iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 4 **Issue:** II **Month of publication:** February 2016

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

Volume 4 Issue II, February 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Intelligent D2D Communication Using Internet of Things

Hemant Karade[1], Rohit Dandime[2], Santosh kshirsagar[3], Swapnil Bhosale[4], Prof. Santosh Darade[5]
Department of Computer Engineering, Sinhgad Institute of Technology & Science, Narhe, Pune.

Abstract: Over the traditional home device in our daily life, the technology will get our life to next generation home automation. The proposed system work on sensor and mobile device to give an intelligent solution for needs, the basic idea is that if we enter in home sensor will recognize room temperature and light environment to switch on the Bulb or AC also with smartphone application one can manage the requirement as per need. It is envisaged that devices will be connected together to create, gather, and share information. These devices may be many types of objects else things with embedded intelligence and communication capabilities. Examples of such devices are sensors, smartphones, cars, home appliances, health care and gadgets, or RFID. Therefore devices are being interconnected as well as humans are being interconnected and evolution of IoT with Internet is transformed from providing human interconnection in to network of inter-connected devices.

Advancements in field of Digital Electronics have immensely contributed to the development that can sense, compute, and wirelessly communicate within short distances. To realize an complete IOT eco-system, Cloud computing offers dynamic way of accumulating and storing data with huge storage capacity and make the processing easy of data access, data analysis and decision making. Cloud offer platform for software as a service, infrastructure platform for generating and storing realtime data. Ultimately to develop and maintain an intelligent environment is dependent on how smart the connected devices are and the quality of data they are able to gather.

Keywords: Device to Device communication, IoT, Sensor, Smart Home Automation, Neural algorithm, Stochastic algorithm, next generation home, RFID

I. INTRODUCTION

Imagine a world where billions of objects can sense, communicate and share information, all interconnected over public or private Internet Protocol (IP) networks. These interconnected objects have data regularly collected, analyzed and used to initiate action, providing a wealth of intelligence for planning, management and decision making. This is the world of the Internet of Things (IOT). The proposed system work on sensor and mobile device to give an intelligent solution for needs, the basic idea is that if we enter in home sensor will recognize room temperature and light environment to switch on the Bulb or AC also with smartphone application one can manage the requirement as per need. It is envisaged that devices will be connected together to create, gather, and share information. These devices may be many types of objects else things with embedded intelligence and communication capabilities, ultimately to develop and maintain an intelligent environment is dependent on how smart the connected devices are and the quality of data they are able to gather.

II. LITERATURE SURVEY

A. Security

The security features of WiFi and Bluetooth are much less robust than those used in public cellular systems. They would not be adequate for major public services and they would be unsuitable for public safety applications.

Independence from cellular networks:

WiFi and Bluetooth operate independently from cellular radio technology such as LTE. Any form of device-to-device discovery based on them would have to run in parallel with cellular radio operation, which would be inefficient and would become a significant drain on device batteries.

Unlicensed spectrum:

WiFi and Bluetooth operate in unlicensed spectrum, without any centralised control of usage or interference. This is not generally a

problem when usage densities are low, but it would become a major limitation as proximity-based services proliferate. Throughput, range and reliability would all suffer.

Manual pairing:

WiFi and Bluetooth rely on manual pairing of devices to enable communication between them, which would be a serious stumbling block for autonomous, dynamic proximity-based services.

Using Internet of Things in device communication will brought us to:

Energy: Issues such as energy harvesting and low-power chipsets are central to the development of IoT.

Intelligence: Devices should have capabilities such as context awareness and inter machine communication.

Communication: New, smart multi-frequency band antennas, integrated on-chip and made of new materials are the communication means that will enable the devices to communicate.

Integration: integration of smart devices into packaging, or better, into the products themselves will allow a significant cost saving and increase the eco-friendliness of the products.

Interoperability: protocols for interoperability have to be standardized.

Standards: open standards will be the key enablers for the success of the IoT. Sustainable. Fully global, energy-efficient communication standards that are security and privacy centered and use compatible or identical protocols ate different frequencies are needed.

Name	Content	Pros	Cons
The review of paper Internet of Things (IoT): A Vision, Architectural Elements, and Future Directions	A cloud implementation using Aneka, which is based on interaction of private and public clouds is presented with Ubiquitous sensing.	Aneka provides a number of services that allow users to control, auto-scale, reserve, monitor and bill users for the resources used by their applications	Specific challenges such as privacy, participatory sensing, data analytics, GIS based visualization and Cloud computing apart from the standard WSN challenges
Survey of journal Progression Towards the Intelligent Home at University of Bradford	The project aims to create a future home resembling the house of the past and eradicating all the black boxes that feature in our homes today.	It contains a vast array of gadgets, designed to enhance the quality of life, with special emphasis on the elderly.	Household environment is a complex mass of wires (resolved by wireless network), confined spaces and uneven floors.
From the study of Internet of Things - A Standardization Perspective by TCS	Preparation of the initial proposals on IoT standardization on protocol and semantic interoperability, security, privacy and trust management issues.	Collection of requirements on handling intra- and inter-domain interoperability, security, privacy and trust management.	Semantic Interoperability Issues, Radio Access Level Issues.

III. FIGURES

Traditional DD Communication

Network (and/or devices themselves) detects D2D candidates before the start of the communication session between the devices

Volume 4 Issue II, February 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Extreme approach:

Network assigns beacon resources to the devices

Beacon are broadcast in the coverage area of the cell, so D2D devices can readily find one another

Next will be posteriori discovery

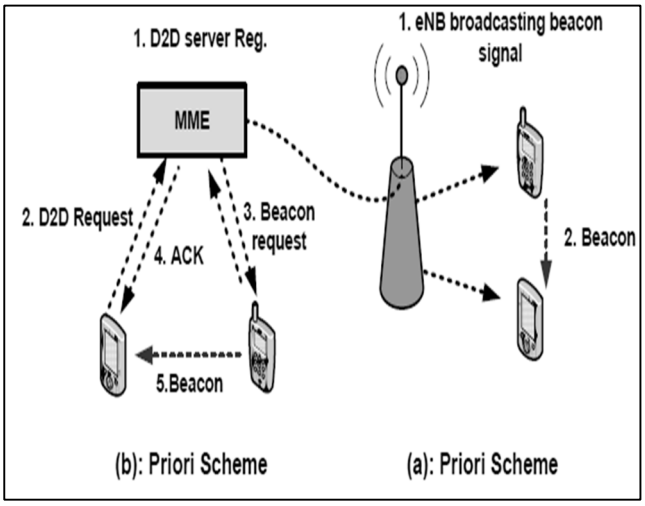


Fig.1 General Priori Scheme

D2D in one image

General enhancements applicable to a wide range of scenarios and use cases

Enhancements specifically targeting small-cell/local-area deployments.

Enhancements specifically targeting new use cases, such as machine-type communication (MTC) and national security and public safety services (NSPS)

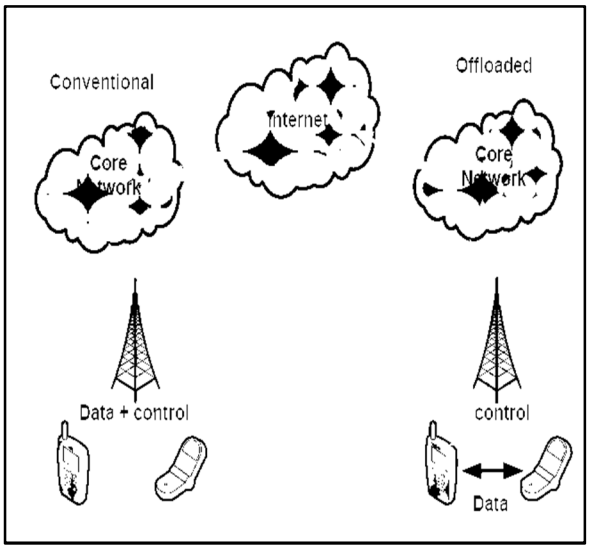


Fig.2 Conventional D2D Communication

Volume 4 Issue II, February 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Feature Name	D2D	Wi-Fi Direct	NFC	ZigBee	Bluetooth	UWB	Femto/Pico/Relay
Standardization	3GPP LTE-A	802.11	ISO 13157	802.1504	Bluetooth SIG	802.1503a	3GPP (release 9. 10. 11)
Frequency Band	Licensed band for LTE-A	2.4. 5 GHz.	13.56 MHz	868/915 MHz . 2.4 GHz	2.4 GHz	3.1-10.6 GHz	Licensed band for LTE-A
Max Transmission distance	1000m	200m	0.2m	10-100m	10-100m	10m	1 -2 Km
Max data Rate	1 Gbps	250 Mbps	424 kpbs	250 kpbs	24 Mbps	480 Mbps	100-500 Mbps
Uniformity of service provision	Yes|	No	No	No	No	No	No
Application	Offload traffic. Public safety. Context sharing. Local advertising. Cellular relay	Context Sharing. Group gamming. Device connection	Contactless payment. Bluetooth and Wi-Fi connections	Home entertainment and control Environmental monitoring	OBject EXchange peripherals connection	Wireless USB. High-definition video. Precision location and tracking systems.	a)Better coverage and prolonged handset battery life. b) Better coverage for cell edge users c) System capacity gain from smaller cell size d) complete operator control.
Infrastructure	Users transfer data directly in licensed band	Users transfer data directly in un-licensed band					Users transfer data through central controller (femto/Relay/Pico) in licensed band
Expenses	CAPEX. No cost. as users are using the same terminal. OPEX. Very low cost in term of battery usage	CAPEX. No cost. as users are using the same terminal. OPEX. Very low cost in term of battery usage					CAPEX. Subsidized Femtocells hardware. Installing new cell sites. Installing new cell towers. OPEX. Electricity. site lease. and backhaul. Providing a scalable architecture to transport data over IP. Upgrading femtocells to newer standards.

Fig.3 Wireless technology comparison

IV. CLASSIFICATION OF ROUTING ALGORITHMS & PROTOCOLS IN INTELLIGENT D2D COMMUNICATION IN THE IOT

Many of IoT applications require the transmission of sensed data between devices to a central station for analysis or storage. The communication of data between devices should be accomplished through efficient protocols that should support efficient data transmission both in terms of energy efficiency and scalability. However, the inherent characteristics of a typical D2D communication in the IoT raise many challenges which a traditional routing protocols cannot solve.

Heterogeneity of devices: Devices differ from their diverse functionality and applications.

Device coexistence and collaboration: Various devices that have the ability to interconnect and communicate anytime in a collaborative manner with any other device will co-exist.

Diverse networks and networking standards: Devices will operate using dissimilar vendor-specific networking or communication technologies [e.g., cellular D2D net- works, ad hoc WLANs (e.g., WiFi direct), Bluetooth, Zigbee, RFID networks, NFC, WSN, vehicular networks, etc.] it involves devices that belong to network domains with different characteristics.

Device limitations: Devices may limits in terms of battery life, memory, or processing power.

Self-configuration, self-organization, and autonomy: Most D2D networks will be self-configuring, self-organized, and autonomous. Therefore, devices will handle interference management, translation of different network protocols, manage end-to-end communication.

Multi hop communication: Most IoT devices have low- power wireless transmitters and receivers; thus, will only be capable of short-range transmissions to route information over multiple hops

A. Stochastic/Probabilistic Algorithms

Two of the basic methods used for optimization by these algorithms are real-time optimization and a priori optimization. In real-time optimization, information about the criteria of interest is revealed as data traffic flows from device to device; thus, routes are dynamically created based on the available information. This method consumes a lot of energy and computational power. For a priori optimization, a solution is determined beforehand, and the solution is probabilistically constrained; thus, routes that are

created must have probabilities within the set constraints.

B. Bio-inspired Algorithms

Features of bio-inspired algorithms that make them appealing for the development of routing algorithms for intelligent D2D communications include the following

1) It can handle the heterogeneity and asymmetry in capabilities and technology of communicating devices within the IoT.
2) It can support self-organization, self-configuration, and collaboration, which facilitate the setup of autonomous infrastructure independent D2D communication in the IoT environment.
3) Bio-inspired algorithms can dynamically adapt to ensure end – to - end communication between devices: The IoT D2D network is a dynamic one, in which devices mobility is unpredictable; thus, routing algorithms can adopt the for aging operation.
4) Adaptability to changing environmental conditions: Bio-logical systems can easily learn and evolve when new conditions arise. Thus, bio-inspired algorithms can assist devices to deal with the issue of unpredictability.

C. Hierarchical Algorithms

Hierarchical algorithms can be tree based or cluster based.

1) *Tree-based algorithms:* Tree-based algorithms require that devices share the same destination. A tree of multiple hops is dynamically constructed for routing messages and data, which create a traffic pattern of many to one.
2) *Cluster-based algorithms:* Cluster-based algorithms classify devices into groups or clusters in a hierarchical fashion. The device with the highest hierarchy in a particular group is the cluster head.

D. Context Aware Algorithms

Context is any information that can be used to characterize the situation of an entity, the context of a device could be its battery status, mobility speed, processing power, or location or memory/storage size and status.

1) Contextual sensing: the ability to detect contextual information.
2) Contextual adaptation: ability to execute or modify a service automatically based on current context.
3) Contextual resource discovery: the ability to locate and exploit relevant resources and services.
4) Contextual augmentation: the ability to associate digital data with the user's context.

V. FUTURE CHALLENGES

Application domain security: it is an end to end security between the application on user equipment and on servers;

Visibility and configuration security: the set of features controls the availability and configuration of certain security service.

Internet-of-Electrical Things (an Internet connected home or workplace that interconnects all the energy appliances) can lead to significant energy savings in terms of energy visualization, appliance control and dynamic pricing.

Network access security: Security interactions between the user and access network, which provides protection against attacks on the radio access link;

Network domain security: it enables the secure data/control signal exchange among network elements, which provides protection against attacks on wire-line network;

User domain security: it secures the access to the mobile station;

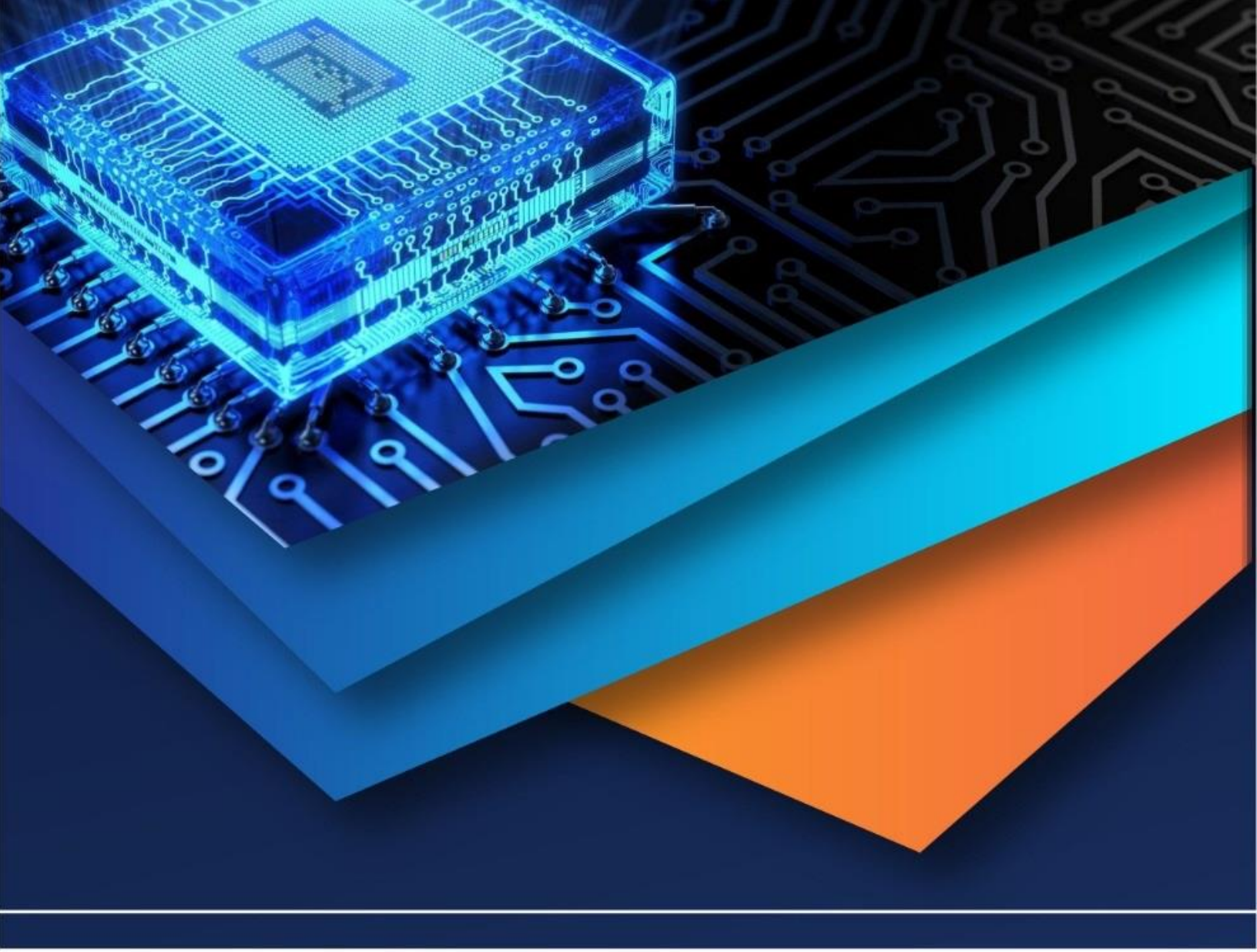
A. Household environment is a complex mass of wires (resolved by wireless network), confined spaces and uneven floors
B. Uncontrolled environment with humans interacting in the space
C. A safe, powerful, portable power supply is needed
D. Robots with AI or other behavioural complexities still have technical difficulties
E. Economic concerns mean that design, functionality and materials can be compromised.

VI. CONCLUSION

Thus D2D communication is an integral part of the IOT environment to design & deploy maintain a sustainable ecosystem. Some of the IoT research issues include energy efficiency, routing, security, context awareness protocols & many. In this paper, we focus on issues that will impact intelligent D2D communication in the IOT environment. We also analyzed state of art communication mechanisms in the licensed & unlicensed spectrum and routing techniques that will lead intelligent D2D communication. In addition, we discussed solutions to address these challenges.

REFERENCES

[1] J. Buckley, “From RFID to the Internet of Things pervasive networked systems.”
[2] D. Evans, “The Internet of things: How the next evolution of the Internet is changing everything,”
[3] Internet of Things - A Standardization Perspective (TCS) by Jaydip Sen
[4] Gábor et. al. “Design Aspects of Network Assisted Device to Device Communication”, IEEE communication Magazine March 2012
[5] Device to Device Communication by Professor: Nelson Fonseca, Ph.D
[6] Progression Towards the Intelligent Home conference at University of Bradfort
[7] Intelligent D2D Communication in the Internet of Things Oladayo Bello, Member, IEEE, and Sherali Zeadally, Senior Member, IEEE (base paper)



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY