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A SURVEY - MANAGEMENT OF DATA CENTERS IN SDN

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ABSTRACT
In a software defined data center, all elements of the infrastructure networking, storage, CPU and security are virtualized and delivered as a service. At the same time, in Cloud Data Centers (DCs), even though network and server resources converge over the same infrastructure and typically under a single administrative entity, disjoint control mechanisms are used for their respective management.in this paper, we purposed the comparison of different techniques of the management of data center in SDN.

Keywords: *Crossroads, NCP And LCA,(TASDN) Architecture, Avalanche Routing Algorithm, Top-Of-Rack (Tor) Switching Technique.*

I. INTRODUCTION
Growing concern for reduced power dissipation, cost and latency demands in next generation Data Centers (DC) motivates us to revisit header optimizations. Current data centers often employ SDNs (Software Defined Networks) that are layered in most cases. However, information overwhelming has been a limitation to SDN deployment. We present a management model for data center networks. In this approach, regional networks on lower layers will be aggregated and viewed as single switches to upper layers. We propose a Software Defined Networking (SDN) based Traffic Engineering (TE), which consists of optimal topology composition and traffic load balancing. In this paper, we exploit the capabilities of SDN and introduce a new functionality that can effectively replace the redundant and repetitive header information with shorter unique identity. We present Scissor that trims the headers lower in the protocol stack. As a replacement for routing, we introduce the notion of Flow-ID,where all packets belonging to a flow are identified using this unique Flow-ID

II. LITERATURE REVIEW

Seamless VM Mobility Across Data Centers through Software Defined Networking(V.Mann Et Al, 2012)[1]
Provide flexibility and availability in crossroads system because a network layer provides live and offline VM mobility on multiple data centers so either the VM mobility is offline data can be accessed. Implement prototype of crossroads based on open flow where the control plane is the network controller. They extend the idea of location independence which is based on pseudo addresses. They address the evaluation of crossroads on a test bed that influence collection of virtualization to imitate different data centers. Their performance result shows that crossroads has so small conduct overhead as compared to default layer. Algorithm is efficient because design supports both east west traffic.

NCP: Service Replication in Data Centers through Software Defined Networking(V.Mann Et Al, 2013)[2]
They present a system in which service replication is enabled through SDN. Their system is efficient because solves challenges that are associated with network based replication. The system solves the problems through server virtualization, multicore and (SDN) technologies and allows user to identify network addresses and ports. Much more flexible, NCP automatically decides replication switch and install different rules like special routing rules. The paper discussed that algorithms is based on the performance parameters they present the requirements, design and implementation of NCP middle box appliance that captures the redirected packets and scalability of NCP middle box appliance through real test bed and multicore machine.

Data Center Optical Networks (DCON) with Open Flow based Software Defined Networking (SDN)(Y. Zhao, J. Zhang Et Al, 2013)[3]
Describes data center optical networks that are based on software defined networking which control different networks with combine resources hence increase efficiency and made it flexible. This paper describes the platform

for the secure data centers. In this paper TASDN architecture and experimental illustration of optical interconnects that are based on Open flow and flexi-grid are discussed and experiments shows that this algorithm is much more secure than others data centers algorithms. Top-of-rack , aggregation and core optical Switches are used to connect data centers. Application controller and network controller control each resource to handle intra DC network, enabled optical switches and this system has high capacity and low energy consumption

Avalanche: Data Center Multicast using Software Defined Networking(A. Iyer Et Al, 2014)[4]
Avalanche Routing Algorithm provides efficiency because they allow multicast in datacenters. Provide flexibility and reduce capacity because AvRA algorithm minimize the size of the routing tree and creates for any multicast group the fact that the typical high performance ,typical data center topologies minimize to a routing algorithm .provide rich path diversity to reduce complexity and achieves highly efficient bandwidth utilization. They have addressed the parameter security in implement Avalanche as an Open Flow controller module. Provide confidentiality because Avalanche with Mininet HiNFi shows that data rate is up to 12% improve and packet loss is improving approximate 51%.AvRA algorithm is more effective than traditional ip multicast routing

Software Defined Networking across Distributed Datacenters over Cloud(A. Iyer Et Al, 2014)[5]
Provide flexibility in a network abstraction so physical and virtual data plane can incorporate in data centers. They discussed new network primitive to minimize issues and increase efficiency. Provides a programmable interface for security parameter. They determines performance result on a real deployment and their performance results shows that system is most promising solution

Virtual Data Center Networks Embedding Through Software Defined Networking(A. Iyer Et Al, 2014)[6]
They approach SDN to employing the NetworkNasNaNService. Their architecture uses to create a virtual topology using BGP configurations and they provide efficiency because they allow an efficient mapping to a physical network of OpenFlow 1.3 switches. In their algorithm control plane controls networks and select virtual paths for network resources and send to data planes so more secure and more efficient. Their experimental evaluation shows their algorithm is efficient and provides better utilization under different traffic patterns. They use RouteFlow algorithm to map entire network environment using BGP protocols so mapping is efficient and fast.

Elastic Tree: Saving Energy in Data Center Networks(B. Heller Et Al, 2010)[7]
In this paper first compare different methods for finding minimum-power network of traffic patterns. They execute and analyze algorithm on a machine. They determine the agreements between energy efficiency, performance and robustness. They describe energy and confidentiality parameters for data center workloads. The algorithm can save network energy greater than 50% and handles traffic load. Provide fast computing networks so algorithm is more efficient. The algorithm minimizes the power bill.

Software Defined Networking-based Traffic Engineering for Data Center Networks(Y.Han Et Al, 2010)[8]
To overcome the limitations of the current DCNs, we propose a Software Defined Networking (SDN)-based Traffic Engineering (TE), which consists of optimal topology composition and traffic load balancing. We can reduce the power consumptions of the DCN by turning off links and switches that are not included in the optimal subset topology. To diminish network congestions, the traffic load balancing distributes ever changing traffic demands over the found optimal subset topology. In this paper, we have presented a dynamic TE system for a DCN in detail. We have explained the overall system architecture of the TE system, which has three components: a DCN, an SDN controller, and a TE manager.

SDNNbased Virtual Machine Management for Cloud Data Center(R.Cziva Et Al, 2012)[9]
In this paper, we presented a converged control-plane framework that integrates VM and network resource management for Cloud Data Centers. We have provided a SDN based implementation for SNCORE, a scalable and network aware live migration algorithm that reduces the communication cost of pairwise VM traffic flows by exploiting collocation and network locality. We have extended the functionality of the POX SDN controller to provide flow utilization measurement and aggregation, to expose network-wide state, and to assign weights to the links of the DC topology. For the purposes of this study, link weights reflect the bandwidth cost and the oversubscription ratio that increase when moving higher towards the core of a DC network hierarchy.
Scissors: Dealing with Header Redundancies in Data Centers through SDN(K.Kanna Et Al, 2012)[10]

In this paper, we exploit the capabilities of SDN and introduce a new functionality that can effectively replace the redundant and repetitive header information with shorter unique identity. We present Scissor that trims the headers lower in the protocol stack. As a replacement for routing, we introduce the notion of Flow-ID, where all packets belonging to a flow are identified using this unique Flow-ID. We leverage the capabilities of the SDN to dynamically allow switching devices to route the packets based on the Flow-IDs. Our approach of trimming header at the switching devices leaves the hosts unmodified making it highly adoptable for DC environment. We propose Scissor that deals with the redundant header information by trimming them at the lower most stack.

Zeppelin N A Third Generation Data Center Network Virtualization Technology based on SDN and MPLS(J.Kempf, Et Al, 2013)[11]

In this paper, we propose a third generation approach: multiple layers of tags to achieve isolation and designate routes through the data center network. The tagging protocol can be either carrier Ethernet or MPLS, both of which support multiple layers of tags. We illustrate this approach with a scheme called Zeppelin: packet tagging using MPLS with a centralized SDN control plane implementing Open flow control of the data center switches. In this paper, we have described the design and implementation of Zeppelin, a third generation data center virtualization Average number of rules per TORS scheme based on MPLS labels. Zeppelin uses two layers of MPLS labels: one is identifying the virtual network upon which the tenant is located and one identifying the routing path through the network. The routing path layer itself consists of two labels: one identifying the link between the destination last hop virtual switch and last hop top of rack switch, and one identifying the route through the back bone network.

A Management Model for SDN-based Data Center Networks(Y.Xu Y.Yan, 2011)[12]

In this paper, we proposed a management model of layered Open Flow networks. We believe that through our network aggregation and information division mechanism, complexity of management can be reduced significantly. Evaluation also showed that overhead of our system is endurable.

N. Accelerating Cast Traffic Delivery in Data Centers Leveraging Physical Layer Optics and SDN(H. Wang Et Al, 2003)[13]

The rising popularity of cloud computing and big data applications has led to massive volumes of rack-to-rack traffic featuring diverse communication patterns denoted as cast that combines unicast, multicast, in cast and allNtoNall cast. Effective support of these traffic patterns in data center networks is still an open problem. We propose a hybrid (optical and electrical) approach that leverages physical layer optics to accelerate traffic delivery for each pattern. Our design consists of an applicationNdriven control plane compatible with software defined networking (SDN) to dynamically configure the optics. We present the network architecture and control plane design and results on the multicast case.

Time-aware Software Defined Networking (Ta-SDN) for Flexi-grid Optical Networks Supporting Data Center Application(Y.Zhao Et Al, 2014)[14]

Data center interconnected by flexi-grid optical networks is a promising scenario to meet the high rustiness and high-bandwidth requirement of data center application, because flexi-grid optical networks can allocate spectral resources for applications in a dynamic, tunable and efficient control manner. Meanwhile, as centralized control architecture, the software defined networking (SDN) enabled by Open Flow protocol can provide maximum flexibility for the networks and make a unified control over various resources for the joint optimization of data center and network resource. Time factor is first introduced into SDN based control architecture for flexi-grid optical networks supporting data center application. Traffic model considering time factor is built and a requirement parameter i.e. bandwidth delay product is adopted for the service requirement measurement. Then, time-aware software defined networking (Ta-SDN)
based control architecture is designed with Open Flow protocol extension. A novel time-correlated PCE (TCNPCE) algorithm is proposed for the time-correlated service under Ta-SDN based control architecture, which can complete data center selection, path computation and bandwidth resource allocation.

Bursting Data between Data Centers: Case for Transport SDN(P.Pan Et Al, 20110)[15]

In this paper, we propose a software-defined networking enabled optical transport architecture (Transport SDN) that meshes seamlessly with the deployment of SDN within the Data Centers. The proposed programmable architecture abstracts a core transport node into a programmable virtual switch that leverages the Open Flow protocol for control. A demonstration use-case of an Open Flow enabled optical virtual switch managing a small optical transport network for a big-data

III. ANALYSIS

The analysis has been done on the selected research papers. Various Parameters have been selected/extracted and are limited by the scope of the papers under review.
Table-1 Represents the parameters and Table-2 shows analysis of the paper selected.

IV. CONCLUSION

This research paper consists of a survey of the different techniques which are used to ensure the management of data center in SDN. To overcome the limitations of the current DCNs, we propose a Software Defined Networking (SDN)-based Traffic Engineering (TE), which consists of optimal topology composition and traffic load balancing. For future work, we recommend that the combination of different algorithms shall be studied to discover a more flexible, secure, efficient and cost effective technique for management of data center in SDN.

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Table-1 Parameter for Analysis

Parameter	Definition
Security	Security is the degree of resistance to, or protection from, harm.
Performance	The accomplishment of a given task measured against preset known standards of accuracy, completeness, cost, and speed
Confidentiality	Confidentiality is a set of rules or a promise that limits access or places restrictions on certain types of information.
Flexibility	Refers to designs that can adapt when external changes
Efficiency	Ability to avoid wasting materials, energy, efforts, money, and time in doing something or in producing a desired result
Energy	The ability of a system to perform work is a common description
Cost	The value of money that has been used up to produce something
Power	The rate of doing work
Capacity	Ability to receive, hold, or absorb something
Scalability	Ability of a computer application (hardware or software) to continue to function well as it (or its context) is changed in size or volume.

Table-2 Analysis of selected Parameters

S.#	Authors	Algorithms	Security	Performance	Confidentiality	Efficiency	Flexibility	Energy	Cost	Power	Capacity	Scalability
1	V.Mann Et Al, 2012	Crossroads	Y	Y	N	Y	Y	N	Y	Y	N	N
2	V.Mann Et Al, 2013	NCP And LCA	N	Y	N	Y	Y	N	N	Y	Y	Y
3	Y. Zhao, Et Al, 2013	(TASDN) Architecture	Y	Y	N	Y	Y	Y	N	Y	Y	Y
4	A. Iyer Et Al, 2014	Avalanche Routing Algorithm	Y	Y	Y	Y	Y	N	N	N	Y	N
5	M. Luo J. Che, 2013	(Tor) Switching Technique	Y	Y	Y	Y	Y	N	N	N	N	N
6	R.V. Rosa Et Al, 2014	Routeflow Mapping Algorithm	Y	Y	Y	Y	N	N	N	N	N	N
7	B. Heller Et Al, 2010	Elastic tree	N	Y	Y	Y	N	Y	Y	Y	N	N
8	Y.Han Et Al, 2010	TE System	Y	Y	N	Y	N	Y	N	Y	N	N
9	R.Cziva Et Al, 2012	SNCORE , NALM algo	Y	Y	Y	N	Y	N	Y	N	N	N
10	K.Kanna Et Al, 2012	Scissors Algorithm	Y	Y	Y	N	N	N	Y	Y	N	N
11	J.Kempf, Et Al, 2013	Zeppelin Scheme	Y	Y	N	N	N	N	N	N	N	N
12	Y.Xu Y.Yan, 2011	Management Model	Y	Y	Y	Y	N	N	N	N	N	N
13	H. Wang Et Al, 2003	Management Model	Y	Y	Y	N	N	Y	N	N	N	N
14	Y.Zhao Et Al, 2014	(TCNPCE) Algorithm	Y	Y	Y	Y	Y	Y	N	N	N	N
15	P.Pan Et Al, 2011	Algorithm	Y	Y	Y	N	N	N	N	N	N	N