrastructure layer helps assess whether the underlying resources are capable of supporting the normal operation of the SFC. It not only enables operation and maintenance personnel to promptly identify network congestion, resource bottlenecks, or equipment failures, but also allows for early warning of potential risks and optimization of resource allocation and network topology. Monitoring of the infrastructure layer should include both network infrastructure and cloud infrastructure.

11.1 Network infrastructure

The monitoring of network infrastructure focuses on data forwarding performance and link status to ensure that data flows can pass through the network stably and efficiently. The monitoring parameters of network infrastructure are required to include the parameters which are shown in Table 5.

Table 5– Monitoring parameters of network infrastructure

Metric name	Description	Unit
Service Function Identifier	Identifier of the service function bound to the specfic network infrastructure	Number
Service Function Status	Indicates whether the SF instance is in an active state	True/False
Ingress Bytes Rate	The rate at which incoming bytes are received over a network interface per unit time	KB/s
Egress Bytes Rate	The rate at which outgoing bytes are transmitted over a network interface per unit time	KB/s
Ingress Bandwidth	The total available bandwidth capacity for incoming traffic on a network interface or link	Mb
Ingress Bandwidth Utilization	The percentage of incoming bandwidth currently being used compared to its total capacity	%
Engress Bandwidth	The total available bandwidth capacity for outgoing traffic on a network interface or link	Mb
Egress Bandwidth Utilization	The percentage of outgoing bandwidth currently being used compared to its total capacity	%
Average latency	Average of delay of data transition	ms
Packet loss	Percentage of packets lost	%

TBD

11.2 Cloud infrastructure

Monitoring of cloud infrastructure mainly focuses on the utilization and health status of computing and storage resources to prevent service function chain interruptions caused by computing or storage failures. The monitoring parameters for cloud infrastructure are those resource layer parameters specified in [ITU-T Q.3914].

12. Security considerations

Editor's note: This clause will describe the security considerations.
TBD

Bibliography

[b-IETF RFC 7665] IETF RFC 7665 (2015), *Service Function Chaining (SFC) Architecture.*