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Modeling Emergency Messaging to Avoid Car Accidents using Ad hoc Networks

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***Abstract* - In Vehicular Ad Hoc Network (VANET), the remote Collision Avoidance (CA) framework issues notice to drivers before they achieve a possibly perilous zone on the street. This paper proposes a systematic model for assessing the execution of crisis informing through remote CA frameworks. In the first place, we use the dichotomized progress demonstrate, the braking model to produce vehicular versatility follows for examination. Second, we infer the likelihood of a backside crash between two vehicles that go in the same course when a sudden occasion happens. Third, we evaluate the likelihood of vehicles neglecting to get the crisis message. The model demonstrates that the quantity of auto crashes every mischance is much higher when a remote CA framework is not utilized. We likewise think that it intriguing that the quantity of auto accidents is not straightforwardly relative to the vehicle thickness when the vehicular versatility follows take after the pace thickness relationship. By coordinating stream hypothesis into VANET examination, our model gives valuable experiences for future smart transportation.**

I.INTRODUCTION

A vehicular Ad hoc Network (VANET) uses cars as nodes to create a dynamic network. In VANET every moving cars turns into router, allowing each vehicle can be connected another vehicle approximately from 100 to 300 meters, in turn create a mobile network with wide range. As vehicles moving with different speeds, falls out of the communication range and will be discarded from the network. Similarly other vehicles can join in to the signal range by connecting one vehicle to another so that wide range of vehicular mobile network is created.

A.VANET Architecture

Vehicular Ad Hoc Network (VANET), as a special of mobile ad hoc network, it contains not only mobile nodes — vehicles, but also stationary Roadside Units (RSUs). In this Network, vehicles communicate through Dedicated Short Range Communication (DSRC) remote gadgets and also Furnished with many brilliant sensors. VANET empowers countless applications, what's more, the real objective is to enhance street wellbeing and transportation productivity by trading information between vehicles.

Diverse sorts of VANET applications, each application will have different Region of Interest sizes. Many applications have a medium-sized compelling range which is up to one kilometer. Vehicles need to be mindful of the kinematic status of different vehicles in their quick regions i.e., a couple of hundred meters or the potential for unsafe conditions in a stretch of street that lies ahead. Then again, accommodation applications for the most part oblige a medium-to-extensive viable extent on the grounds that it is imperative for drivers to know the blockage circumstance or movement condition at this extent for settling on choices and outing arrangements.

B.Applications of VANETs

VANETs are considered as a standout amongst the most noticeable innovations for enhancing the effectiveness and security of modern transportation frameworks. Case in point, vehicles can communicate alternate route, auto collision, and clogging data with adjacent vehicles ahead of schedule to reduce traffic jam close to the influenced territories. VANETs applications empower vehicles to interface with the internet to get continuous news, activity, and climate reports. VANETs additionally fuel the unfathomable opportunities in online vehicle amusements, for example, gaming and document sharing through the Internet alternately the neighborhood impromptus system.

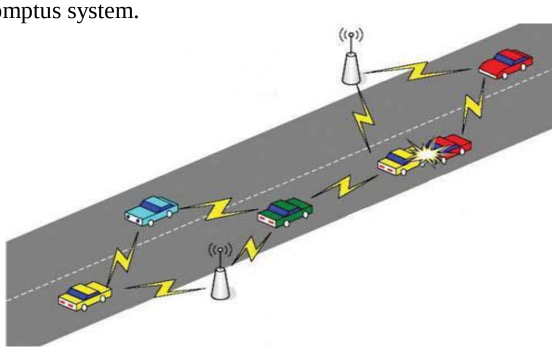

Fig 1.1 VANET Architecture

The following are the some applications of the vehicular ad hoc networks.

- Safety messaging within the vehicles
- Alarm messaging application
- Video streaming
- Web browsing
- Video on demand facility
- Internet sharing among passengers etc.

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II PROBLEM DEFINITION

Behavior of the driver is main reason for auto collisions. The VANET security system permit drivers to respond and react to the risky situations, on the other hand awful movement ranges. Be that as it may, information exchanging in vehicular networks is a challenging to the always evolving topologies with high versatility .

A. *Objective of the Paper*

The main objective of implementing on board Collision Avoidance system in vehicles to avoid the accidents by generating the crisis information whenever collision occurred on the roads and sending this emergency message to the Road Side Units as well as previous vehicles so that driver's can get more time to react with the situation occurred. As result collision can be lessened.

The main purpose of the this paper is to improve the road safety and travelling comfort by implementing the in broad Collision Avoidance system(CA) in vehicles and Road side units(RSU) as infrastructure beside to the roads.

A sending emergency message considered as major aspect in this project. At the point vehicles are connected with Vehicular Ad hoc Network, drivers can early receive the warning messages through the dedicated short range communication system. In such cases, driver can get much time to respond to the hazard condition properly so that vehicle speed can be reduced or can stop before colliding with preceding vehicle otherwise vehicles may take reroute decision according to driver choice so that collision of the vehicles can be reduced.

B. *Existing System*

The Vehicle Safety Communications (VSC) task recognizes vehicle security applications empowered by DSRC interchanges. The numbers of applications for safety movement of vehicles have been generally created. The vehicle to vehicle communication can be occurred through the Dedicated Short Range Communications devices. This inter vehicle cooperative communication possible only when vehicles are connected together otherwise cannot able to convey the messages to enhance the highway traffic safety.

On the other hand when two vehicles are not connected to the network, information can be transmitted store carry-forward plan through opposite vehicles. A key inquiry expected to be addressed is whether a vehicle situated in the Region of Interest will able get a crisis information without depending store-convey forward plan. In that case driver can able to identify the dangerous situation as soon as possible. Accordingly, the back side vehicles will get more time security stop, while vehicles which are far distance can able to change path or make temporary route for moving.

1. *Limitations of Existing System*

- Inter vehicle Communication can be possible only when vehicles are connected in the Region of Interest.
- Vehicles are performing storing and forwarding of messages in the movement of vehicle itself without using any infrastructure devices.
- Difficult to react in the hazard situation if there is long delay in the receiving the messages through the store carry-forward plan.
- More propagation delay in message so driver will get less time to react to the crisis circumstances.

C. *Proposed System*

In this paper Proposed System an on-board unit utilized for giving caution before vehicle conceivably reaching to the hazardous place. At the point when any occasion happens like crisis failure then again an accident. A vehicle furnished with the remote CA framework can quickly create a crisis message to vehicles behind it. when the VANET is all around associated, auto crashes can be altogether lessened at the point when activity related information can be effectively gathered, this can be done through the Road Side Units (RSU) deployment. To legitimately outline a remote CA framework, the main thing is to check vehicle is situated in dangerous place that is joined with vehicular network. At the point when vehicles are connected to VANET, the drivers can get crisis messages. In such cases, drivers will get much time to react with the situation occurred so that accidents can possibly lessened.

1. *Benefits of Proposed System*

- The proposed protocol improves secure travelling through the vehicles communication. RSU's help in establishing the connection between the vehicles if they are not in range.
- Collision Avoidance (CA) system installed in each vehicle brings the vehicles into safe zone before they meet an accident by sending emergency messages
- Collision avoidance system broadcast the traffic related information such speed, location, direction, position, present time etc. at every time.
- Generates the emergency messages immediately after the collision occurs.
- Sending to the messages to Road Side Units as well as the behind vehicles to alert the driver about the situation occurred.
- Less propagation delay in receiving the message through the road side unit as result reduction in the number of vehicles collision.

III Aspects of VANET

A Vehicular Ad Hoc Network is a technology that uses moving cars as nodes in a network to create a mobile network. VANET not only has general characteristics of MANET, but also has many special aspects such as enhance the driving and travelling comfort like internet access, navigation and much more.

VANET has turn into a dynamic territory of exploration, institutionalization and advancement in light of the fact that it can possibly enhance vehicle and street wellbeing, activity effectiveness and comfort and additionally solace to both drivers and travelers.

A. *Intelligent Transportation Systems (ITSs)*

In remote frameworks, every vehicle tackles part of sender, recipient, and switch to broadcast data to the vehicular system, utilizes the data to guarantee protected, stream movement. For correspondence to happen in the middle of vehicles and Road Side Units, vehicles must be furnished with a radio interface or On Board Unit that empowers short-go remote impromptu systems to be framed. Vehicles should likewise be fitted with equipment that allows itemized position data. The more number of road side infrastructure convention is utilized. Case in point, a few conventions oblige roadside units to be conveyed equally all through the entire street arrange, some oblige roadside units just at crossing points, while others oblige roadside units just at area outskirts.

These incorporate between vehicle, vehicle-to roadside, and directing based interchanges. This steering construct interchanges depend in light of exceptionally exact and state-of-the-art data about the encompassing environment, which thus obliges the utilization of precise situating frameworks and keen correspondence conventions for trading data[2]. In a system situation in which the correspondence medium is shared, very questionable and with constrained data transfer capacity, shrewd correspondence conventions must ensure quick and dependable conveyance of data to every vehicles in the region. It merits specifying that Intra-vehicle correspondence utilizes advancements.

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B. Inter-Vehicle Communication

The inter-vehicle communication configuration Fig.2.2 use multi-hop multicast/broadcast to transmit traffic related information over multiple hops to a group of receivers. In intelligent transportation systems, vehicles need only be concerned with activity on the road ahead and not behind, example of this would be for emergency message dissemination about an imminent collision or dynamic route scheduling[3].

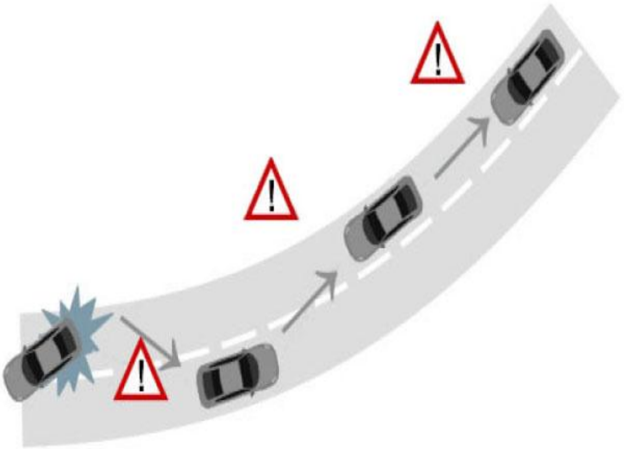

Fig 2.2 Inter-vehicle communication

C. Vehicle-to-roadside Communication

The vehicle-to-roadside correspondence design Fig. 2.3 speaks to a solitary jump telecast where the roadside unit sends a show message to every single prepared vehicle in the region. Vehicle-to-roadside correspondence setup gives a high transmission capacity connection in the middle of vehicles and roadside units. These static units may be put one kilometer or less, empowering high information rates to be kept up in overwhelming activity[3].

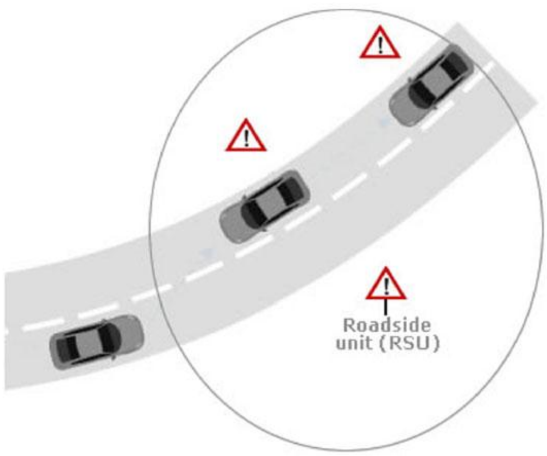

Fig.2.3 Vehicle-to-roadside communication

IV INSTRUCTIONS

- sendHello(): This method creates a hello packet and broadcasts to all the nodes in the network.
- sendRequest():This method is to send route request to its neighbor node If any node wants to find a route for any destination.
- sendReply(): If Node receives any request, then it replies back with its current location.
- recvHello(): Method to receive hello message and updates in its table.
- recvRequest(): If any request comes and the a node can find the near node to find destination node in the request, then an entry will be made in its table.
- recvReply(): If a node receives the reply message, then it updates the information into its routing table.
- forward(): When a node receives a message, which is not destined for it, then the node will forward the packet to the next nearest node.
- sendLudp():Nodes send their location updates to its neighbor nodes.
- recvLudp(): Each node receives location update message and updates into its routing table.

V MODULES DESCRIPTION

A. RSU and OBU unit

The Road Side Unit is located across on road side, which is used to transfer the data packets to OBU unit. The On Broad Unit is installed on each vehicle which is act as a receiver medium of messages from road side unit. Both the RSU and OBU units are controlled and authenticated by access point.

B. Safety message broadcasting

The goal is to allow all user nodes to simultaneously broadcast safety messages to all their neighbors within transmit range. Safety messages can be divided into two types. The first type is periodic information such as the speed and location of an automobile. The second type of messages relates to emergency events such as lane-change warning or pre crash warning.

C. Collision avoidance

Rear end collision may occur due to sudden deceleration of speed in the previous vehicle will be treated as possibility of accidents. To avoid those accidents, collision avoidance system will generate crisis message and will broadcast to the vehicles and road side unit within a communication range. Priority number 1 is set to possibility of accident messages, Priority number 2 is set for warnings messages. Few examples of the different types messages that are classified as “School zone is ahead go slow” is treated as warning messages and set as a priority number 2.

VI PERFORMANCE EVALUATION

A. Experimental Results

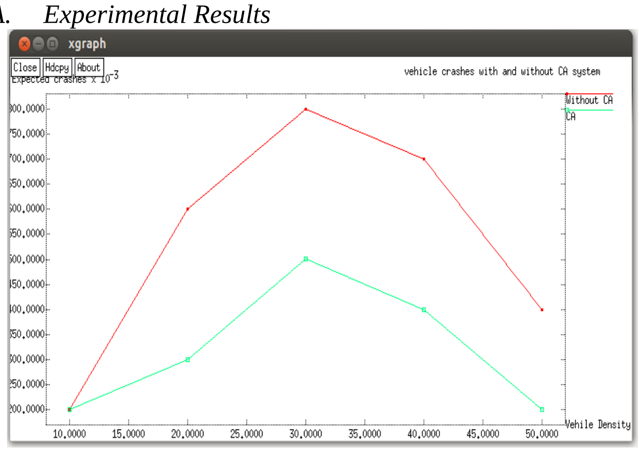

Fig 5.1: Graph comparison of vehicle collision with and without collision system

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The figure 5.1 shows the collisions in Vehicular Ad hoc Networks with collision avoidance system and without collision avoidance system in the vehicle, as the vehicle collision increases, when vehicle not equipped with collision avoidance system and accidents are going to be decreased when vehicle have on board collision avoidance system by issuing emergency message.

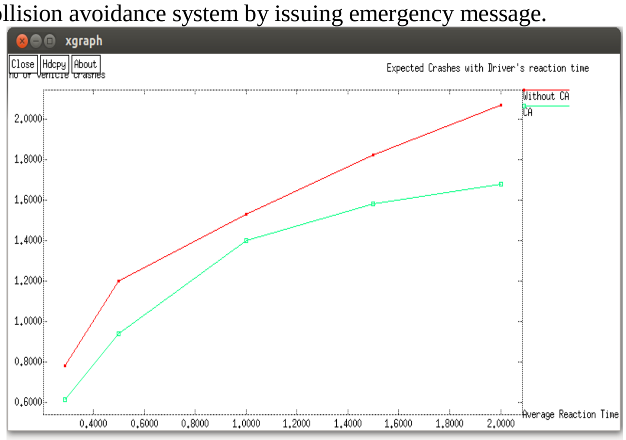

Fig 5.2: Graph comparison of vehicle collision with Driver's reaction time

The Fig 5.2 shows that excepted vehicles crashes with drivers reaction time , when driver get a warning message before reaching to accident zone , collision can be avoided instead of colloid with the preceding vehicle which met with an accident by applying brake or by slowdown the vehicle speed. The number accident can be lessened if collision avoidance system is implemented in the vehicle.

VII CONCLUSION

VANET can impressively enhance street wellbeing and travel comfort by empowering inter vehicle interchanges. Among an immeasurable show of potential applications, crisis informing has pulled in much consideration in the writing. At the point when vehicles are associated with vehicular network, drivers will get the crisis messages through broadcasting after an accident, that cases drivers will get more time to respond to risky circumstances properly. Case in point, vehicles close to the mischance site can back off or stop anytime recently crashing into the first vehicle, while vehicles are at for distance can rapidly change their paths makeshift route choices in like manner. As a result collision of the vehicles can be lessened.

VIII FUTURE ENHANCEMENT

As a future work, authors can generate crisis information through the road side units and can broadcast to the vehicles which are connected in the road side units region of interest.

IX SNAPSHOTS

A. Screenshot for Vehicle and Road Side Unit Deployment.

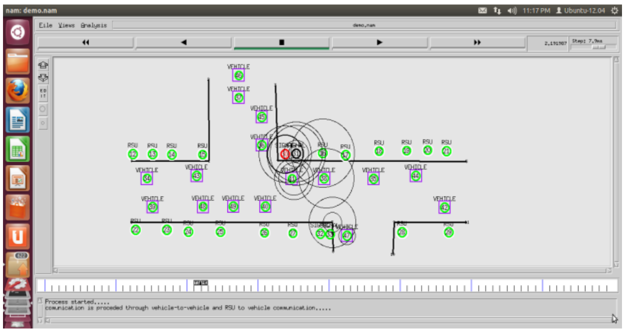

Fig 8.1: Screenshot for Vehicle and Road Side Unit Deployment

B. Screenshot for Vehicle and Road Side Unit communication range.

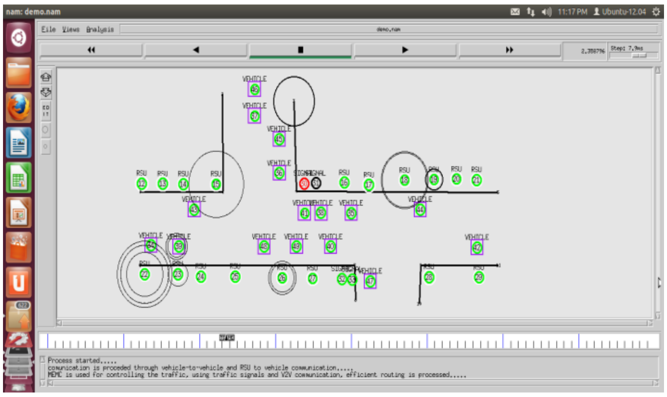

Fig8.2: Screenshot for Vehicle and Road Side Unit communication range

C. Screenshot for two vehicle collision.

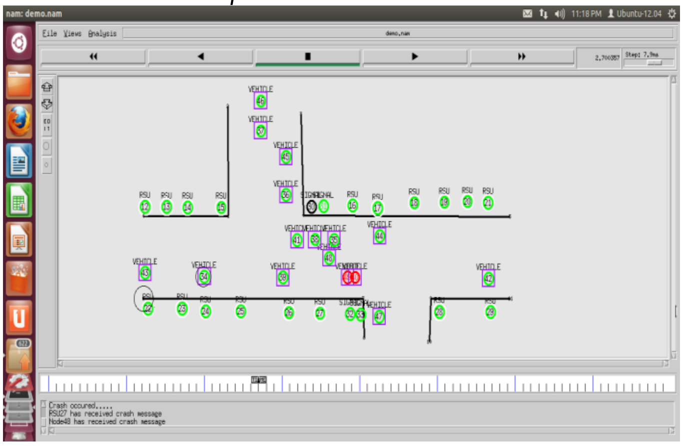

Fig 8.3: Screenshot for two vehicle collision

D. Screenshot for sending an emergency message.

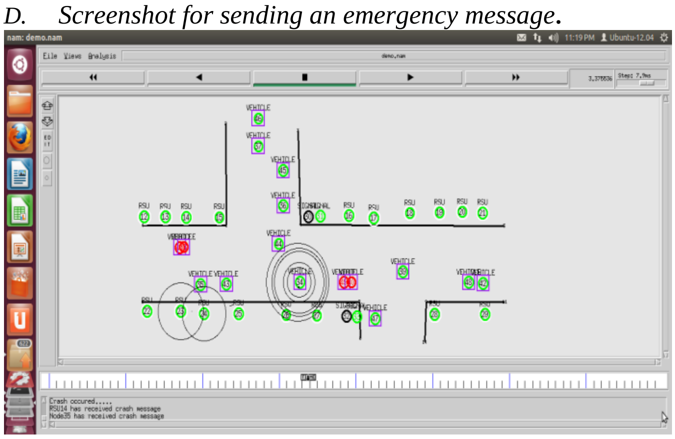

Fig 8.4: Screenshot for sending an emergency message

E. Screenshot for vehicle rerouting after receiving Crisis message

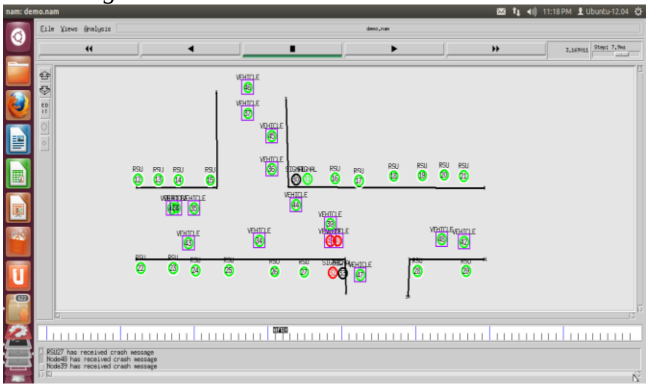

Fig 8.5: Screenshot for vehicle rerouting after receiving Crisis message.

F. Screenshot for vehicle taking another route after crisis message.

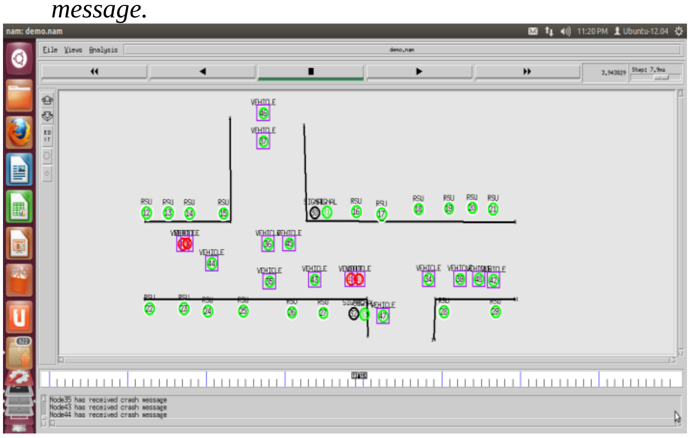

Fig 8.6: Screenshot for vehicle taking another route after crisis message

G. Screenshot for another collision and broadcasting of emergency message

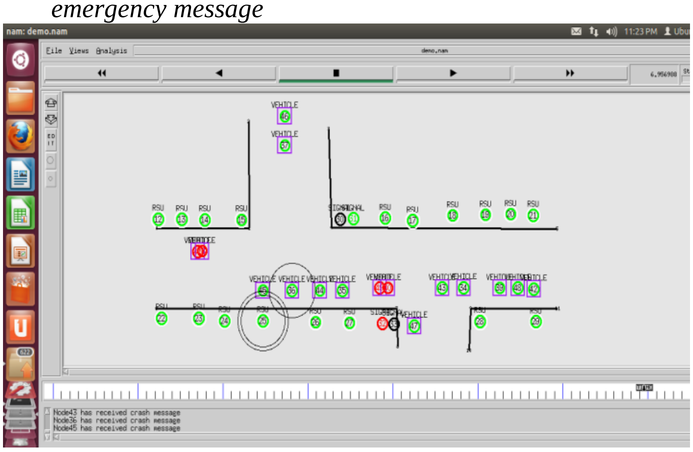

Fig 8.7: Screenshot for another collision and broadcasting of emergency message

RSU	Road Side Unit
DSRC	Dedicated Short Range Communication
OBU	On broad Unit
RoI	Region of Interest
CA	Collision Avoidance
VSC	Vehicle Safety Communication
MANET	Mobile Ad hoc Network
QoS	Quality of Service
ITS	Intelligent Transport System
GPS	Global Positioning System
DGPS	Differential Global Positioning System
CBR	Continuous Bit Rate
AP	Access Focus
VoIP	Voice over Internet Protocol
TCL	Tool Command Language
UDP	User Datagram Protocol
LLD	Low Level Design
SDLC	Software Development Life Cycle
UML	Unified Modeling Language

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