Light Weight Security Protocol in IOV Network for RSU –Internet of Vehicles

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Abstract: A Roadside Unit (RSU) cloud and Vehicular cloud are 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 used Software Defined Networking (SDN) to dynamically instantiate , repeat and, or migrate services. The detailed reconfiguration overhead analysis will present to reduce the reconfiguration which is costly for service providers. VANET is a technology which provide safety and comfort to devices in vehicular environments. Emerging applications and services, however require a computing and networking models which demand new network for VANET with encryption of data and provide malicious attack from the third party.

INTRODUCTION

The Internet of Things is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. It means connection of devices to the internet such as cars, kitchen appliances and even heart monitors everything can be connected through IOT. Any stand-alone internet-connected devices can be monitored and/or controlled from the remote location. For the past several decades, VANET has become one of the major networking technology provide safety and comfort to drivers in vehicular environment. This work is to examine how VANET evolves with two emerging paradigms – vehicular cloud computing and Information Centric Networking. VCC brings the mobile cloud model to vehicular network and thus changes the way of network services provisioning, whereas ICN changes the concept of data routing and dissemination. We predict a new vehicular networking system, vehicular cloud networking on top of them. This work analyses it architecture and operation and discuss its design principles.

NEW MODELS FOR VANET

Application and Networking

Our study of the existing VANET is summarized as the VANET applications gets from simple data consumers to ones that enable local collaborations with wide contents for richer user experience (UX). But the underlying network does not seems to be efficiently support the core functioning which the applications demand. This section involves the recent research in the issues of two categories of computing and networking.

Vehicular cloud computing:

A number of solutions were proposed to address the challenges and issues in vehicular networks. VCC is one of the solutions for this problems. It is a hybrid technology that has a significant impact on traffic management and road safety by instantly using vehicular resources, such as computing, storage and internet for decision making [4].Gerla [5] introduced a new computing model, vehicular cloud computing (VCC), to explain these characteristics. VCC is an alternative 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 for using both unlimited computing resources on the internet and for storing/downloading contents to/from the internet. Still, it is too costly to upload every content to the internetcloud and time consuming to search and download contents from the internet cloud. Likewise, most of the contents picked up by vehicles have local purpose only and could be best stored locally.

In VCC, most of the queries from drivers are about the world surrounding us (i.e., local relevance) and vehicles are the best probes of this environment. Vehicles efficiently form a cloud within which services are produces, maintained and consumed. To realise the model, the advantage of VCC is to increasing processing and storage capacity of vehicles. It builds cloud by using the collection of vehicles, computing resources which is the main concept at extending the capability of interactions amongst vehicles.

Information Centric Networking:

Information Centric Networking (ICN) is initiallyconceptualized as a general form of communication architecture to achieve efficient content distribution on internet. ICN focuses on what (content) instead of where (host).this is to satisfy the primary demands that the consumers are only interested in content not in provenance and publishers aim 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 a specific node address (i.e. address). This decouples the content from the publishers. In this sense, ICN is classified into two types geo-routing and context-based routing. Some of the recently proposed architecture of 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).

From the architecture, NDN [8] has been recently extended to VANET [9],[10].NDN contains two types of packets: Interest and Data. Both types of packets carry a name which identifies a piece of data that can be transmitted in one Data packet. A consumer sets the name of the desired piece of data into the interest packet and send to the network. Routers use this name to forward the interest towards the data producers. If the interest reaches the node, the node will return the Data packet which contains both name and content. The same process continues in reverse to get back to the requesting consumer.

RSU CLOUD ARCHITECTURE:

The RSU cloud architecture is discussed in this section, 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 de facto communication protocol for SDN is Open Flow [10]. SDN consists of Open Flow-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, and voice over IP to increase in-vehicle productivity. As illustrated in Fig. 1, RSU clouds include traditional RSUs and microdatacenters 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 V2I) and V2V communication using WAVE. A fundamental component of the RSU clouds is the RSU microdatacenter.

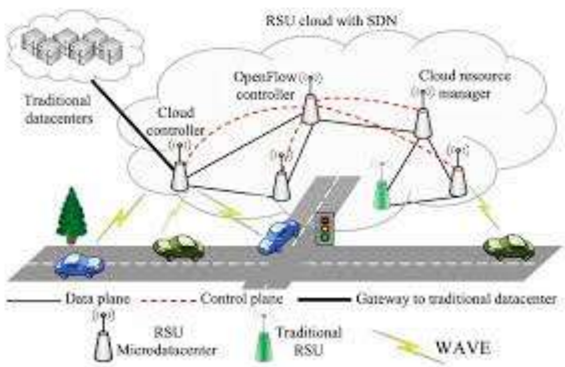

Fig1. RSU Cloud Architecture

APPLICATIONS

Universal connectivity-Low cost, highspeed, pervasive network connectivity, especially through licensed and unlicensed wireless services and technology, which makes almost everything connectable.

Extensive endorsement of IP-based networking-IP has become powerful global standard for networking, it provides a well-defined and widely implemented platform of software and tools that can be integrated into a broad range of devices easily and cheaply.

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.

Advances in Data Analytics- New algorithms and rapid increasing in computing power, data storage and cloud services enables the aggregation, correlation and analysis of large quantities of data, these vast and dynamic datasets provide a new opportunities for extracting information and knowledge.

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

CONCLUSION

Vehicular communication evolves with new emerging paradigms and this work examined the details behind the evolution. We analysed the

VANET applications and observed three noticeable characteristics which cannot be supported by existing VANET technology. To accommodate such characteristics, we introduced a new VANET network planning, consists of two recent paradigms-Vehicular cloud computing and Information centric Networking. As a computing model, VCC enables vehicles to create and share their resources, so it creates a vehicle cloud on that collaborate to produce value-added services. ICN is influenced as a networking model, to provide 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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