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Survey on Energy Efficient Routing Issues in IOMT

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Abstract: IOT is going to offer large number of applications in various environments for improving the quality of our lives. Routing issues become more and more challenging for low-power and lossy radio-links, multi-hop mesh topologies, the battery supplied nodes and frequently changed network topologies. So that IOT routing protocols has some challenges like traffic Patterns, Energy efficiency, Scalability, Mobility Energy-aware metrics for routing protocol in IOT are node energy, throughput, latency, link quality. The multimedia transmission in IOT depends on a routing protocol to determine stable and resource – efficient path, and to provide varying levels of QoS/QoE based on different requirements. The Quality- of-Service (QoS)/Quality-of- experience (QoE) guarantee for multimedia in internet of things . The current research and development activities have been restricted to scalar sensor data based IOT systems and overlooked the challenges of provisioning multimedia devices over IOT.
Keywords: WSN, IOT, MULTIMEDIA, QOS/QOE.

I. INTRODUCTION

With rapid advances in Electronics, VLSI, MEMS and different wireless communication standards, heterogeneous devices with different capabilities are being designed and deployed for many emerging application domains. Many of the devices are addressable over the internet for communication and information exchange. The management of the devices will become difficult unless it is autonomous and is intelligent enough to make automated decisions and interact with users or devices across internet. Things or Objects across the computing Demand.

Thus evolving self-configurable and intelligent devices are to be inter-connected and the development of mechanisms and techniques to overcome various challenges thrown open during practical realization of data transfer across the globe. Human to Machine (H2M), Machine to Human (M2H) and Machine to Machine (M2M) are closely connected to emerging paradigm called IOT. The internet of things (IOT) is the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity that enable these objects to collect and exchange data.[5] IOT allows people and things to be connected Anytime, Anyplace, Anything and Anyone ideally using any path/network and any service.

The main objectives of IOT are to build highly interconnected system where devices will be the users of the internet, this system should work 'smartly' for the betterment of human beings, and the system should improve the relationship between the humans and the environment in which they live.

Main application areas are environmental monitoring, Infrastructure management, Manufacturing: It is also termed as IIOT (industrial internet of things), Energy management, Building and home automation, waste management, Medical and healthcare systems, Transportation [1][11].

The main contributions of this paper are

A. IOMT multimedia devices are expected to be low-cost and tiny, possessing limited memory resources hence energy efficient data acquisition techniques to be developed at node level.
B. Computationally less complex encoding techniques are required
C. To minimize the processing overhead which is directly proportional to energy consumption for a given set of bandwidth and compression requirements

Hence, the main obstacles of realizing IOMT, enabling Internet access to wireless multimedia network devices, are limited available power, limited available capacity, and heterogeneity of multimedia devices. The remainder of the paper is organized as follows II.IOMT III. IOMT Architecture IV.IOMT designed issues V. Concludes the paper.

II. IOMT-Internet of Multimedia Things

Multimedia content refers to a combination of two or more different media contents such as text, audio, image, video, etc. The emerging categories of IOT objects tend to be mobile, multi-sensorial and smart, such as wearable sensors, smart phones, and smart vehicles, bringing also to an increase of multimedia content in the IOT [13].

Requirements of multimedia data:

1) High bandwidth and storage capacity,
2) Highly complex multimedia data processing
3) Delay intolerant for real-time video streaming application

A. Applications of IOMT

1) Smart homes, remote patients monitored with multimedia based telemedicine services in smart hospitals
2) Intelligent multimedia surveillance systems deployed in smart cities
3) Transportation management optimized using smart video cameras
4) Remote multimedia based monitoring of an ecological system

B. Internet of Multimedia Things

IOMT as a novel paradigm in which smart heterogeneous multimedia things can interact and cooperate with one another and with other things connected to the Internet to facilitate multimedia based services and applications that are globally available to the users.

In IOMT the amount of data generated may vary from few kbps to several mbps so that the relevant systems should be adaptive in the offered bandwidth [5]

Quality of Service (QOS) requirements, the network characteristics defined in terms of end-to-end delay, jitter [3] and error rate, among others, are required to be regulated to ensure acceptable delivery of the multimedia content. Real-time multimedia applications, services, and solutions such as video conferencing, remote video-on demand, telepresence, real-time content delivery, and online-gaming, have contributed to the exponential growth of the Internet multimedia traffic

In IOMT, the delivery of multimedia data should be within the bound of QOS constraints (i.e. delay, jitter) which obligate higher bandwidth and efficient communication mechanisms.

III. IOMT ARCHITECTURE

IOMT architecture comprises of four distinct stages; (i) multimedia sensing, (ii) reporting and addressability, (iii) multimedia-aware cloud, and (iv) multi-agent system

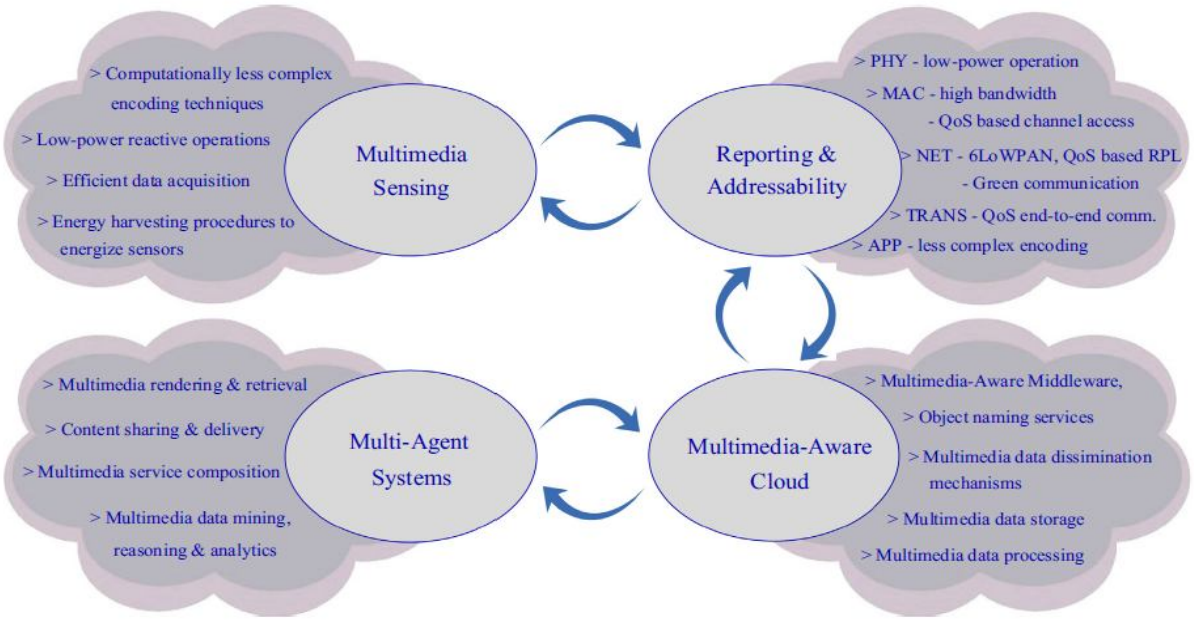


Fig a. IOMT Architecture.

A. The Need For Iomt

Previous studies and research done over wireless networks is application, content and device specific which do not hold good for Multimedia over IOT. The existing architectures for delivery of multimedia services have fixed infrastructure with limited mobility in a particular location/environment and deployed systems are not energy efficient .To provide ubiquitous adaptation, the multimedia devices possessing similar communication stacks are not meant to communicate with other network devices performing different tasks, users cannot address the individual multimedia device or trigger different operation on network multimedia devices, since these devices were not designed for two-way communication architecture. Hence there is a need to develop a whole new architecture for IOMT paradigm that focuses on these issues collectively.

1) *IOMT devices:* are supposed to be small sized objects equipped with a limited amount of power resources. Therefore for increasing network life time energy efficient methods are needed to be devised. IOMT devices should be embedded with application and context aware intelligence, so that the multimedia content from the physical environment is only acquired when needed, thus minimizing redundant information acquisition.
2) *IOMT Routing Protocol:* are to be energy efficient, high data rate supportive and low overhead communication protocols are required to facilitate multimedia traffic, considering acceptable level of jitter, end-to-end delay, latency, etc., over resource constraint devices in LLNs.

IV. IOMT DESIGN ISSUES

A. Energy Efficiency

Multimedia sensor nodes are battery constrained devices just like scalar sensor nodes. So energy is one of the major concerns in WMSNs too. Due to network congestion, packet interference, retransmission, and too much concentration on QOS requirements, battery of sensor nodes drains quickly.

B. Energy Efficiency Requirements

An explosive growth in the number of devices is forecasted over the next decade and the need for physical objects or things around us to communicate with each other will generate the demand for novel Energy Efficient solutions.

Following the requirements for energy efficient IOMT [9]

1) In IOMT the devices are supposed to be small sized objects equipped with a limited amount of power resources, which they have to utilize efficiently to increase network life time. Therefore, energy efficient methods are needed to be devised .Multimedia IOT devices should be embedded with application and context aware intelligence, so that the multimedia content from the physical environment is only acquired when needed, thus minimizing redundant information acquisition.
2) Multimedia sensor nodes in IOMT are deficient in terms of energy, processing and memory resources, so the event driven responsive procedures should be computationally less complex.
3) Thus, there is a trade-off between the achievable compression and the energy utilization for a specific level of user experience restriction.
4) IOMT applications pose a new set of stringent requirements on video codecs as given below:

Low-complexity encoding on IOMT node
Resilience to transmission errors
High data rate with low-power
Delay bound for multimedia streaming**.**

C. *Routing Protocols In Iot / Iomt*

An intelligent routing protocol can unleash the intrinsic power of any heterogeneous, dynamic, and complex network that is characterized by multiple dynamic factors such as changing topology and flow. Thus to achieve the full functionality of IOT, intelligent protocols are needed for D2D communication in IOT. Efficient and scalable routing protocols adaptable to different scenarios and network size variations, capable to find optimal routes are required. The Machine intelligence based algorithms should be light weight to be running on resource constrained IOMT node to perform intelligent routing based on the type of data under consideration for Low energy consumption and more node life time.

The energy constrained IOMT device need to process the acquired data, take local decisions and forward the information over lossy wireless networks to the destination entity. End-end data processing and communication in every IOMT device needs to consume

least energy with lowest possible delay. All this involves effective resource management of nodes, networks and the software components involved.

Multimedia applications demand real-time deadlines. Hence Energy efficient routing transmits the data to the destination through those nodes which are having sufficient energy resources and avoids the participation of nodes having energy below a specific threshold value. The data sensed should be communicated with minimum delay as expiry is associated with the data and it is essential to send the data to the destination within fixed time span.

Environmental monitoring or patient monitoring involves observations within and nearby systems to be considered for context recognition. Routing decisions will be taken according to the context gathered from various parts of the network [3] [4]. These routing algorithms are termed as 'Context aware routing algorithms' and form the integral part need of the IOMT. The need for Energy efficient routing algorithms with Context awareness is stressed in for Multimedia data transfer compared to DTN routing or plain Energy efficient routing protocol design for IOMT networks Previous studies are limited to scalar sensed data network applications and no previous work has considered RPL for multimedia communication over IOMT. Also, the heterogeneous network devices, in terms of their energy sources, are not considered before in a IOT scenario. Recently Standardized Routing Protocol for Low Power and lossy Networks (RPL) is highly adaptive and dynamic, but till now RPL has not been optimized to support multimedia communication. Designed an energy efficient enhanced version of RPL for IOMT called green routing protocol (Green-RPL) in which the sensed information is essentially provided by the multimedia evices [11] .

Generally protocols searches the shortest path length based on the minimum number of hops on that path. But such path length may or may not serve the purpose. For that it is essential to search the path towards the destination based on the energy requirement in IOMT networks.

Table 1 Parameter based comparison between IOT protocols [4]

Protocol	Context Aware	Secure	Multi-hop routing	Supports dynamic topology	Incentive Based	Considers Link quality
AOMDV-IoT	No	No	Yes		No	No
SMRP	No	Yes	Yes		No	No
EARA	Yes	No	Yes		No	No
RPL	Yes	Yes	Yes	Yes	No	No
Multiparent routing in RPL	Yes	No	Yes	Yes	No	No
PAIR	Yes	No	Yes	Yes	Yes	No
REL	Yes	No	Yes		No	Yes

Based on the analysis of the table above it can be concluded that existing protocols are mainly using residual energy of the nodes as a parameter for context awareness but along with it resources of the node at component level, link quality, Incentive based routing for relay nodes and Media-aware energy efficient mechanisms to build a routing protocol that will incorporate all the types of heterogeneity in IOMT Networks load balance and. Routing protocols are needed to aid the communication between things in a decentralized, self-organized and changing infrastructure Thus, two of the main design objectives of WSN/IOT applications are to reduce energy consumption and prolong the network lifetime. The route selection scheme must consider the residual energy and end-to-end link quality to avoid the energy holes, while at the same time providing fair distribution of the scarce network resources.

D. Some of the common Open research issues

1) One of the most critical challenge for the IOT communication stack to support multimedia communication is its higher data rate requirement.

2) Energy efficiency along with QOS support by Wi-Fi that is devisable to ZigBee is an open challenge. IOMT routing protocols should consider metrics that may energy efficiently route the multimedia traffic for specific QOS bounds and requirements.

3) Real time streaming protocols are required to initialize sessions and retrieve multimedia content from servers, considering the processing capability and the Internet bandwidth of the user device

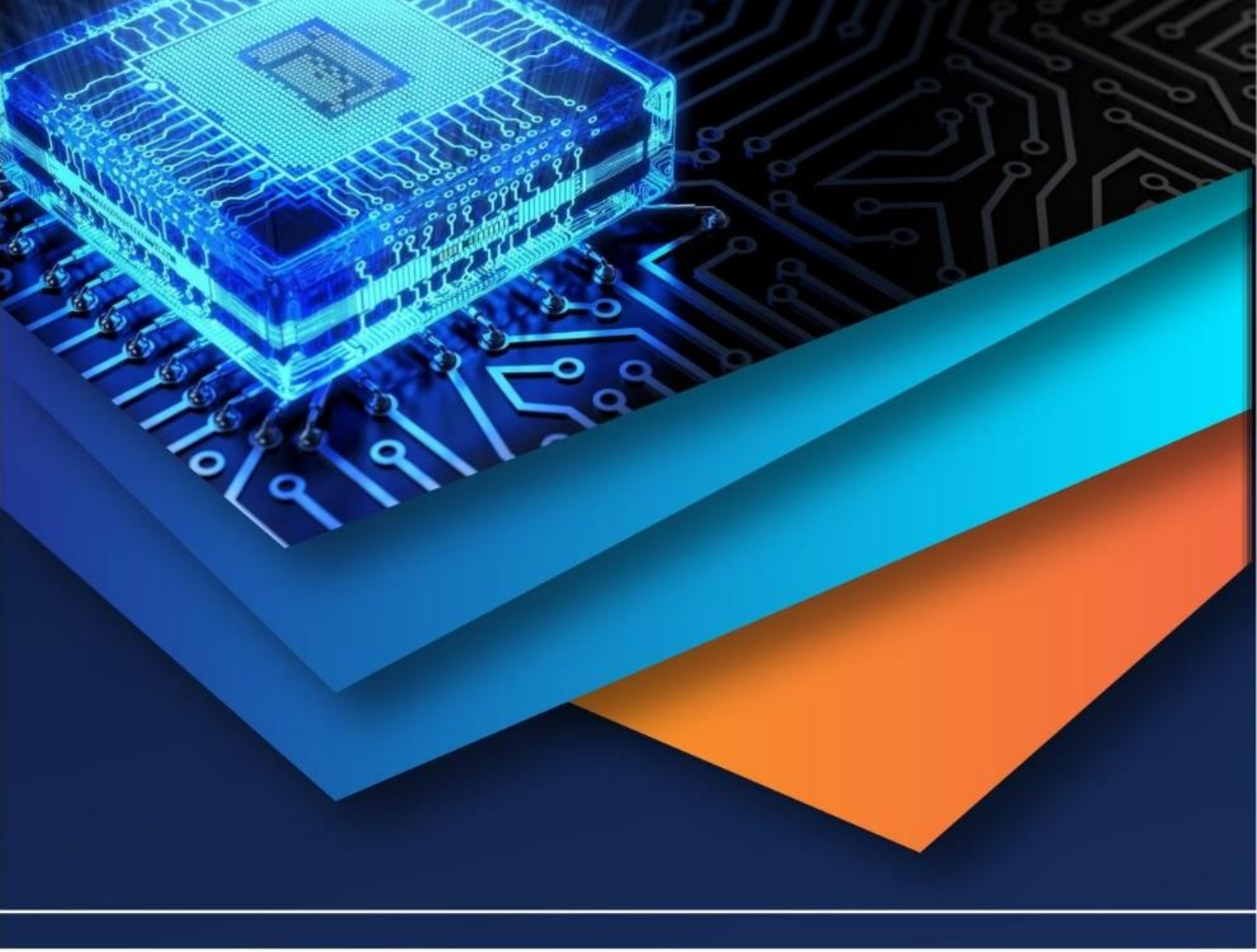
The trade-off between the compression and complexity at the sensing device and the complexity of the decoder needs to be investigated.

V. CONCLUSIONS

The existing architectures for delivery of multimedia services have fixed infrastructure with limited mobility in a particular location/environment and deployed systems are not energy efficient .To provide ubiquitous adaptation, the multimedia devices possessing similar communication stacks are not meant to communicate with other network devices performing different tasks, users cannot address the individual multimedia device or trigger different operation on network multimedia devices, since these devices were not designed for two-way communication architecture. Hence there is a need to develop a whole new architecture for IOMT paradigm that focuses on above mentioned issues collectively.

REFERENCES

[1] Hang Shen,Guangwei Bai Routing in wireless multimedia sensor networks: A survey and challenges ahead. Elsevier publications May 2016.
[2] Denis Rosário , Zhongliang Zhao , Aldri Santos , Torsten Braun , Eduardo Cerqueira , “A beaconless Opportunistic Routing based on a cross-layer approach for efficient video dissemination in mobile multimedia IoT applications”, journal of Computer Communications, Elsevier publications April 2014.
[3] Lotte Steenbrink , Ausarbeitung , “ Routing in the Internet of Things”, Technical report , Hamburg University of applied sciences , July 25, 2014.
[4] Amol Dhumane et.al., “Routing Issues in Internet of Things: A Survey”, Proceedings of the International MultiConference of Engineers and Computer Scientists 2016 Vol I, IMECS 2016, March 16 - 18, 2016, Hong Kong.
[5] Gérald Santucci Sebastian Lange, “Internet of things a road map for the future”, EC EPOSS workshop, Technical report v3,05 September, 2008
[6] Liang Zhou, Nanjng University of Posts and Telecommunications Han-Chieh Chao, National Ilan University, “Multimedia Traffic Security Architecture for the Internet of Things”, IEEE Network , May/June 2011.
[7] Zeeshan Abbas and Wonyong Yoon, “A Survey on Energy Conserving Mechanisms for the Internet of Things: Wireless Networking Aspects”, Sensors 2015, 15, 24818-24847; doi:10.3390/s151024818 .
[8] K´assio Machado , Denis Ros´ario , Eduardo Cerqueira , Antonio A. F. Loureiro , “A Routing Protocol Based on Energy and Link Quality for Internet of Things Applications” , Sensors 2013, 13, 1942-1964; doi:10.3390/s130201942.
[9] Sheeraz A. Alvi , Bilal Afzal, Ghalib A. Shah, “Internet of multimedia things: Vision and challenges” , Ad Hoc Networks 33 (2015) 87–111, Elsevier Publications.
[10] Vikas Bhandary AmitaMalik and Sanjay Kumar, “Routing in Wireless Multimedia Sensor Networks: A Survey of Existing Protocols and Open Research Issues: Review Article” , Hindawi Publishing Corporation Journal of Engineering Volume 2016, Article ID 9608757, 27 pages http://dx.doi.org/10.1155/2016/9608757.
[11] Sheeraz A. Alvi, Ghalib A. Shah, Waqar Mahmood, “ Energy Efficient Green Routing Protocol for Internet of Multimedia Things”, 2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP) Singapore, 7-9 April 2015.
[12] Iuliana Chiuchisan, Iulian Chiuchisan, and Mihai Dimian , “ INTERNET OF THINGS FOR E-HEALTH: AN APPROACH TO MEDICAL APPLICATIONS ”, IEEE 2015.
[13] Alessandro Floris, Luigi Atzori , “Quality of Experience in the Multimedia Internet of Things: definition and practical use cases”, Workshop on Quality of Experience-based Management for Future Internet Applications and Services IEEE ICC 2015.
[14] Huadong Ma, Member, IEEE, Liang Liu, Anfu Zhou, and Dong Zhao, “On Networking of Internet of Things: Explorations and Challenges”, DOI 10.1109/JIOT.2015.2493082, IEEE Internet of Things Journal.
[15] Zhao Zhang, Huadong Ma, and Liang Liu, “Cache-aware Named-data Forwarding in Internet of Things”, IEEE 2015.



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