# Light Weight Secure Protocol in IOV Network for RSU –Internet of things

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***Abstract-* A Roadside Unit (RSU) Cloud, a Vehicular Cloud, as the operational backbone of the Vehicle Grid in the Internet of Vehicles (IoV). The architecture of the proposed RSU Cloud consists of traditional and specialized RSUs employing Software Defined Networking (SDN) to dynamically instantiate, replicate and, or migrate services. We then present a detailed reconfiguration overhead analysis to reduce reconfigurations, which are costly for service providers. VANET has been a core networking technology to provide safety and comfort to drivers in vehicular environments. Emerging applications and services, however, require major changes to its underlying computing and networking models, which demand new network planning for VANET with encryption of data and provide malicious attack from third party.**

## I. Introduction

One of the buzzwords in the Information Technology is Internet of Things (IoT). The future is Internet of Things, which will transform the real world objects into intelligent virtual objects. The IoT aims to unify everything in our world under a common infrastructure, giving us not only control of things around us, but also keeping us informed of the state of the things. Over the past several decades, VANET has been a core networking technology to provide safety and comfort to drivers in vehicular environments. Emerging applications and services, however, require major changes on its underlying computing and networking models, which demands new network planning for VANET. This article especially examines how VANET evolves with two emerging paradigms - Vehicular Cloud Computing and Information Centric Networking. VCC brings the mobile cloud model to vehicular networks and thus changes the way of network service provisioning, whereas ICN changes the notion of data routing and dissemination. We envision a new vehicular networking system, Vehicular Cloud Networking, on top of them. This article scrutinizes its architecture and operations and discusses its design principles.

## II. NEW MODELS FOR VANET APPLICATION AND NETWORKING

Our observation of the existing VANET is summarized as the VANET applications evolve from simple data consumers to ones that enable local collaborations with ample contents for richer user experience (UX). But, the underlying networking does not seem to efficiently support the core functions that the evolving applications demand. This section introduces recent research efforts that address the issues under two categories of computing and networking.

### Vehicular Cloud Computing

Vehicles and sensors within a local area generate vehicle contents. These contents are stored and searched in the vicinity; and processed and consumed within their lifetime period by neighbors. Recently, Gerla [5] introduced a new computing model, Vehicular Cloud Computing (VCC), to account for these characteristics. VCC is a variant of Mobile Cloud Computing (MCC) [6] that begins from a conventional cloud computing model. To mobile nodes with limited resources, the Internet cloud offers network access both for using unlimited computing resources on the Internet and for storing/downloading contents to/from the Internet. However, it is too costly to upload every content to the Internet cloud, and too time-consuming to search and download interesting contents from the Internet cloud. Besides, most of the contents picked up by vehicles have local relevance only and could be best stored locally.

In VCC, most of queries from drivers are about the world surrounding us (i.e., local relevance), and vehicles are the best probes of this environment. VCC resolves the queries, using a self-organized model of the local environment. That is, vehicles effectively form a cloud within which services are produced, maintained, and consumed. To realize the model, VCC leverages the increasing processing and storage capacity of vehicles: it constructs a cloud by using the collection of vehicles' computing resources, which primarily aim at extending the capability of interactions amongst vehicles.

### Information Centric Networking

Information Centric Networking (ICN) is initially conceptualized as a general form of communication architecture to achieve efficient content distribution on the Internet. ICN focuses on what (content) instead of where (host). This is to fulfill the primary demands that consumers are only interested in content itself, not its provenance, and publishers strive to efficiently distribute contents to consumers. To this end, ICN uses node or data attributes (e.g., content name, geo-location, or context) for routing rather than a specific node address (i.e., IP address). This decouples the content from the publishers. In this sense, content-based routing (see the right-hand side in Fig. 1), geo-routing and context-based routing can be classified into types of ICN. Some of the recently proposed architecture for ICN in the Internet context [7] include DONA (Data-Oriented Network Architecture), NDN (Named Data Networking), PSIRP (Publish-Subscribe Internet Routing Paradigm), and NetInf (Network of Information).

Of these architectures, NDN [8] has been recently extended to VANET [9], [10]. NDN has two types of packets: Interest from consumers and Data (i.e., content) from publishers. Content name in these packets is used for routing. A consumer requests content by broadcasting an Interest with its name toward potential publishers. When a publisher receives the Interest and has data matching the Interest, it replies with the data back to consumer using path of the Interest in reverse. NDN allows routers on the path to cache the content so that they can reply the cached content to consumers once they receive the matching Interest. This way, NDN achieves an effective content distribution that VCC critically requires to support its content oriented applications.

## II. RSU CLOUD ARCHITECTURE

In this section, we discuss the architecture of our RSU Cloud, implemented with the Software Defined Networking (SDN). In SDN, there are two communication planes, the physical data plane and an abstracted control plane. This decoupling of control and forwarding planes enables the deep programmability of SDN and allows it to be dynamically reconfigured [8]. The defacto communication protocol for SDN is OpenFlow [10]. SDN consists of OpenFlow enabled switches and controllers, where a switch contains data forwarding rules and the controller has dynamic global network interconnection knowledge. Each switch maintains flows that pertain to data forwarding. Switches receive flow rules, proactively or reactively, from controllers, via the control plane.

Recall that in IoV, users can subscribe for services such as traffic congestion avoidance, remote vehicle diagnostics, on-the-go-Internet, online gaming, multimedia streaming, voice-over-IP to increase in-vehicle productivity. As illustrated in Fig. 1, RSU Clouds include traditional RSUs and micro-datacenters that host the services to meet the demand from the underlying OBUs in the mobile vehicles. Traditional RSUs are fixed roadside infrastructure that can perform vehicle-to-infrastructure (V2I) and vehicle-to- vehicle (V2V) communication using WAVE. A fundamental component of the RSU Clouds is the RSU micro-datacenter.

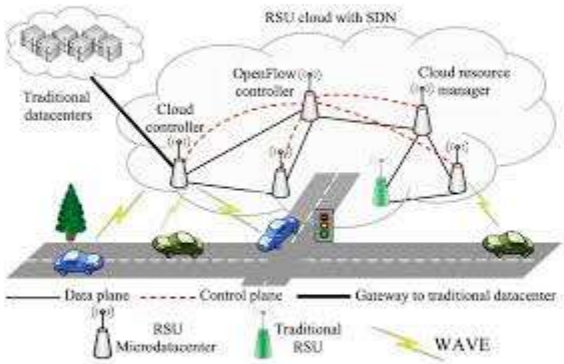


**Fig1: RSU CLOUD ARCHITECTURE**

## III. Applications

Ubiquitous Connectivity—Low–cost, high–speed, pervasive network connectivity, especially through licensed and unlicensed wireless services and technology, makes almost everything "connectable''.

• Widespread adoption of IP–based networking— IP has become the dominant global standard for networking, providing a well–defined and widely implemented platform of software and tools that can be incorporated into a broad range of devices easily and inexpensively.

• Computing Economics— Driven by industry investment in research, development, and manufacturing, Moore's law continues to deliver greater computing power at lower price points and lower power consumption.

• Miniaturization— Manufacturing advances allow cutting-edge computing and communications technology to be incorporated into very small objects.Coupled with greater computing economics, this has fueled the advancement of small and inexpensive sensor devices, which drive many IoT applications.

• Advances in Data Analytics— New algorithms and rapid increases in computing power, data storage, and cloud services enable the aggregation, correlation, and analysis of vast quantities of data; these large and dynamic datasets provide new opportunities for extracting information and knowledge.

• Rise of Cloud Computing– Cloud computing, which leverages remote, networked computing resources to process, manage, and store data, allows small and distributed devices to interact with powerful back-end analytic and control capabilities.

 

## IV. CONCLUSION

Vehicular communication evolves with new emerging paradigms, and this article examined the very details behind the evolution. We looked into emerging VANET applications and observed three noticeable characteristics, which cannot be supported efficiently by the existing VANET technology. To accommodate such characteristics, we introduced a new VANET network planning, consisting of two recent paradigms - Vehicular Cloud Computing and Information Centric Networking. As a computing model, VCC enables vehicles to discover and share their resources so as to create a vehicle cloud on which they collaborate to produce value-added services. ICN is leveraged, as networking model, to disseminate cloud contents efficiently among vehicles. Then, Vehicular Cloud Networking, as a proposed future vehicular networking system, is built on top of them.

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