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Device to Device based Women Safety System

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Abstract: ***Device-to-device (D2D) communication, which offers ultra-low latency for user communication, is projected to play a large role in future cellular networks. This new mode could work in either licensed or unlicensed spectrum. It's a fresh take on the classic cellular communication model. Its advantages, however, come with a slew of technological and financial difficulties that must be addressed before it can be fully integrated into the cellular ecosystem. This paper discusses the main characteristics of D2D communication and how we can use this to build Human Safety Device.***
Keywords: Device-to-device communication, Inband Spectrum, RSUs, Bluetooth

I. INTRODUCTION

Device-to-Device (D2D) Communication is the transfer of information between two cellular devices while not involving the use of a Base Station (BS). It can occur on frequencies between 1800 and 2300Mhz. Typically in a cellular network, all information transfer must go through a Base Station, sometimes in spite of the communicating devices being in close proximity to each other. Application of D2D Communication in scenarios like proximity-based communications can significantly increase the usefulness of the network.

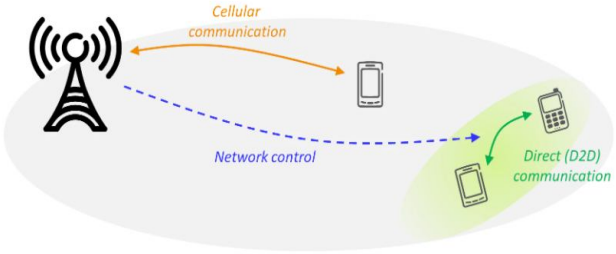

Fig. 1 Overview of D2D Communication

A. *Modes of Transmission*

1) *Direct Mode:* Receiver receives signals directly from the source.
2) *Two Hop Mode:* The D2D receiver receives signals only from a relaying user/device in the second stage.
3) *Co-Operative Mode:* The D2D receiver receives signals transmitted by a D2D transmitter in the first stage and from a relaying user in second stage, and together conducts a combination of signals of different stages.

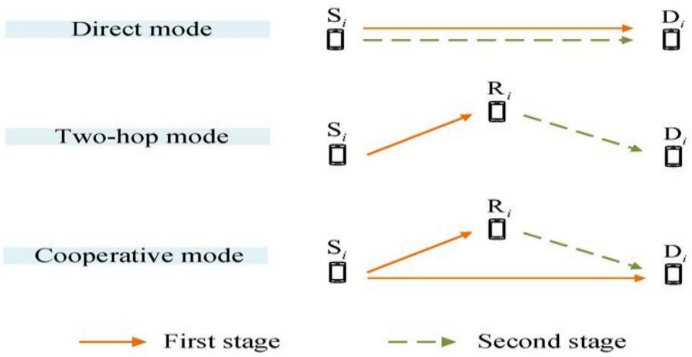

Fig. 2 Modes of Transmission

B. *D2D Node/Peer Discovery*

Before two devices can directly communicate with one another, they must first discover that they are near to each other.
Two peer devices need to meet in space, time, frequency.
These are of two types: No coordinated discovery and Coordinated discovery.

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II. INBAND AND OUTBAND SPECTRUM

A. In Band Spectrum

In this communication occurs under licensed spectrum: Cellular spectrum is used for both cellular link and D2D. It has a high control over cellular spectrum. It has underlay and overlay spectrums, where underlay is more popular than overlay, probably due to its high spectral efficiency.

B. Out Band Spectrum

In this communication occurs under unlicensed spectrum. It aims to eliminate the interference issue between D2D & cellular links. It requires an extra interface, usually WI-FI direct, Zigbee or Bluetooth. It can be classified into Controlled and Autonomous forms.

III.DEVICE TO DEVICE BASED HUMAN SAFETY DEVICE

Women safety has been a major concern in our society. There have been various initiatives that have been taken for this issue but we still see a lot of incidents taking place. As an initiative, not only women but in general for a person safety, we would like to introduce a Human Safety Device based on the D2D communication.

It's not necessary that our family and loved ones will be with us everywhere wherever we go, so in order to ensure the safety of a person, a D2D based device will help them do that.

Available applications for women safety are:

A. RAKSHA
B. HIMMAT
C. BSAFE
D. SHAKE 2 SAFETY
E. SAFETIPIN

IV.METHDOLOGY

A. It consists of power source, GPS, BLUETOOTH and a Panic button.
B. User will have to install an application and through Bluetooth they will connect their respective devices.
C. User personal details can be added or whenever they need to change any information.
D. Whenever a victim presses the panic button, then the victim's details along with their current location will be sent to nearest authority.

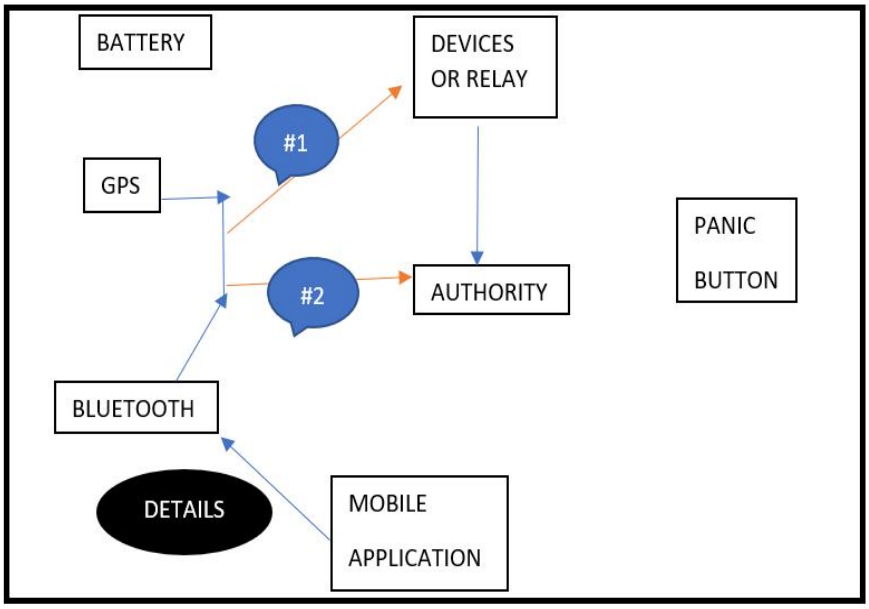

Fig. 3 Basic model of the safety device

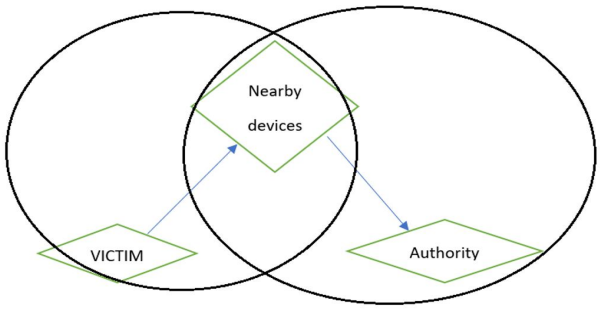

Fig. 4 Case-1: When the victim and authority are in range

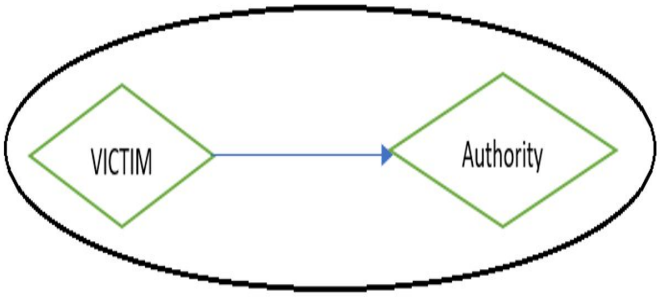

Fig. 5 Case-2: When the victim and authority are not in range

V. WORKING OF RSU

1) *Step 1:* RSU receives message.
2) *Step 2:* Check (warning or normal message).
3) *Step 3:* If (warning message) then add weight as 1.
4) *Step 4:* Else (normal message) add weight as 0.
5) *Step 5:* RSU (First broadcast messages with weight 1 in FCFS Scheduling algorithm).
6) *Step 6:* RSU (broadcast messages with weight 0 in FCFS Scheduling algorithm).

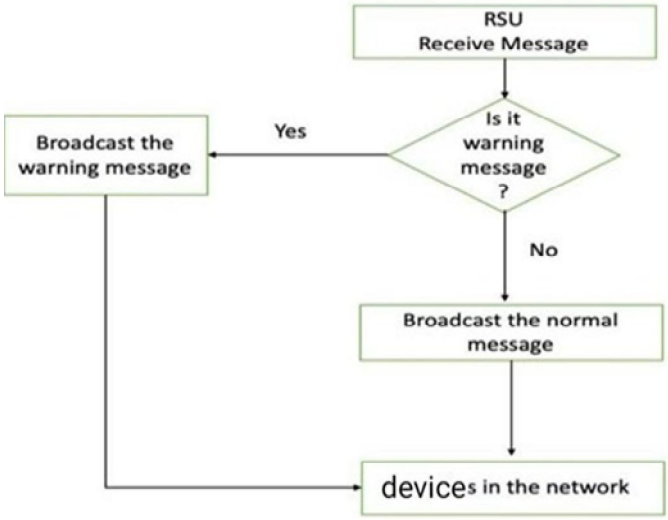

Fig. 6 Flowchart of RSU

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VI. SOFTWARE REQUIREMENT

The software used is Network Simulator (NS2)

A. It's a Linux-based open-source simulation programme.
B. It allows you to simulate routing, multicast protocols, and IP protocols including TCP, UDP, and FTP via wired and wireless (local and satellite) networks.
C. Support for numerous protocols and the ability to graphically display network traffic are just a few of the features that make it a useful tool.
D. NS2 also has a number of routing and queuing algorithms. Routing algorithms include LAN routing and broadcasting, for example. Fair queuing, deficit round-robin, and FIFO are several queueing algorithms.

VII. RESULTS

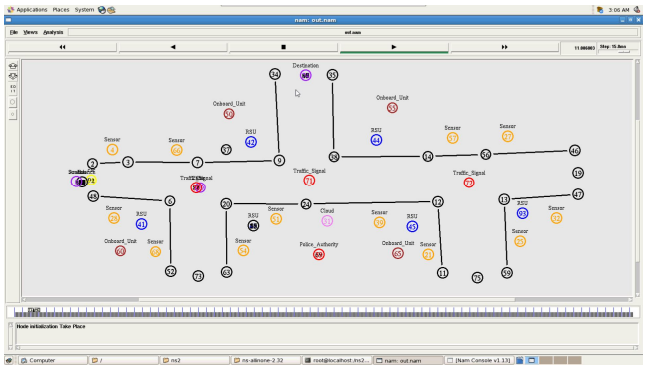

Fig. 7 Node Initialization

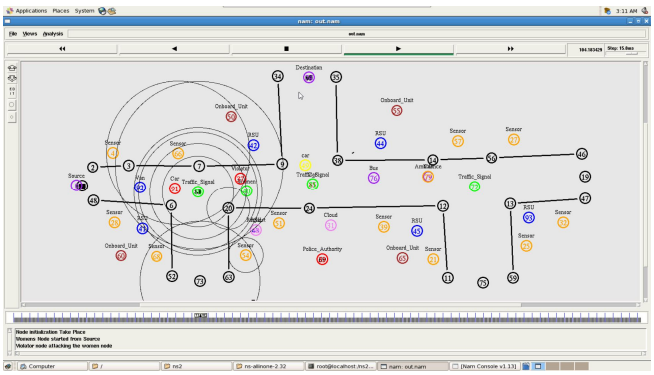

Fig. 8 Representation of woman node starting from source

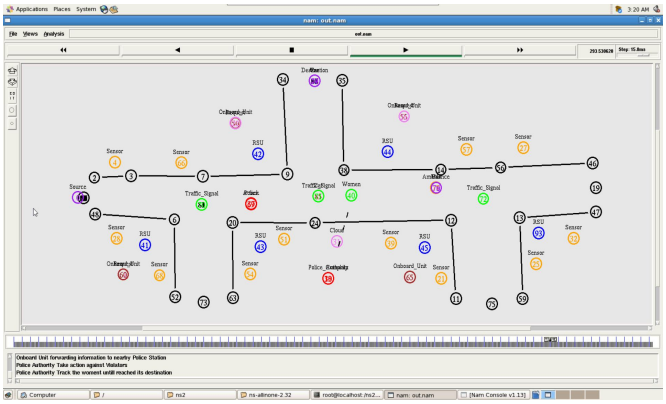

Fig. 9 Authority tracking woman location

VIII. GRAPHICAL ANALYSIS

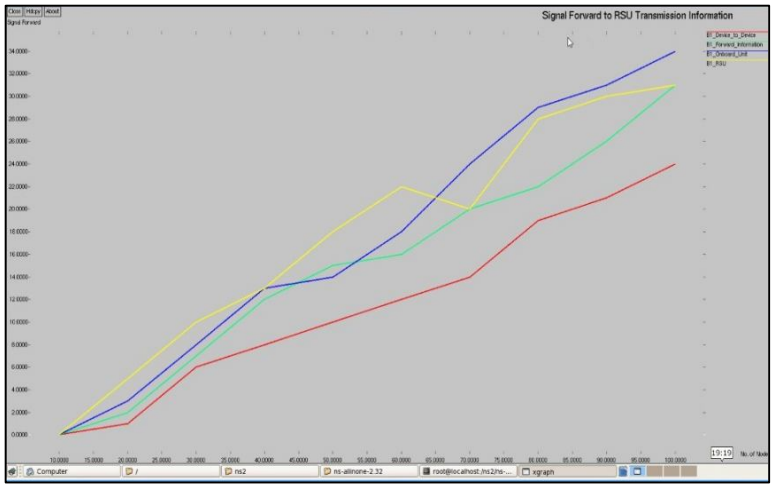

Fig. 10 Signal Forward to RSU

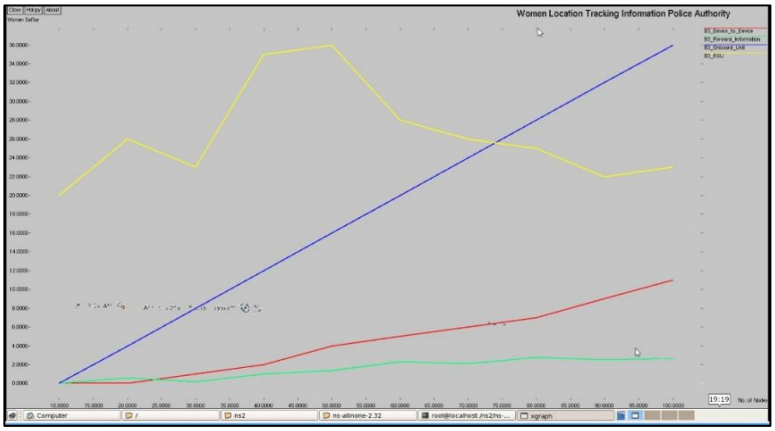

Fig. 11 Police Authority tracking woman location

IX. ADVANTAGES AND DISADVANTAGES

A. Advantages

1) Connection can be established even during absence of network.
2) Less power consumption.
3) Public Safety.
4) Local area emergency broadcast and warning messages.

B. Disadvantages

1) Huge investment.
2) High maintenance cost.
3) Limited distance.

X. CONCLUSION

The Device to Device Human Safety Device provides high performance with improved coverage. It provides spectral efficiency and protection for everyone from anyone. A straightforward evolution of the existing technology will thus be able to meet our demands for a few more years, but the time will soon come that requires a true revolution: more spectrum, greater data, and more intelligence in communication systems will be required in future applications.

From the modest sensor to the complex self-driving car, 5G networks will be smarter and more efficient to accommodate each type of radio spectrum and each type of device. From embedded devices in all kinds of equipment to autonomous vehicles and drones, smart enterprises and cities, 5G networks will connect things to each other, to persons, and the cloud.

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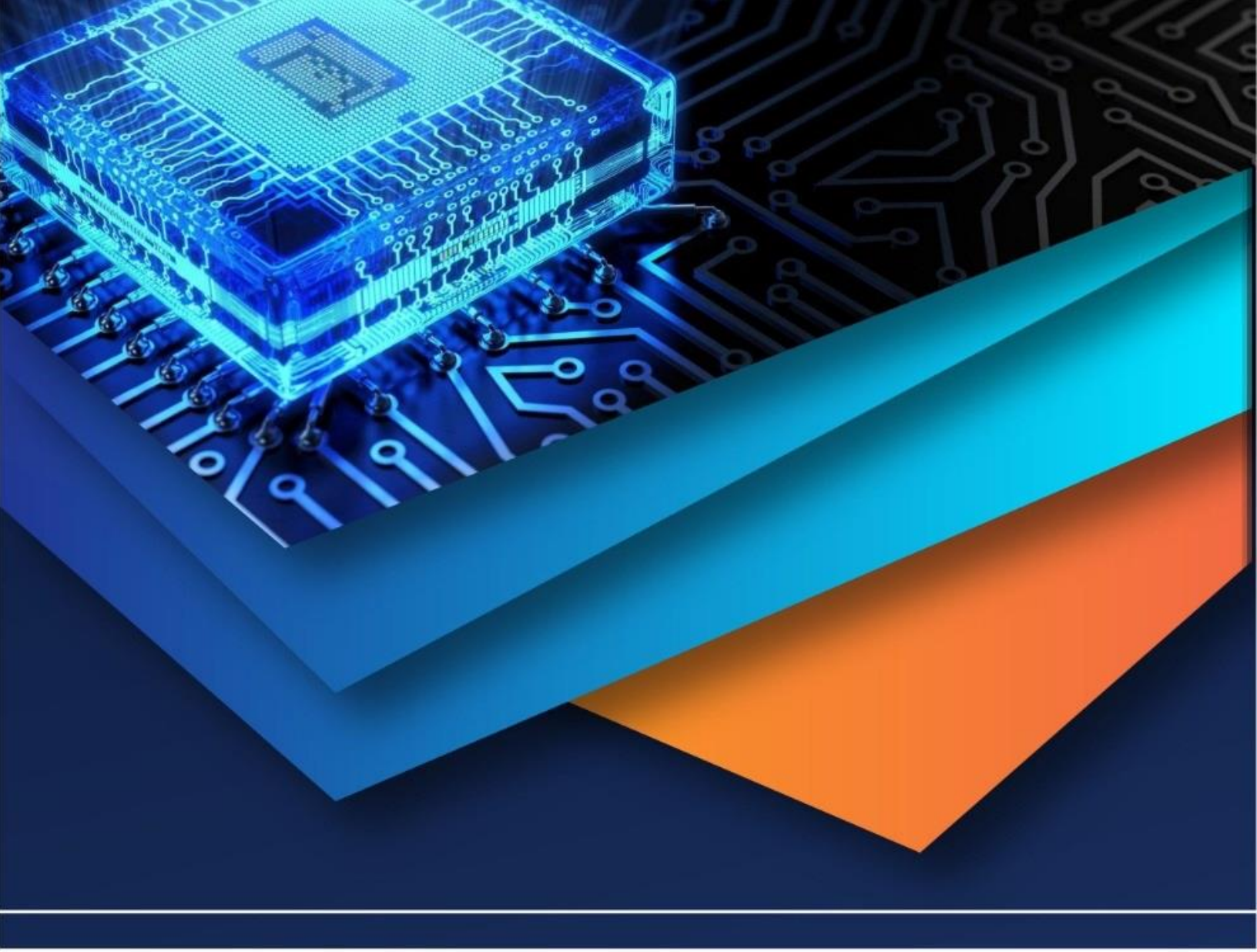

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