



# A Survey on Shift towards Database Defined Network

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**ABSTRACT:** Programmability of the network will be critical for business growth. The old methods of management i.e. device by device and system by system using manual methods cannot scale at the rate required today. Automation for network programmability is the ways by which IT can overcome the costs associated with rapid growth without burning out engineers. This is why software-defined networking is always a better choice in easing management. With SDN, we're making the network programmable. The key innovation here is to introduce different techniques to implement software defined network in form of database defined network. On to is methods in improve and ease management and security for a network.

**KEYWORDS:** Software Defined Network (SDN), Network Management, Database Defined Network (DDN), Database, Security, Ravel, Network Poly Chain, SQL, Multilevel Security, Access Control

**MOTIVATION:** The main focus are requirements for a future all-digital-data distributed network which provides common user service for a wide range of users having different requirements. A number of trends are increasing the load on enterprise networks, the Internet, and other internets also there a rising demand on networks. Since then the complexity of network remain on the same end which limits the availability of skilled people in area of network. So, to get a way through it we can reduce complexity of managing a network so that it can be easily mastered.

## I. INTRODUCTION

Software Defined Network makes physical separation of the network control plane from the forwarding plane, and where a control plane controls several devices. Software-Defined Networking (SDN) is an architecture with many characteristics that are dynamically manageable, adaptable to cost which makes it ideal for the high-bandwidth, dynamic nature of applications. The architecture separates data plane and control plane which enables the network to be directly programmable.

More recently, a new approach to the implementation of SDN has emerged aimed at simplifying the task of network administration through the introduction of further data-based abstractions of the control and data planes. This approach is called Database-Defined Networking (DDN), which represents the entire network through standard relational databases<sup>[3]</sup>. Database Defined Network simplify the network management as the interface to its current state becomes purely database defined.

In this paper, a survey is performed to improve network management through many aspects and security constraints. Here<sup>[4]</sup> has examined and addressed several difficulties with context-dependent policy interaction. And the most important part is a system, Ravel, which is SDN network control infrastructure from<sup>[5]</sup>. Then diving into security<sup>[6]</sup> specifies and to directly enforce security policies to control the routing configuration.



## II. LITERATURE SURVEY

Sr. No.	Published Year	Published Topic	Research Topic	Outcomes
1.	2017	Access Control for a Database-Defined Network	Improve network management through a specific aspect of security for SDN using Ravel controller.	This position paper propose a way to implement access control (a specific aspect of security for SDN) in the setting of the Ravel controller.
2.	2018	Database Criteria for Network Policy Chain	The main focus is to define and addresses difficulties with policies like, context-dependent policy interaction, coupled policies, and policies that are examined jointly.	A correct policy chain with a more accurate estimate of policy dependency and check atomic policy, unit of policy that is proper for policy chain.
3.	2011	Access Control Method Based on Multi-level Security Tag for Distributed Database System	To design Multi-level security system structure that defines the security tags of subjects and objects.	An access control is achieved making it mandatory by modifying the user's query statement and security tag.
4.		Ravel: A Database-Defined Network	To present a system, Ravel, which is SDN network control infrastructure using SQL.	A simple and familiar SQL query, constraints, and Triggers using which we can rapidly launch, modify, and switch between abstractions.
5.	2015	Software-Defined Networks as Databases	An approach to deal with concurrency and isolation problems. Observing a close connection between the SDN data-plane and distributed databases	A model called concurrency model for software defined network by drawing connection to databases solving concurrency and isolation problems.
6.	2018	V2V Data Offloading for Cellular Network based on the Software Defined Network (SDN) inside Mobile Edge Computing (MEC) Architecture	Using SDN inside the mobile edge computing MEC architecture(SDNI-MEC server) to tackle the complicated issues of VANET V2V offloading.	Proposed the SDNi-MEC architecture for calculation of the V2V path using which data offloading can be derived using the centralized network edge, instead of a distributed way among vehicles.
7.	2019	Enforcing Multilevel Security Policies in Database-Defined Networks using Row-Level Security	To specify and directly enforce security policies to control the routing configuration in a software-defined network.	An approach proposed in specifying and directly enforcing security policies to control the routing configuration in a DDN by using rowlevel security checks.



### III. LIVE SURVEY

DDN is related closely with the open flow protocol used for network plane elements communicate remotely i.e. for determining the trail of network packets across network switches.

These come with Cisco Systems Open Network Environment and also Nicira's network virtualization platform. SDN technology is currently available for industrial control applications that need extremely fast failover.

As per <sup>[8]</sup>, Software-defined mobile networking (SDMN) is an approach to plan the mobile networks where all protocol-specific features are implemented in software which maximize the use of generic hardware and software in both the radio access network and core network. It is proposed as an extension of SDN paradigm to include mobile network specific functionalities.

An SD-LAN that is a Local area network (LAN) built round the principles of software-defined networking, though there are key differences in topology, network security, application visibility and control, management and quality of service. SD-LAN differentiates control management, and data planes that enables policy driven architecture for wired and wireless LANs. SD-LANs are characterized by the use of a cloud management system and wireless connectivity without a physical controller.

Distributed applications which are used for the datacenters, replicate data to aim the synchronization, fault resiliency, load balancing and so that data closer to users. This reduces latency to users and increases their perceived throughput. Also, many applications, like Hadoop, replicate data within a datacenter across multiple racks to extend fault tolerance and make data recovery easier. All of those operations require data delivery from one machine or datacenter to multiple machines or datacenters. The process of reliably delivering data from one machine to multiple machines is mentioned to as Reliable Group Data Delivery (RGDD).

The modern virtualization ecosystem supports specific virtual service that is running within the network layer (functions like NFV into SDN platforms). This type of network security creates a genuinely proactive environment that is capable of risk reduction and responds to the incidents very quickly. Whenever a violation occurs, every second is quite critical to stop the attack. It is also essential to identify the attack and also to ensure that other network components are safe from the attack. As the organization in the modern era becomes even more digitized, and as the network layer becomes even more critical, we will see even more attacks and more advanced sophisticated advanced persistent threats. You will be ready to create a more proactive environment which is capable of responding to the changes if you integrate potent services into the SDN layer.

### IV. ALGORITHMIC SURVEY

#### [I] *Access Control Policy By Multi-Level Security*

Multi-level security refers to that the managed objects are divided into different groups with a certain security level, different groups have different security levels, the objects of the same group have the same security level, and the information flow among objects with different security levels must meet certain security access control policy. In the research on Multi-level security access control, Bell-LaPadula model describes the reasonable flow path of information in the security system and defines the system security requirements for processing the data with the different security levels. It is a basis that we design multilevel secure database system. By using safety tag theory in the Bell-LaPadula model, we introduce some concepts, such as subject, object and domain, subject and object are defined with safety level respectively, and level management and security management for group are banded together and are added some security tags. According to these security tags, we can achieve mandatory access control. This security access control mechanism can resolve the problem about insecurity of information flow and leakage of unauthorized information to realize data sharing in distributed database system. Therefore, it is used to implement security access control.

#### [II] *Database Criteria for Network Policy Chain*

A precise logical language to describe and reason about network policy We model a network as a database whose valid states and allowed state transition are defined by a collection of database integrity constraints (invariant). The network policies that determine those states and transitions are reduced to the maintenance of the integrity constraints through the unified database language of queries and updates: The query statement checks the network states for constraint violation, the update statement reconfigures network state to repair a broken constraint. Together, the query and update formulation allow us to characterize policy interaction as the database problem of determining



when an update cannot affect a query (irrelevant update). A criterion to be used in determining policy chain. We observe that, intuitively, a policy chain is meaningful if it reserves the semantics (constraint) of every member policy. Thus, the gist to correct policy chain is to take care of policy dependency when the repairing update of one policy may introduce new violation to the constraints of others. Built on this insight, we develop a criterion that reduces policy chain correctness to compliance with behavioural dependency — a more accurate estimate of policy dependency based on database irrelevant update reasoning. A criterion to be used in deriving atomic policy for chaining. We formalize network the policies that are unnecessarily coupled or incomplete using two novel notions that are divisibility and unifiability. Under the logical framework presented in the above, divisibility and unifiability gives the right unit of constraints (policies) for policy chaining. We also sketched method to check and obtain atomicity for divisible policies. We leave the general discussion for unifiable policies to future work.

### [III] Database Defined Network Using Ravel

Ravel implements an entire SDN network control infrastructure within a standard SQL database. We undertake whole of SDN control system under the hood of a standard SQL database and rely on SQL for data manipulation. The database runtime for data mediation propose a novel protocol to refine the database runtime to enforce only orchestrated execution. As a realization of this approach, Ravel offers the following attractive advantages: An ad-hoc programmable abstraction via database views. The database view construct enables new abstractions to be constructed where ad-hoc enables them to build on each other. Ravel system access Network control via SQL, to expose application programmers and network engineers via standard SQL interfaces and database mechanisms. Orchestration across applications via a data mediation protocol. In Ravel, an orchestration protocol mediates multiple applications whose database modifications affect each other. The protocol assumes a simple conflict resolution strategy an ordering of view constraints where lower-ranked constraints yield to the higher ranked.

## V. CONCLUSION

From the above survey, it can be concluded that the using a software defined network makes handling a network centralized and simply controlled. And on top of that a database defined network provides better organization, eradicates repetition and redundancy of data, makes updates and deletion easier and improve security by encryption of data. Basically, it simplifies the task of network administration and saves time.

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