When migration occurs:

"We assume cycle-stationary traffic conditions because it is well known that data-center traffic matrices exhibit strong diurnal patterns and are typically cycle-stationary [40], [42], [43]. We denote with N the number of stationary intervals after which the same traffic characteristic occurs again. We denote the duration of a stationary interval with Δt and we assume that in the h −th (h =0 ,1,⋯,N−1) stationary interval the traffic state Sh occurs and characterized by the values of bandwidth BWh,i (i =1 ,⋯,T) of the T offered SFCs."

It goes off previous research that the cycle of traffic is very similar from day to day and uses this information to break the day up into what they call traffic states. The traffic states are put into a set with S0 being the peak hour interval which is the highest traffic time of the day. Migration occurs in between traffic states and is done in order to reduce cost over the upcoming traffic state. This paper does not give any indication as to how many or the length of the traffic states is determined.

How this algorithm differs from our approach:

This paper focuses on what is called a Service Function Chain that can contain any combination of Virtual Network Functions. The service function chain contains one or more network function that is necessary for the data to pass through. Each transaction of data may call for a different service function chain. Also, this approach has a heavy emphasis on consolidation of network functions, taking into consideration the amount of processing power of the switches to see if they can hold more virtual network functions. The consolidation allows for the system to conserve power and turn off unused switches. As a whole the algorithm looks to minimize bandwidth rejected and also to minimize running costs as a function of power costs coming from having machines turned on and reduction of functionality costs coming from loss in quality of service while the system migrates and consolidates virtual network functions.

Paper List:

https://halshs.archives-ouvertes.fr/halshs-01643064v2/document

On a Virtual Network Function Placement and Routing problem: properties and formulations

We have a general graph G(N,A), N for nodes and A for Arcs or links and we have one type of VNF. VNF can be installed on any of the nodes and can serve a limited amount of demand, D. Each source/destination pair has a certain amount of demand and each VNF instance can handle a certain amount of demand which cannot be split. The problem here is to match the pair's demand to available VNFs.

https://www.researchgate.net/publication/308139637_Virtual_Network_Function_Placement_For_Resilient_Service_Chain_Provisioning

VNF Placement for resilient service chain provisioning

Network is modeled as directed graph G(V,E). Each edge has a latency and bandwidth capacity. Each node has a cpu capacity limiting the number of VNFs that can be placed upon it. VNFs are chained into service chains. Different users may need different service chains.

https://users.soe.ucsc.edu/~qian/papers/NFV_survey.pdf

A Survey of Network Function Placement

Overview and discussion of virtualization, what is it, how can it be used.

https://arxiv.org/pdf/1706.04762.pdf

Optimal Orchestration of Virtual Network Functions

Network modeled by graph G(N,A) where nodes contain VNFs. VNFs of the same type can be put on the same node, but each demand cannot be split between VNFs. VNF resource consumption measured by CPU and RAM usage. Latency introduced by VNFs is measured.

https://arxiv.org/pdf/1803.06025.pdf

CPVNF:Cost-efficient Proactive VNF Placement and Chaining for Value-Added Services in Content Delivery Networks

Focus on proactive placement of VNFs which provide value added services while maintaining a certain quality of service threshold. Given content X, the server containing X, a set of users that want to view X and a set of services to be accessed we attempt to find the number and locations of VNF instances and a way to chain these instances for minimization of cost and maximization of quality of service.

http://staff.ustc.edu.cn/~kpxue/paper/ComputerNetwork-Defang-201904.pdf

Virtual network function placement and resource optimization in NFV and edge computing enabled networks

https://ondm2018.scss.tcd.ie/wp-content/uploads/2018/05/019.pdf

Virtual-Network-Function Placement For Dynamic Service Chaining In Metro-Area Networks

Attempts to determine VNF nodes per service chain request in a 4 level hierarchical aggregation network of cell sites.

http://www.sfu.ca/~fangxinw/Papers/15-IPCCC-NFV_Placement.pdf

Bandwidth Guaranteed Virtual Network Function Placement and Scaling in Datacenter Networks

Looks a t data center as a three layer single root tree.