Innovative Science and Technology Publications

International Journal of Future Innovative Science and Technology,
ISSN: 2454- 194X **Volume-4, Issue-2, May - 2018**

PASSIVE DRIVER GUIDANCE FOR CONGESTION AVOIDANCE ON TRAFFIC REROUTING SYSTEM

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ABSTRACT

Centralized solutions for vehicular traffic re-routing to alleviate congestion suffer from two intrinsic problems: scalability, as the central server has to perform intensive computation and communication with the vehicles in real-time; and privacy, as the drivers have to share their location as well as the origins and destinations of their trips with the server. This article proposes DIVERT, a distributed vehicular re-routing system for congestion avoidance. DIVERT offloads a large part of the rerouting computation at the vehicles, and thus, the re-routing process becomes practical in real-time. To take collaborative rerouting decisions, the vehicles exchange messages over vehicular ad hoc networks (VANET). DIVERT is a hybrid system because it still uses a server and Internet communication to determine an accurate global view of the traffic. In addition, DIVERT balances the user privacy with the re-routing effectiveness. The simulation results demonstrate that, compared with a centralized system, the proposed hybrid system increases the user privacy by 92% on average. In terms of average travel time, DIVERT's performance is slightly less than that of the centralized system, but it still achieves substantial gains compared to the no re-routing case. In addition, DIVERT reduces the CPU and network load on the server by 99.99% and 95%, respectively.

Keywords: *DIVERT, Re-Routing, Hybrid System, CPU and Network Load, VANET*

I. INTRODUCTION:

The problem addressed in this article is how to perform vehicular traffic re-routing for congestion avoidance in a scalable and privacy-preserving way. Previously, we proposed in centralized vehicular traffic re-routing system for congestion avoidance. The centralized system collects real-time traffic data from vehicles and potentially road-side sensors, and it implements several re-routing strategies to assign a new route to each re-routed vehicle based on actual travel time in the road network. Rather than using simple shortest path algorithms (e.g , Dijkstra), the re-routing strategies use load balancing heuristics to compute the new path for a given vehicle to mitigate the potential congestion and to lower the average travel time for all vehicles. This individualized path is pushed to a driver when signs of congestion are observed on his current path.

2. LITERATURE REVIEW

This section gives a detailed review about various re-routing schemes. Here we reviewed how the congestion problem is determined in each scheme. While reviewing a scheme we scheduled the algorithms and techniques used in that scheme and the merit and demerit of that scheme are also specified. The following papers are survived in this section.

In [1] the author proposes the Inter-vehicle communication (IVC) systems reveal rich location information about vehicles. High-tech sanctuary architectures are aware of the problem and provide privacy attractive mechanisms, conspicuously pseudonymous authentication. Vehicles that can communicate with each other and road-side units (RSUs) enable a range of applications. For example, applications that provide cautions on road dangers and traffic jams, or those that offersComfort enhancements (e.g., automated update of point-of interest information to car direction-finding systems). Operating one approach relating to the problem of multi-target tracking, in particular Multi-Hypothesis-Tracking (MHT) [20], we find that linking between samples under different pseudonyms for the same vehicle can be randomly successful under various system setups. The merits are Lower beacon rates and spatial noise of a certain level prevent a tracker from connecting anonymous position samples to a constant path. The demerits is would provide the majority of transportation safety applications – based on vehicular communication – useless, because they require accurate situation information.

In [2] the author establish three traffic re-routing approaches designed to be incorporated in a cost-effective and easily deployable vehicular traffic instruction coordination that reduces the effect of traffic congestions. In this system, vehicles can be viewed as both mobile sensors (i.e., collect real-time traffic data) and actuators (i.e., change their path in response to newly conventional guidance). Traffic blocking causes driver aggravation and expenditure billions of dollars per annum in lost time and fuel spending. This system collects real-time traffic data from vehicles and road-side sensors and computes proactive, individually-tailored re-routing guidance which is pushed to vehicles when signs of obstruction are observed on their route. While congestion is largely thought of as a big city problem, delays are becoming regularly more common in small cities and some rural areas as well. The merits is The EBkSP approach balances best the trade-offs between low average travel time and low down overhead along numerous parameters. The demerits is V2V communication to better balance the need for separation, scalability, and low overhead with the main goal of low average travel time.

In [3] the author describe the process of making SimuLTE and Veins interoperable, i.e. using both in the similar simulation circumstances with the specific aim of keeping them divide and independent. Among these, vehicular networks are being considered as one of the most hopeful and stimulating applications, requiring support for communications in high-speed mobility and delay-constrained information exchange in contiguity. We discuss the limitations of the previous solution, namely VeinsLTE, which integrates entirely three in a single framework, thus preventing independent evolution and improvements of each building block.On one hand, cellularcommunications allow existing vehicular network services tobe enhanced and new ones to be supported. On the other hand,recent research projects imagine vehicular communications asa capable use case for cellular systems, under the name of “connected cars”. The merits is the integration of SimuLTE and Veins, with the specific goal of preserving them as self-regulating frameworks. The Demerits is the requirements coming from Veins to allow agreement nodes to be managed according to its mobility model.

In[4] the author is proposeone of the most interesting features is the opportunity to use aimpulsive and reasonably priced wireless ad hoc network between vehicles to exchange helpful information such as caution the drivers of an accident or a danger. VANET are self Organizing network. It does not rely on any fixed network infrastructure. Even though some fixed nodes act as the roadside units to make easy the vehicular networks for allocation topographical data or a gateway to internet etc. Higher node mobility, speed and rapid pattern movement are the main characteristics of VANET. A Vehicular Ad-Hoc network (VANET) is a type of Mobile Ad-Hoc (MANET) network in which the nodes are guarded to move along the street. The development of "**S**imulation of **U**rban **MO**bility", or "SUMO". The merits is the increasing approval and courtesy in VANETs has provoked canvassers to develop precise and truthful simulation tools. The Demerits is extended to the green signal pre-emption or adaptive traffic control system or any other exclusive application by modifying necessary steps in the given algorithm.

In [5] the author has to determine the hybrid data communication framework is build to execute the multicast and broadcast data transmission tasks. The Secure Hybrid Routing Protocol (SHRP) integrates the ROFF and TMC protocol features with security solutions. The Dirichlet Process (DP) and Hidden Markov Model (HMM) methods are engaged for the spatiosequentialassociation based channel allocation process. Service channels are assigned with immoral frequencies and licensed occurrences are allocated for the emergency conditions. For driver-to-driver privacy, DIVERT can leverage the solutions. The Cognitive Radio based Vehicular Ad-Hoc

Network (CR-VANET) is created to support the data communication over the vehicles. The data transmission and receive operations are managed with reasoning radio devices. The Road Side Infrastructure (RSI) or Access Points (AP) is deployed to transmit the data values. Unicast, multicast and broadcast data communication operations are supported by the CR-VANET environment. The merits is Robust and Fast Forwarding (ROFF) protocol is used to handle data distribution process. The demerits is the system can be improved to handle anonymous and malicious rounds. Clustering techniques can be integrated to develop the bandwidth preparation process.

In[6]the author proposed to Congestion is a thoughtful problem with high populations for big cities. Google maps traffic of internet based solutions are not satisfactory for instant response to fine grained traffic, highly dynamic and congestion control. Vehicles that are already in packed areas are direct against the use of assured roads, and the VANET-assisted communication helps nearby vehicles to re-route themselves around surprising traffic jams. Ns2 simulation is used to evaluate the performance of RSU backbone directing. Thus Simulation results that the proposed RSU technique provides detailed information for each vehicle with an individual information range of more than 50km from the current position with low delay and high accuracy. The merits is complete assessment, Increasing the throughput,Reduce the delay.They are current in avoiding accidents and traffic congestion. The demerits is resulting closed-form expressions for average packet loss probability and throughput of a VANET cluster.

In [7] the author is determined to Smart routing of vehicles is one of the key services presented by ITS for achieving best possible load balance of the traffic on the roads. Some of the existing profitable routing products, such as Google Maps and Nokia Ovi, can either only plan the route before the drivers start their journey or cannot quickly provide anreplacement route in case of occasions. Intelligent Transportation System (ITS) provides a capable context to improve the congestion on the roads. The main focus of this paper is on designing novel vehicles re-routing strategy to reduce the traffic congestion in urban areas. The proposed strategy is a hybrid approach which takes full advantage of both careful and heuristic algorithms and meets the requirements of dynamic time restrictions of real road traffic scenarios. The next step of our work is to estimate the performance of our approach and compare it with the existing algorithms. The merits is Lower fuel ingesting reduces the economy cost for a driver as well as the air pollution. The demerits is it should be measured as the average litres of the consumed fuel per kilometre. It based on several metrics and under a benchmark of road topologies and traffic scenarios.

In [8] the authoris determined to The primary stimulation for deploying DSRC is to enable collision preclusion applications. These applications be contingent on frequent data exchanges between vehicles, and between vehicles and roadside infrastructure. The U.S. Department of Transportation (DOT) has estimated that vehicle-to-vehicle (V2V) communication based on DSRC can address up to 82% of all smashes in the United States. This paper provides aexplanation of the core DSRC standards under development for use in the United States. Most of these standards are either recently published or in the final stages of specification. If a vehicle determines that a potential collision or other hazard (e.g., violating a red light) exists, the aboard system can take action to caution the driver, or even to assist in controlling the vehicle. The merits is effectiveness of this technology is highly dependent on sympathetic standards for interoperability. The demerits is Policy and Business issues, many of which will not require technical standardization but which nevertheless are important for deployment.

In[9] theauthordescribes about the a striking operational model involves coordinating a fleet of independent vehicles to provide on-demand service to customers, also called autonomous mobility-on demand (AMoD). An AMoD system may decrease the cost of travel as well as give additional sustainability profit such as increased overall vehicle ingesting, reduced demand for urban parking infrastructure, and reduced pollution (with electric vehicles). This paper reflects the trouble of routing and rebalancing a shared fleet of autonomous (i.e., self-driving) vehicles providing on-demand mobility within a capacitated transportation network, where crowding might interrupt throughput.The merit is formulating the routing and rebalancing problem and showed that on symmetric road networks, it is always possible to route rebalancing vehicles in a coordinated way that does not increase traffic congestion. The demerit is that rebalancing did not increase congestion even for reasonable degrees of network asymmetry.

In [10] the authorproposes the scheme of location-based services (LBSs) offer important opportunities for a wide range of markets, they present users significant privacy threats. An obvious one is service anonymity threat, i.e., the potential contact of service uses. Just like normal Internet access, a user may not want to be identified as the subscriber of some LBS, especially when the service is thoughtful. An additional threat, which is more grave, is location privacy. A user's location disclosed in her service demand may reveal sensitive private information such as health conditions, lifestyles, and so on. In particular, it has the potential to allow an antagonist to locate the subject and effect in physical harm. Existing work adopts traditional *K*-anonymity model and confirms that each place disclosed in service requests is a spatial region that has been visited by at least *K* users.The merit is that model allows a service user to express her privacy requirement by requesting that the location disclosed on her behalf must be at least as popular as some spatial region such as a shopping mall.The demerit is to measure the popularity of a spatial region, we appropriate the concept of entropy from information theory to take into account not only the number of its visitors.

3.PROBLEM STATEMENTS

The problem addressed in this article is how to perform vehicular traffic re-routing for congestion avoidance in a scalable and privacy-preserving way. These requirements suggest a distributed system architecture. However, a fully decentralized architecture is not suitable for a proactive re-routing system. For example, by creating vehicular ad hoc networks (VANETs), the vehicles can exchange information using multi-hop communication, and thus can detect signs of congestion in small regions while preserving their privacy. However, VANETs do not permit vehicles to get an accurate global traffic view of the road network, resulting in wrong or at least sub-optimal re-routing decisions. In addition, in a fully distributed architecture, due to the lack of a coordinator, the vehicles cannot take synchronized actions at the same time, which makes it infeasible to make collaborative decisions in real-time.

4. PROPOSED SYSTEM

DIVERT offloads the path computation to the vehicles and the server is only responsible for the graph weight updating, these results demonstrate a substantial CPU load reduction at the server.

DIVERT also reduces the network load on the server, which could become a major bottle neck as the number of vehicles increases. Since the privacy enhancement protocol only allows vehicles to send traffic reports when the privacy metric meets the probabilistic criterion, the number of messages is decreased by 95%.

General network simulation 2.35

NS (from **network simulator**) is a name for series of discrete event network simulators specifically **ns-1**, **ns-2** and **ns-3**.

- It should be aligned with the simulation needs of modern networking research.
- It should encourage community contribution, peer review, and validation of the software.
- Current status of the three versions is:
- ns-1 is no longer developed nor maintained,
- ns-2 is not actively maintained,
- ns-3 is actively developed (but not compatible for work done on ns-2).

Features of ns2

A network simulation is a virtual representation of a network. There are two common types of network simulation—one is used on existing networks, and the other issued before a network is constructed. Network Simulator provides an integrated, versatile, easy-to-use GUI-based network designer tool to design and simulate a network with SNMP, TL1, TFTP, FTP, Telnet and Cisco IOS device.‖The researcher used network simulations to test different scenarios that are not easy to present in real life cause of its difficulty and experiments. These network simulator are used to

a)Specifying nodes.

b)Specifying the link between those nodes.

c)Specifying the traffic between these nodes.

d)Specifying everything about the protocols that used to handle traffic in the network.

e)Visualize the working of network graphical applications.

Modules Description

Shortest path algorithms(e.g, Dijkstra), the re-routing strategies use load balancing heuristics to compute the new path for a given vehicle to mitigate the potential congestion and to lower the average travel time for all vehicles.

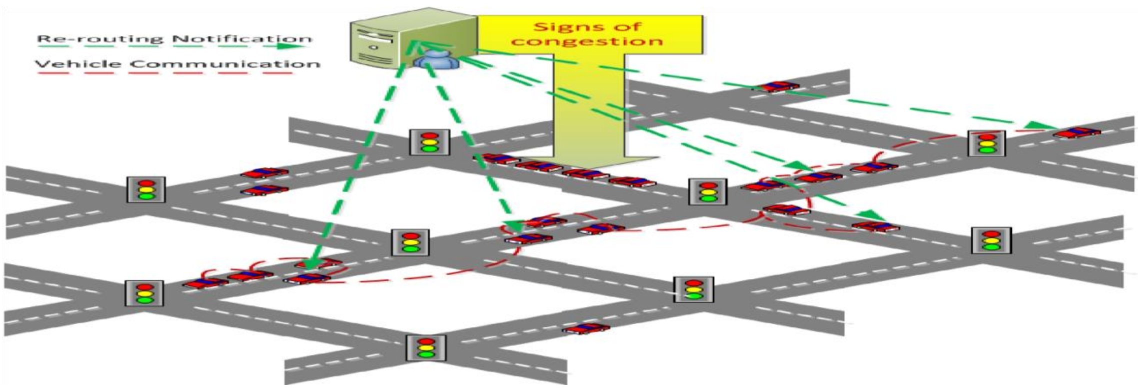


Figure 4.1 congestion re routing

AODV protocol description

(RERRs) are the message types defined by AODV. These message types are received via UDP, and normal IP header processing applies. So, for instance, the requesting node is expected to use its IP address as the Originator IP address for the messages. For broadcast messages, the IP limited broadcast address (255.255.255.255) is used.

Parameter	MIP	LAM	MAO DV	MP-MAODV	Proposed Model
Lifetime	7,450 s	6,445s	7,250s	7,450s	8,150s
Energy Consumption	High	Low	low	Low	Very low
Through put	250 pkts	295 pkts	300 pkts	340 pkts	310 pkts
End-to-end Delay	0.045s	0.044s	0.044s	0.047s	0.042s

Table 4.1. Parameter calculation

Tcl script development

Tcl (Tool Command Language) is a very powerful but easy to learn dynamic programming language, suitable for a very wide range of uses, including web and desktop applications, networking, administration, testing and many more. Open source and business-friendly, Tcl is a mature yet evolving language that is truly cross platform, easily deployed and highly extensible.

		TA	
		I (p_b)	N ($1 - p_b$)
an individual node	O (p_f)	$-C$, C-h	w, $-w$
	F ($1 - p_f$)	w-g, v-w-h	w-g, v-w

Table – 4.2. Individual probability of node calculation

Node creation

The topology consists of two mobile nodes, node(0) and node(1). The mobile nodes move about within an area whose boundary is defined in this example as 500mX500m. The nodes start out initially at two opposite ends of the boundary. Then they move towards each other in the first half of the simulation and again move away for the second half. A TCP connection is setup between the two mobile nodes. Packets are exchanged between the nodes as they come within hearing range of one another. As they move away, packets start getting dropped.

Node initialization

The network simulator is discrete event packet level simulator. The network simulator covers a very large number of application of different kind of protocols of different network types consisting of different network elements and traffic models. Network simulator is a package of tools that simulates behavior of networks such as creating network topologies, log events that happen under any load, analyze the events and understand the network. Well the main aim of our first experiment is to learn how to use network simulator and to get acquainted with the simulated objects and understand the operations of network simulation and we also need to analyze the behavior of the simulation object using network simulation.

Initialization

From the above command we get that a variable ns is being initialized by using the set command. Here the code [new Simulator] is a instantiation of the class Simulator which uses the reserved word 'new'. So we can call all the methods present inside the class simulator by using the variable ns.

Links : Links are required to complete the topology. In ns2, the output queue of a node is implemented as part of the link, so when creating links the user also has to define the queue-type.

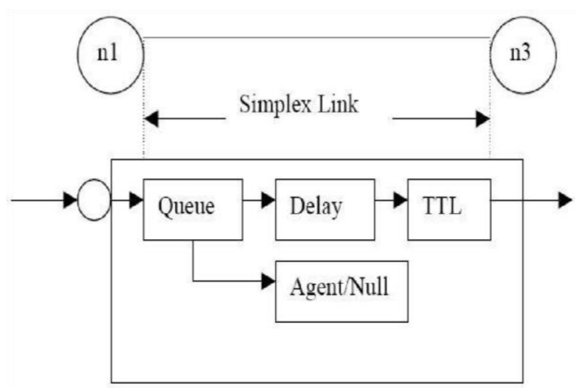


Figure 4.2 Link in ns2

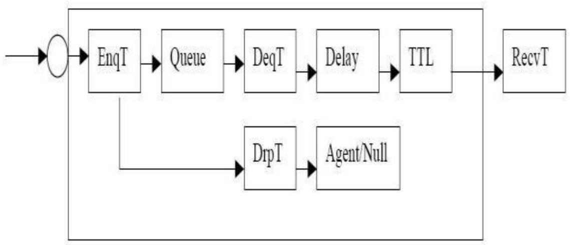


Figure 4.3 Link in ns2 when tracing is enabled

These new objects will then write to a trace file whenever they receive a packet. Next step is to modify some of the NS system files so that the newly written protocol or agent can work with the simulator. The files that are needed to be modified are shown within red bubbles in Figure4.4.

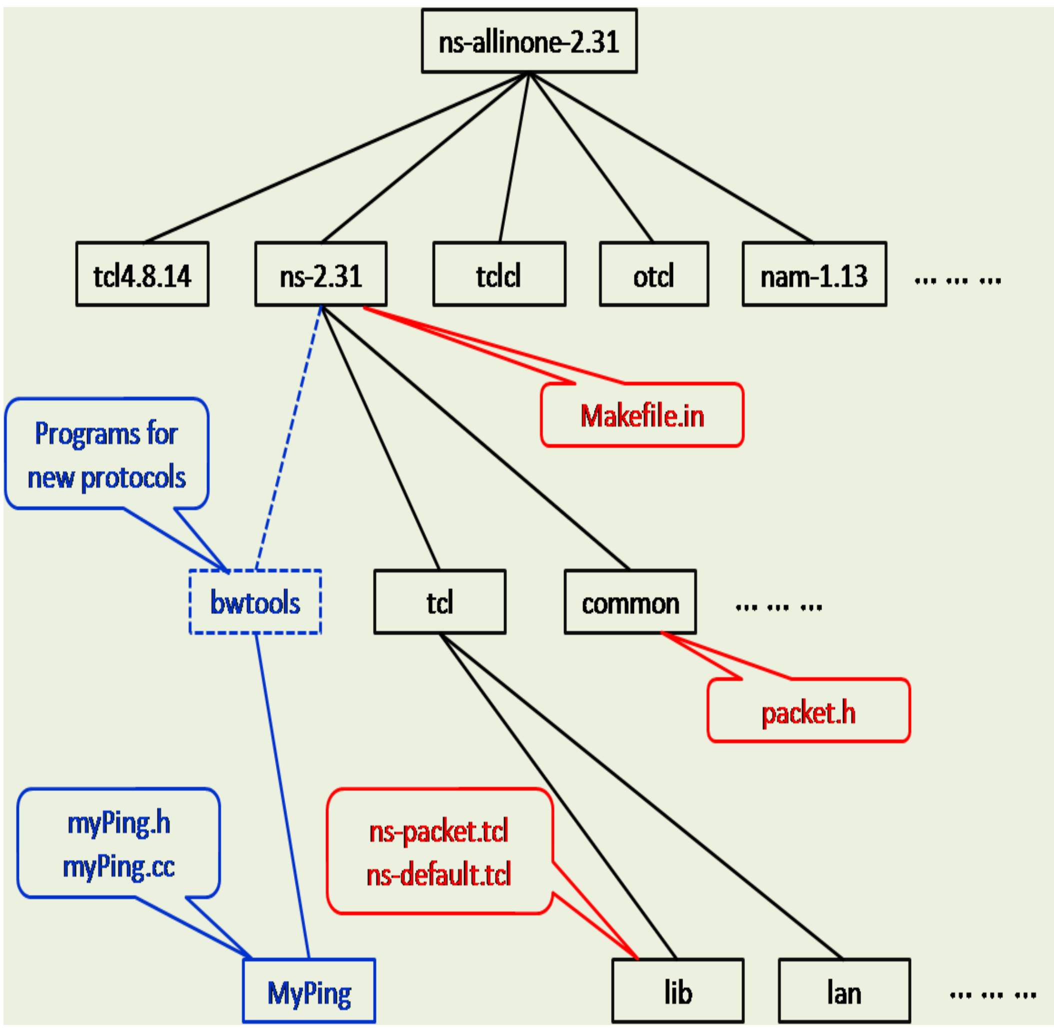
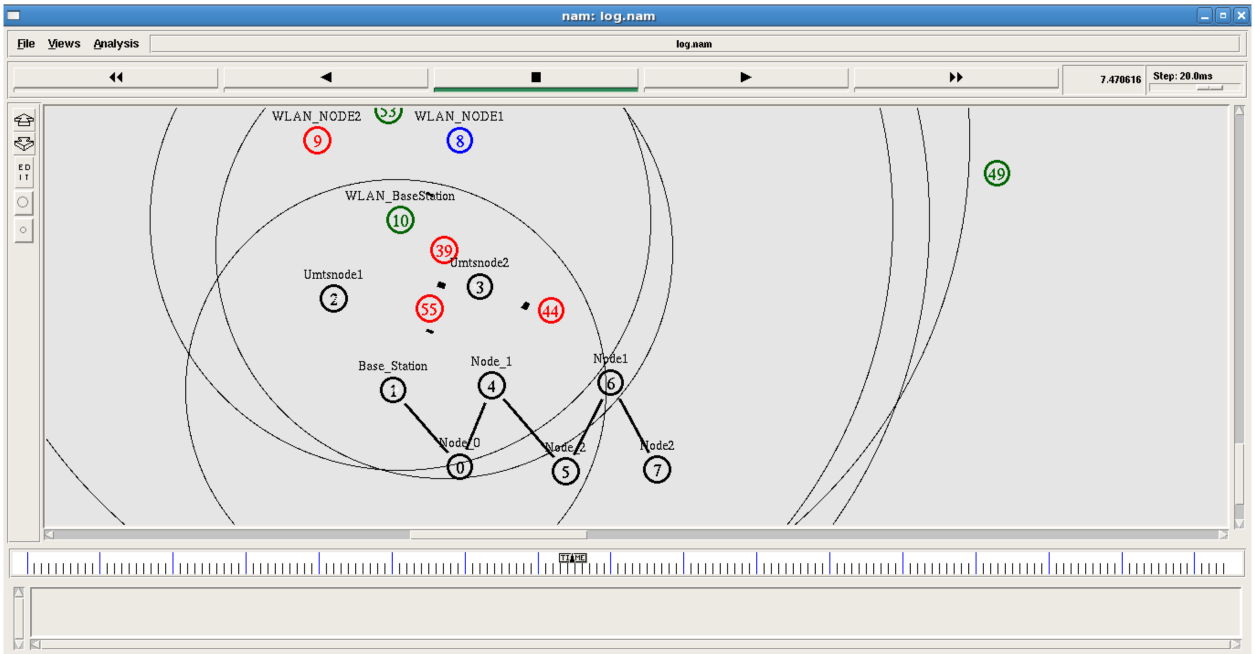


Figure 4.4. NS directory structure

SAMPLE OUTPUT:



CONCLUSION:

This system, DIVERT, offloads a large part of the re-routing computation at the vehicles, and thus, the re-routing process becomes scalable in real-time. To make collaborative re-routing decisions, the vehicles exchange messages over VANETs. We have optimized VANET data dissemination to allow for efficient distributed re-routing computation. In addition, the system balances user privacy with the re-routing effectiveness. The simulation results demonstrate that, compared with a centralized system, DIVERT increases the user privacy substantially, while the re-routing effectiveness is minimally impacted.

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