

Design analysis of methods for distributing the computing metric  
draft-shi-cats-analysis-of-metric-distribution-00

Commenté [BMI1]: After reading the document, it seems this is more about deployment options.

Abstract

This document analyses different methods for distributing the  
computing metrics from ~~the~~ service instances to the ingress router.

Commenté [BMI2]: Metrics are shared with C-PSes

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Table of Contents

1. Introduction . . . . .	2
2. Conventions and Definitions . . . . .	2
3. Requirement of distributing computing metric . . . . .	3
4. Option 1: Centralized C-SMA + Centralized C-PS . . . . .	4
5. Option 2: Centralized C-SMA + Distributed C-PS . . . . .	4
6. Option 3: Distributed C-SMA + Centralized C-PS . . . . .	4
7. Option 4: Distributed C-SMA + Distributed C-PS . . . . .	4
8. Comparison . . . . .	4
9. Security Considerations . . . . .	5
10. IANA Considerations . . . . .	5
11. References . . . . .	5

11.1. Normative References . . . . .	5
11.2. Informative References . . . . .	5
Acknowledgments . . . . .	6
Author's Address . . . . .	6

## 1. Introduction

Many ~~modern~~ computing services are deployed in a distributed way. Multiple service instances deployed in multiple sites provide equivalent function to the end user. As described in [I-D.yao-cats-ps-usecases], traffic steering that takes computing resource metrics into account would improve the quality of service. Such computing metrics are defined in [I-D.du-cats-computing-modeling-description]. This document analysis different methods for distributing these metrics.

## 2. Conventions and Definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

This document uses terms defined in [I-D.ldbc-cats-framework]. ~~We list them below for clarification.~~

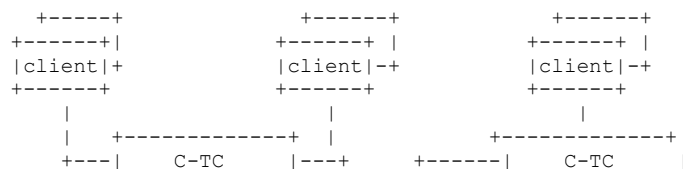
~~\* Computing-Aware Traffic Steering (CATS): An architecture that takes into account the dynamic nature of computing resources and network state to steer service traffic to a service instance. This dynamicity is expressed by means of relevant metrics.~~

~~\* CATS Service Metric Agent (C-SMA): Responsible for collecting service capabilities and status, and reporting them to a CATS Path Selector (C-PS).~~

~~\* CATS Path Selector (C-PS): An entity that determines the path toward the appropriate service location and service instances to meet a service demand given the service status and network status information.~~

## 3. Requirement of distributing computing metric

The CATS functional components ~~of the CATS is are~~ defined in [I-D.ldbc-cats-framework] (see Figure 1, the figure is replicated here for better understanding). C-SMA is responsible for collecting the computing metrics of the service instance and distributing the metrics to the C-PSes. A C-PS then selects the a path based on the computing metrics and network metrics.



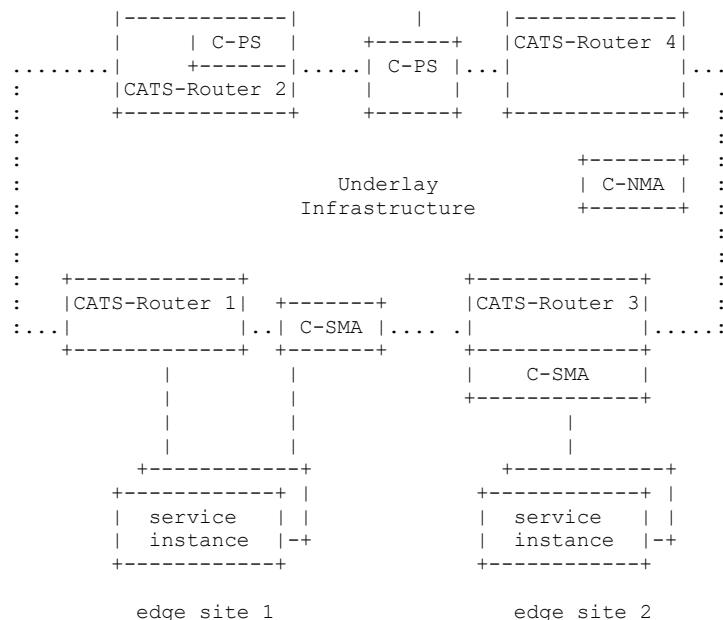


Figure 1: CATS Functional Components

#### 4. Option 1: Centralized C-SMA + Centralized C-PS

The computing metrics can be collected internally with a hosting infrastructure by a centralized cloud-monitor of the cloud platform hosting infrastructure. Various tools such as Prometheus for this purpose. The cloud-monitor can pass the metrics to the-a network controller, which behaves as a C-PS. Then, the network controller calculates the optimal path and distribute the paths to the-CATS ingress routers. When a service request arrives at the CATS Ingress Router, -The ingress router it just need to steers the flow request to the path. The network controller distributed the metric update to the C-PS using south-bound protocol.

Commenté [BMI3]: The controller behaves as a C-PS.

#### 5. Option 2: Centralized C-SMA + Distributed C-PS

Similar to option 1, the network controller does not calculate the path. It just passes the computing metrics received from the cloud monitor to the C-PS -inembedded in -the-a CATS ingress router. The C-PS at each CATS ingress router will calculate the best path independently proceed with path computation locally.

Commenté [BMI4]: It does!

#### 6. Option 3: Distributed C-SMA + Centralized C-PS

The C-SMA can be deployed in a distributed way. For example, C-SMA running at each site collects the computing metrics of the service instances running in the-a site. Then, it reports the metrics to the-a

network controller, which behaves as a C-PS. The network controller calculates the best path for a service and distribute the path to ~~the-a~~ CATS ingress router.

7. Option 4: Distributed C-SMA + Distributed C-PS

Similar to option 3, each C-SMA collects the computing metricss of each site. Then it needs to distribute the metric to C-PS at each ingress router. It can do so directly or through a network controller.

8. ~~Comparison~~Comparaison

	Option 1	Option 2	Option 3	Option 4
Protocol	None	Southbound	Southbound	Southbound or Eastbound
CATS router requirement	Low	High	Low	High
Network controller requirement	High	Low	High	Low

Table 1: Comparison between different options

9. Security Considerations

TBD

10. IANA Considerations

This document has no IANA actions.

11. References

11.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/rfc/rfc2119>>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/rfc/rfc8174>>.

11.2. Informative References

[I-D.du-cats-computing-modeling-description] Du, Z., Fu, Y., Li, C., and D. Huang, "Computing Information Description in Computing-Aware Traffic Steering", Work in Progress, Internet-Draft, draft-du-cats-computing-modeling-description-00, 5 March 2023, <<https://datatracker.ietf.org/doc/html/draft-du-cats-computing-modeling-description-00>>.

Commenté [BMI5]: If the controller relays the metrics, then this is similar to the centralized C-SMA mode.

Commenté [BMI6]: Protocol for what?

Commenté [BMI7]: You may explicit the interface.

Commenté [BMI8]: How to interpret these?

Commenté [BMI9]: Which requirement?

Commenté [BMI10]: Do you mean the presence of a controller?

computing-modeling-description-00>.

[I-D.ldb-cats-framework]

Li, C., Du, Z., Boucadair, M., Contreras, L. M., Drake, J., Huang, D., and G. S. Mishra, "A Framework for Computing-Aware Traffic Steering (CATS)", Work in Progress, Internet-Draft, draft-ldb-cats-framework-01, 10 March 2023, <<https://datatracker.ietf.org/doc/html/draft-ldb-cats-framework-01>>.

[I-D.yao-cats-ps-usecases]

Yao, K., Eardley, P., Trossen, D., Boucadair, M., Contreras, L. M., Li, C., Li, Y., and P. Liu, "Computing-Aware Traffic Steering (CATS) Problem Statement and Use Cases", Work in Progress, Internet-Draft, draft-yao-cats-ps-usecases-00, 3 March 2023, <<https://datatracker.ietf.org/doc/html/draft-yao-cats-ps-usecases-00>>.

#### Acknowledgments

The author would like to thank Xia Chen, Guofeng Qian, Haibo Wang for their help.

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