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The use case in Edge Datacenter network draft-aoch-nvo3-edge-datacenter-01.txt

Abstract

This document introduces the Edge Datacentet network, and describe some use cases about Edge Datacenter, discusses an important component in the Edge Datacenter:Service Gateway and its functions, elaborates the requirements on Service Gateway.

Service Gateway works as a Flow Split Device(FSD) in the Edge DC network, it needs to not only play a gateway of the edge Datacenter network, implementing coordination with existing technology, but also meets many new requirements. For example, to make sure the packets goes into Edge DC or Metro network, SDN forwarding, and as a leaf in the leaf-spin architecture.

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1. Introduction

With the challenge and the chances of the new network SDN/NFV and the development of the Datacenter, the provider is facing many changes from traditional network, which is representive by traditional CO. How to use the resource of the traditinal CO fully and achieve the transition to the SDN/NFV is the problem providers and vendors need to consider. CO re-architection is the attractive to more and more providers and vendors. and getting more and more attention. Using lots of CO resource, the providers can re-architected CO to Edge DC, which is more adaptive in SDN/NFV.

In this document, we will present some use cases of the Edge Datacenter and its main component, Service gateway. As a result, some requirements are proposed for Edge DC and Service Gateway.

2. Terminology

Edge DC(EDC): a Datacenter network which is close to user, may by recontructureed from CO, and is SDN/NFV

Servie Gateway: flow split device(FSD) in the Edge Datacenter network.

FSD(Flow Split Device): device to split user flow according to the control flow table, include forwarding plane and stack module.

CO: Center Office.

3. Problem statement

Current network is facing some bottlenecks which also rises some important requirements.

1.Low latency:Generally, there is more than 10ms latency between user and application in the cloud. If we put some application requiring low latency to network front end, low latency can be meet by this closing to user mode.

2.Massive access: One of the bottlneck of the network is from the increasing number of session to access to the network, and it's difficult to meet the explosive session in current network. It is required to adpot NFV, and to seperate the control plane and user plane. Meanwhile, Massive IP address can be processsed at the edge of the network in the case of IoT, so that IP address management can also be optimized.

3.Large traffic: There will be a serious pressure in bandwidth resource if the large traffic is transitted from the edge of the network to the core of the network. EDC can be used for these large traffic locally process so that some of them can be absorbed at the edge of the network.

4. Edge Datacenter

From above section, we know that EDC(Edge Datacenter) can meet the challenge from the low latency, Large traffic and massive sessions by improving the capability at the edge of network and providing a cloud architecture. The interoworking archtecture about EDC is as Figure 1.

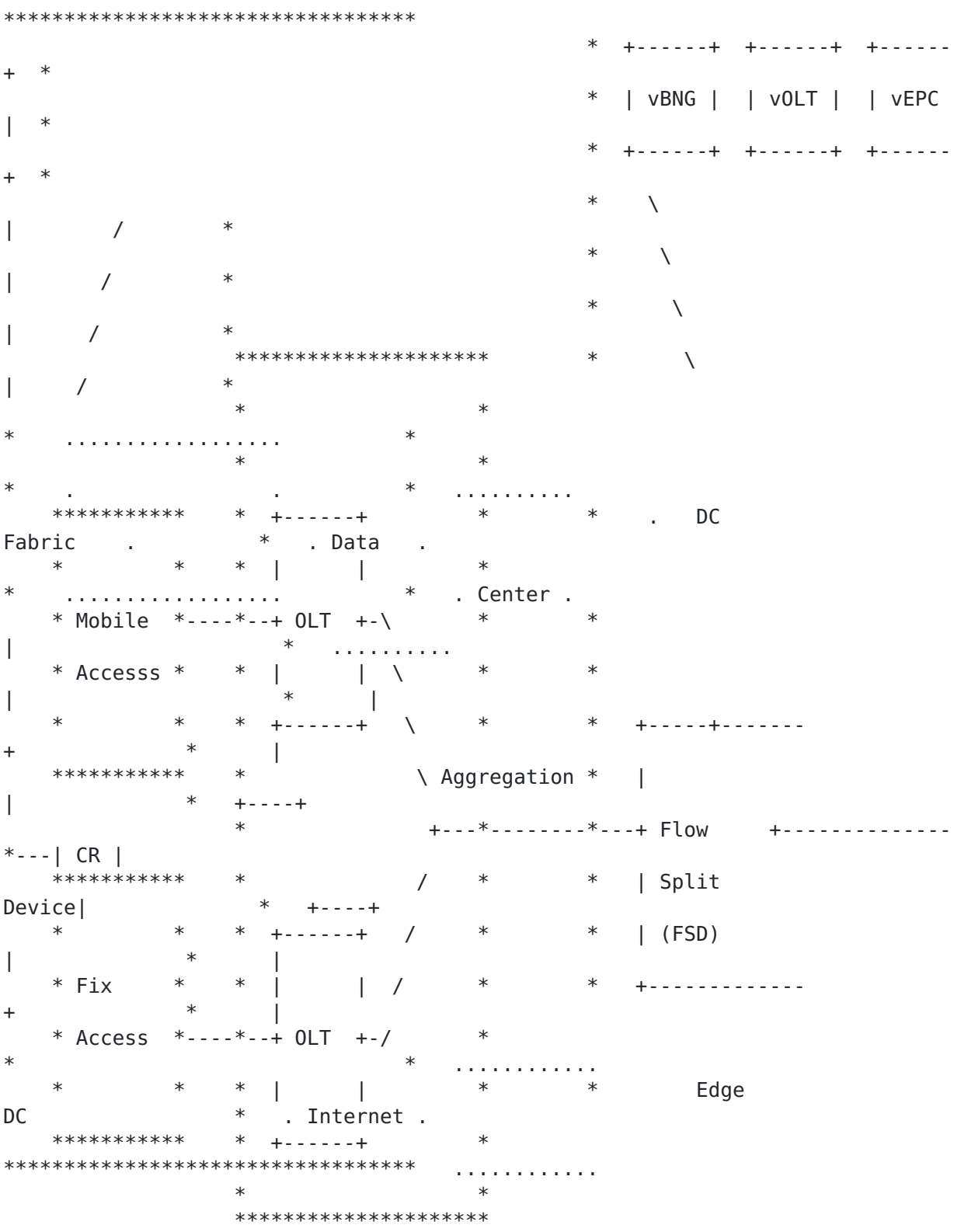
vBNG
vOLT
vEPC
DC Fabric
Data Center
Internet
Mobile Access
Fix Access
OLT
Aggregation
Flow
CR
Split Device
(FSD)
Edge DC

Figure 1

Considering there are many communication COs which have lots of traditional dedicated devices in providers network, with the evoluation of SDN/NFV, Edge Datacenter can be developed based on the CO. An example of Edge Datacenter is showed as Figure 1. In the Edge Datacenter, general server can be used as network element. Virtual network elements includes vBNG,vCPE,vOLT, etc. And in generally, the Edge Datacenter uses leaf-spin topology. There are three types of leaf: Distribution leaf, Server leaf and Board leaf. Server leaf is connecting Server. Board leaf is the DGW providing DC interconnection. Distribution leaf is the SGW in Figure 2. As a key node in the Edge datacenter, Service Gateway will be elaborated in the next section.

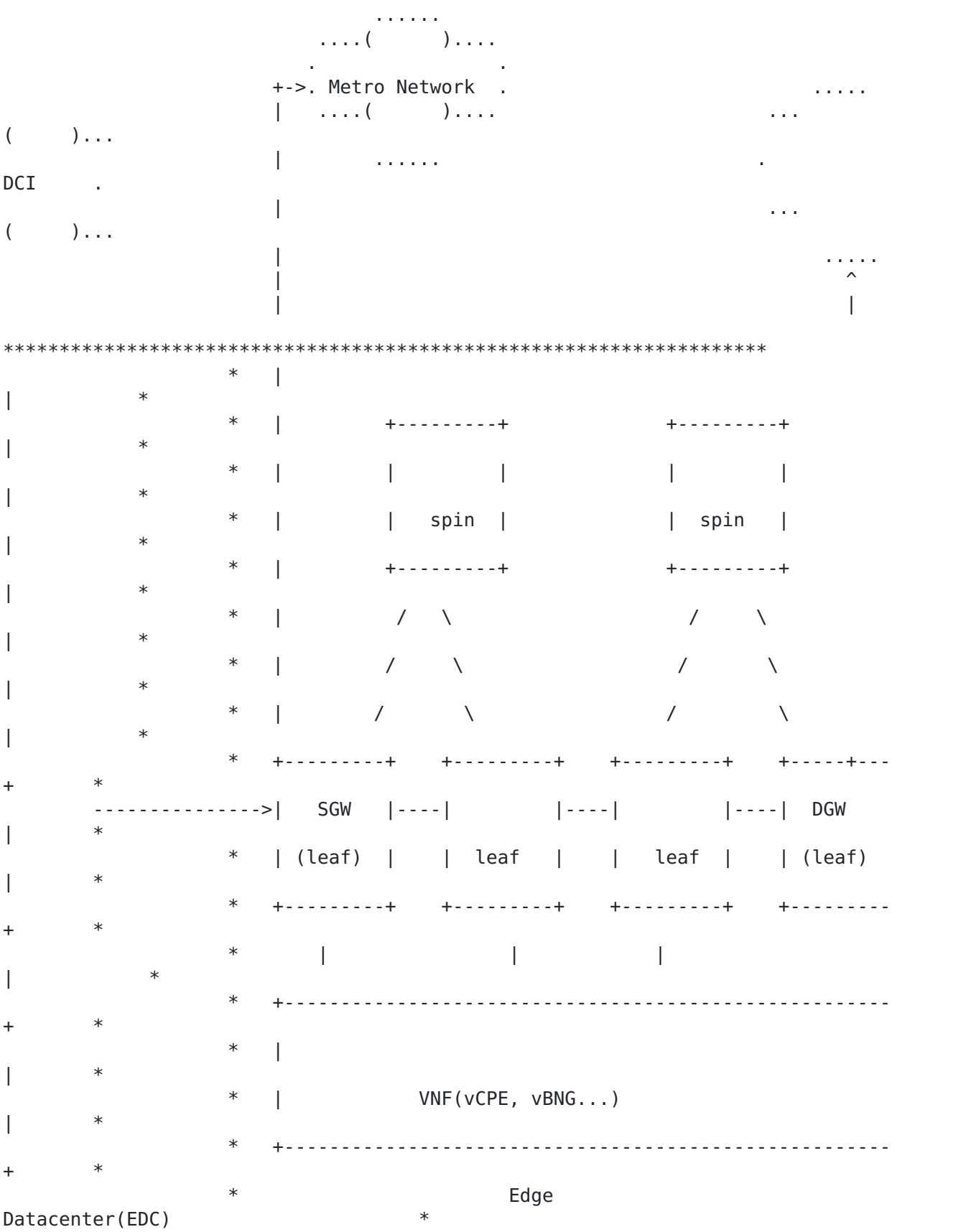
Metro Network
DCI
SGW
(leaf)
leaf
leaf
(leaf)
spin
spin
VNF(vCPE, vBNG...)
Edge
Datacenter(EDC)

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Figure 2

4.1. Use cases of the EDC

EDC is in the place that is closest to user. It may not have a large scale, but because of its "edge" propoerty, it can meet most access requirements from user.These EDCs can get realtime data update through WAN and core DC. By the EDC, we can not only avoid to tranmit lots of duplicated data, but also let the users get the same service and data as same as from core DC, but with better experience.

In this section, we will list 4 use cases of the EDC to make it clear.

4.1.1. Future video application

In this use case, all the video traffic are getted from EDC so that the users can get better experience when they play games or watch video,etc. EDC has the capability of abstract for elephant traffic(IPTV), and support the extremely low latency video application. Figure 3 is the diagram of this case.

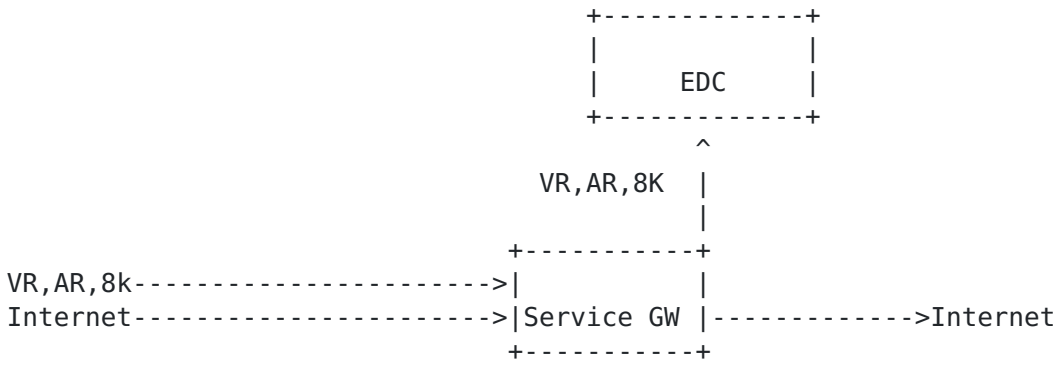

Figure 3

4.1.2. Edge IOT control application

EDC has its own computational capbility, and getting more and more intelligent. In the case that UAV(UnmannedAerialVehicle), it needs to communicate with the apps in EDC so that the UAV can be remote controlled. Similar with other IOT control scenarios. Figure 4 is the diagram of this case.

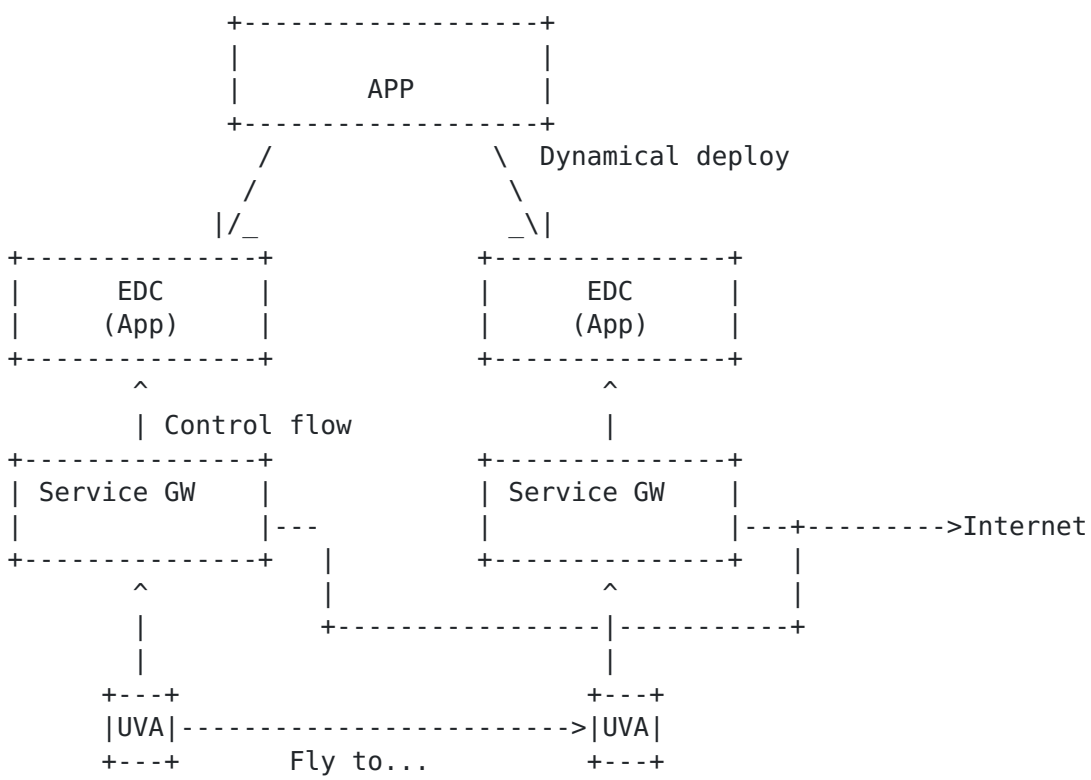

Figure 4

4.1.3. Home Hybird Cloud

In this case, EDC is an extension of Home Gateway. Some expanded computation or expanded store are extended into EDC instead of on HGW. Even some APPs can also extened into EDC. Users can get more applications, such as OTT white box, remote download, and remote desktop, etc. Figure 5 is the diagram of this case.

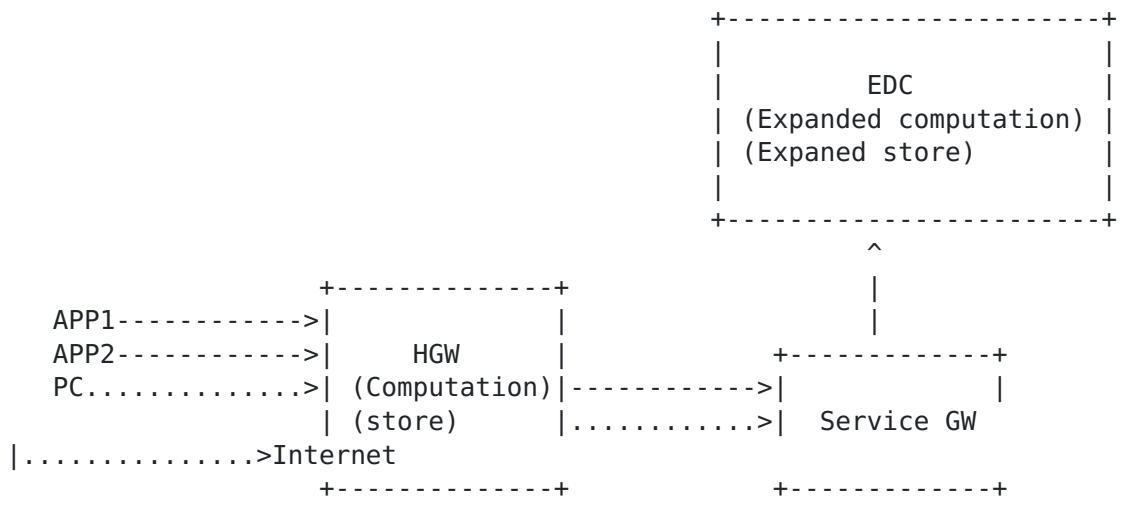

Figure 5

4.1.4. Light weight lease line based on application

In this use case, EDC is a control node for user 2/3 layer lease line (VxLAN or MPLS). It can support dynamically setup the tunnel according to application identification; support user private IP address or address management, etc. Figure 6 is the diagram of this case.

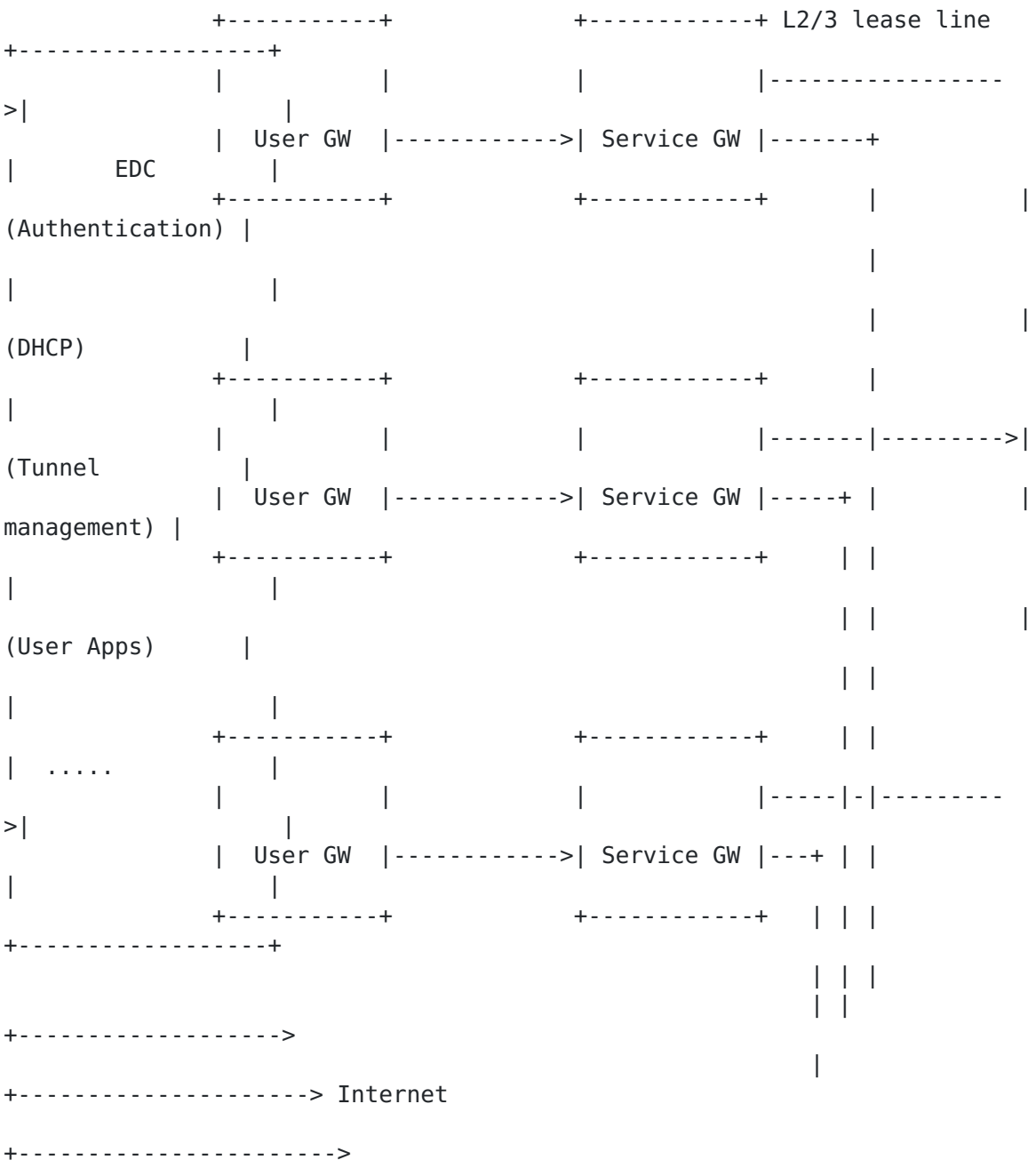

Figure 6

5. Service Gateway

From those use case above, we know that Service Gateway as a key node in the forwarding plane, is a flow distribution device in Edge DC network. It needs not only to support currently existing protocols, but aslo to meet all kinds of new requirements, ie. SDN forwarding, virtualization,SDN control, and spine-leaf network architecture, dynamic SFC, etc. The main purpose of the Service Gateway is to

improve the forwarding, and converge or distribute traffic according to different service. By the Service Gateway, we can avoid the hairpin of the traffic to Metro network, and divide the traffic into north-south traffic and south-east traffic clearly.

5.1. Functions

5.1.1. PPPoE proxy

To terminate PPPoE tunnel.

5.1.2. VxLAN encapsulation

Encapsulate the packets into Edge DC with VxLAN as VTEP. Provide VxLAN mapping, forwarding, and interconnection with VLAN as a gateway.

5.1.3. C/S VLAN forwarding

Support QinQ VLAN forwarding, so that be compatible to traditional network, and reduce the capacity of FDB.

5.1.4. Distribution

Achieve traffic distribution according to service VLAN. The forwarding table on the SGW can be configurated by the SDN controller with NATCONF or OFPCONFIG protocol.

Can implement linea forwarding based any field in IP header.

6. Conclusion

CO being re-architected as Edge DC is a very critical step for provider's evolving to SDN/NFV.

7. Security Considerations

Service Gateway must have the capability of checking the validation of user's address.

8. IANA Considerations

N/A

9. Information References

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