

IEEE ComSoc Bangalore
wishes you a

HAPPY NEW YEAR
2018

ABOUT IEEE COMSoc CHAPTER BANGALORE NEWSLETTER

The IEEE ComSoc Chapter Bangalore Newsletter includes news useful to its members, nonmember and highlights most important technology development. It also highlights important concluded and upcoming events. Links for few important topics from current issue of *IEEE Communication Magazine* are also embedded.

EDITOR MESSAGE

Dear Reader,

Greetings from IEEE ComSoc Bangalore Chapter! It is a privilege to bring this newsletter to the communication engineering community of Bangalore Section and India. As you are aware, the newsletters of an organization serve as the archives of the activities and have a major role to play in the history of the organization. We wish the ComSoc-News, apart from the record of activities of IEEE ComSoc Bangalore Chapter to include some articles of current interest. The prime aim of this newsletter is to provide a way to communicate with the members and the community at large in regular intervals. Usually, we get a very few occasions to communicate with our valued colleagues. Such occasions normally come during the IEEE AGM, conferences, workshops and other gatherings such as invited talks. ComSoc-Newsletter values your contribution and I look forward to your continuous support

With warm regards
Anand M.

Treasurer, IEEE ComSoc Bangalore Chapter
anand.m@ieee.org



CHAIRMAN MESSAGE

DEAR IEEE MEMBERS,



First of all, I wish you all a very happy and prosperous New Year 2018.

I also express my sincere thanks to all for supporting me throughout the year and the love and affection shown towards me. We have worked as a team and continued our efforts to ensure the growth of individual, to society and section and the region. I hope, we have done reasonably well and of course, there is always a possibility to do more.

The 2nd issue of the Newsletter, Communication Society Bangalore India is delayed because of some difficulties and also with the intention to get hardcopy and distribute to number of people. We will ensure that two issues are distributed electronically to our members from the coming year.

I congratulate and thank all the contributors and companies who extended their support in bringing this Newsletter. I sincerely thank our team who shared their experience, suggested the kind of contents and material in bringing this up.

I am sure that with the help of active IEEE volunteers, we will be able to keep the momentum in publishing attractive IEEE ComSoc Bangalore India Newsletter in the months and years to come, which will be of archival value.

With warm regards,

Navin Kumar, PhD

Chairman, IEEE ComSoc Bangalore Chapter

navinkumar@ieee.org

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ABOUT IEEE COMSOC AND COMSOC BANGALORE CHAPTER

Since IEEE Communications Society (ComSoc) began operations in January 1972 (IEEE founded in 1963) as an independent Society of The Institute of Electrical and Electronics Engineers (IEEE) with over 32,000 members, IEEE ComSoc has become the premier international forum for the exchange of ideas on communications technologies and information networking.

IEEE ComSoc has evolved into a diverse group of global industry professionals with a common interest in advancing all communications technologies. Members interact across international and technological borders to: Produce publications; Organize conferences; Foster educational programs; Promote local activities; Work on technical committees.

IEEE GLOBECOM, IEEE ICC, and other conferences have earned international reputations. Publications increasingly support local and international coverage of important issues, and the Board of Governors reflects the changing direction of global communications technology.

Volunteer members of+ the society shape the course of IEEE ComSoc, its publications, technical activities, and conferences while the society's strength comes from the vision and dedication of its members and staff.

IEEE ComSoc members stay on top of the world of communications technology by accessing up-to-the-minute technical information, networking with other experts in the field, and leveraging many other exclusive benefits.

Formed in 2008 by an initiative from Prof T Srinivas, IISc, ComSoc Bangalore chapter has evolved and currently enjoys around 300 professional members from academia and industry. Today, ComSoc Bangalore chapter is one of the most vibrant and dynamic chapters with a large number of expert volunteers performing diverse tasks for the growth of the society and lives of the people. ComSoc Bangalore Chapter is known for the quality event. A huge support is extended to ComSoc chapter and volunteers by industry around.

IMPORTANT EVENTS (MAY 2017 – DEC 2017):

EVENT NAME	DATE AND MONTH	VENUE
Workshop on Research Methodology (How to write and publish paper)	May 8-9, 2017	CMRIT, ITPL Road
Two Days Extensive workshop on Research Methodology	Jul 9-10, 2017	Amrita School of Engineering
Smart City Conclave	Sep 01, 2017	BIET, Devangere
Software Defined Connectivity and Analytics	Sep 09, 2017	Nokia Inc, Bangalore
Big Data Analytics in Health Industry	Sep 23, 2017	Mysore SJCE
2 nd International Workshop on 5G and Future Wireless Technologies (5G-FWT 2017) in association with IEEE ANTS Bhubaneswar.	19 Dec, 2017 (17-20 Dec)	C V Raman Engineering College Bhubaneswar, Odisha

NEW INITIATIVE BY COMSOC BANGALORE

5G WORKSHOP SERIES

Over 8th Edition of Workshop on 5G was conducted by ComSoc Bangalore since the series took off in Nov 2013. In each of this event, we tried to focus on one or two specific area. The response has been significant. Research on 5G Wireless and Cellular Systems is intensively going on worldwide. There are few conferences initiated by IEEE 5G initiative as well as 3GPPP and other organizations worldwide. In the efforts to increase the awareness, ComSoc Bangalore is also taking step forward to start a conference focused to 5G like, 5G India Forum or so. Most probably in 2018, we will conduct such an event along side a workshop which has become part of very reputed conference in India IEEE ANTS. The most recent one as 2nd International Workshop on 5G and Future Wireless Technologies (5G-FWT 2017) in association with ANTS 2017 was concluded in Bhubaneswar, Odisha on 19th Dec. 2017. You may like to know more about this, please visit - <http://ants2017.ieee-comsoc-ants.org/workshops/5gfwf/>
Please keep an eye on event details on - <http://bangalore.chapters.comsoc.org/>

More information is provided at: <http://bangalore.chapters.comsoc.org/events-3/>



FIG: 5G EVENT SNAP

RESEARCH METHODOLOGY WORKSHOP SERIES

Another initiative by ComSoc is the Research Methodology Workshop Series. This year, we conducted two with the edition of July 9-10 becoming real knowledge distribution. The objective of this workshop is to let the research community especially young research scholars to understand the process involved in doing research starting from problem definition to peer review process. This workshop is expected to give a tutorial like session on different topics like How to define a problem, how to do research, how to publish and how to do peer review. The July edition has been a great success and participants from different cities who attended would like to request organizing committee to continue. We plan at least 3-events every year with one of them to be outside Bangalore. Organization, institutions who are interested in hosting the event, kindly get in touch with Chair/Secretary ComSoc.



Dear Reader, we plan to dedicate this page for 5G Tutorial Series. Starting from the basic, I would like to continue discussing about 5G Cellular System and Technologies in sequence (starting from Part 1, Part 2,). The tutorial will be in continuation from the previous issue. I hope, we will go in parallel with ongoing 5G research and development. It is believed that the reader will gain better understanding of 5G Cellular System if they follow the tutorial. In this Part 1, we start with the basic definition, important specifications. Some of the questions like, what is 5G, why is the 5G and when is the 5G are expected to be answered in this issue. I would welcome any suggestion from you.

Navin Kumar, PhD, Associate Professor, Amrita School of Engineering Bangalore

5G TECHNOLOGY AND CELLULAR SYSTEM TUTORIAL SERIES: PART II – ENABLING TECHNOLOGIES

In the first part of this series, we discussed the expected specifications and services from forthcoming 5G cellular system. For example, some of them are: high system capacity (/km²); very high data rate (multi giga bit data per second); reduced latency of close to 1 milli second and less; massive device connectivity, etc. Thus, we see that the major performance requirements entrusted on 5G cellular technology are diverse and specified from different perspectives. The technology as envisioned must be able to provide high data rate (both cell edge and peak), sub-1ms latency, ubiquitous connectivity, energy/cost efficiency, extreme mobility and support to diverse set of low-rate Internet of Things (IoT) devices along with high-rate mobile users. Hence, to conceive a new technology that could meet all the key performance indices is extremely difficult. Also, not all the requirements will be satisfied simultaneously in all the 5G use cases. For instance, high data rate applications such as high definition video streaming may relax on latency, where as a fully automated car clearly require a sub-1ms end-to-end round trip delay. However, technologies like augmented reality, virtual reality and tactile internet would require both high bandwidth and low latency. The question arises as which are the technologies support these specifications and services.

To meet the diverse performance requirements, various key technologies are envisioned in the proposed 5G networks. Fig.1 describes some of the key enabling technologies and the 5G requirements they address as specified by industry experts.

Millimeter waves (mmWaves) which span the 30GHz-300GHz frequency band are envisioned to offer multi-gigabits per second peak data rates through increased channel bandwidths. Extensive research work is being conducted to investigate the feasibility of high frequency mmWaves, which typically travel along localized paths, in cellular communication systems dominated by mobility and blockage.

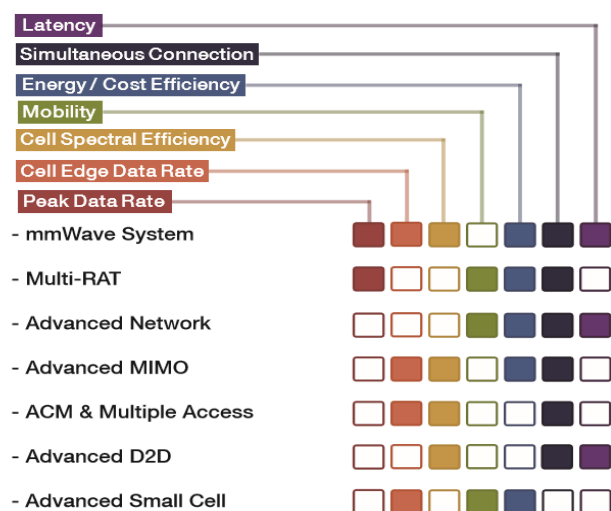


Fig. 1 : 5G key enabling technologies

The challenges and opportunities of using mmWaves as an alternative solution to the existing sub-6GHz spectrum are enormous with significant focus on mitigating their adverse propagation conditions. The short communication ranges of the heavily attenuated mmWave spectrum limits its usage in wireless communication. Also, atmospheric absorption coefficient for higher frequencies is seemingly large subsequently limiting the achievable transmission distance. For example, atmospheric absorption loss of 60GHz frequencies would be around 16dB/km. The atmospheric variations such as rain, fog and added moisture content additionally affects the transmission. Another major issue is its susceptibility to blockage. According to recent research measurements, the blocking loss could be as high as 15-40dB. MmWave cellular systems, as opposed to, existing microwave systems will exhibit two key features, (i) they rely less on techniques to improve data rate and more on methods to reduce overhead (ii) they are power limited than interference limited. To this end, new channel models are being developed as well as a few of the existing sub-6GHz models are being modified.

5G systems must additionally incorporate techniques for integrating multiple radio access technologies including carrier aggregation of licensed and unlicensed bands to extend available system bandwidth. Physical, MAC and network layer algorithms must be designed to suit this. In short, 5G systems should take advantage of the benefits of each RAT and offer a coexistence mechanism to improve efficiency. A key technological move at the network side is to evolve towards a flat network architecture wherein a single network gateway would not interfere with the operations of the other gateways. Also functional convergence of fixed and mobile networks and structural convergence of network equipment and infrastructures are aimed by 5GPPP to offer best possible customer experience.

Navin Kumar, PhD

Sheeba Kumari, PhD Scholar

To be continued in Part 3 (May 2018 Issue of Newsletter)...

IMPORTANT LINKS

<http://www.comsoc.org/>

<http://www.comsoc.org/whitepapers>

<http://www.comsoc.org/tech-focus>

<http://icc2017.ieee-icc.org/>

<http://www.comsoc.org/comstandardsmag>

<http://globalpolicy.ieee.org/wp-content/uploads/2017/02/IEEE17001.pdf>

http://www.ieee.org/about/volunteers/volunteer_index.html?WT.mc_id=dhtml_vol_see

<http://www.comsoc.org/free-tutorials>

<http://www.comsoc.org/training/training-calendar/road-5g>

<http://www.comsoc.org/ctn/death-and-possible-rebirth-dsp>

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https://docs.google.com/forms/d/1RRKwAvnza2dzS5P6rC_Src7t6Ab8f9P8xADI5P2NeBs/edit

The winner will be announced in the next issue.

CALL FOR CONTRIBUTION TO COMSOC NEWS

Please get in touch with us if you wish to write and to be included in this newsletter (in the area of Communication Technology). The article should be from 300-1000 words in docx or doc file and separate image jpeg or tiff file format. You can submit to: (navinkumar@ieee.org)

SIMULATE 3GPP 5G NEW RADIO TECHNOLOGIES

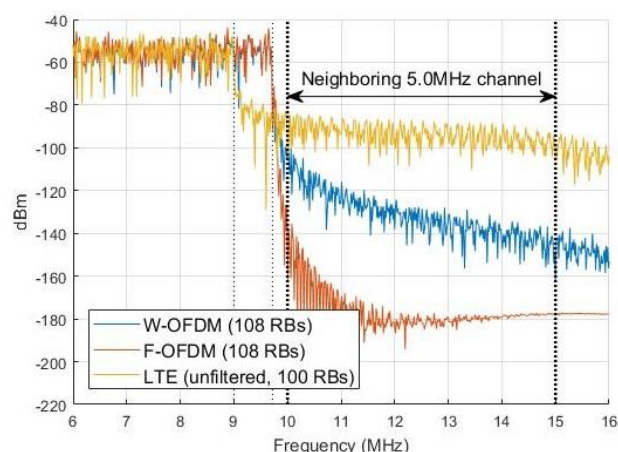


The **5G library** is a free, downloadable add-on for the **LTE System Toolbox** in MATLAB. It provides functions and link-level reference designs that allow you to explore the behavior and performance of new 3GPP radio technologies.

The library allows you to simulate the following:

- Channel models, including tapped delay line (TDL) and clustered delay line (CDL) channel models as specified in 3GPP TR 38.900.
- New radio waveforms, including candidate algorithms to improve spectral efficiency by limiting out-of-band emissions. These algorithms include:
 - ✓ Filtered OFDM (F-OFDM)
 - ✓ Windowed OFDM (W-OFDM)
 - ✓ Cyclic Prefix OFDM (CP-OFDM)
- Link-level simulation reference design, enabling you to measure the throughput of a 5G link using the provided waveforms and channel models.

Explore the behavior and performance of new 3GPP radio technologies using the 5G library.



https://in.mathworks.com/products/lte-system/features.html?s_tid=srchtitle#5g-library

M2M COMMUNICATION IN AD-HOC WIRELESS NETWORK

Suma M N

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Machine-to-machine (M2M) enables networked devices to share information and perform actions, without the manual assistance or not much of human intervention. A simple laboratory demonstration can be done for M2M communication between devices that are connected in an adhoc configuration and communicate using any IOT protocol. The open cloud can be used for the database storage. Experimental studies suggest adhoc M2M communications established with MQTT protocol has provided effective communications for industrial applications with minimum packet loss and delays. The current technology in M2M communication is based on is INDUSTRY4.0. In this technology all the machines will be interconnected to each other wirelessly and are connected to the internet. The basic functions of M2M communications are data collection from the machines. Ex: sensor value, temperature value, etc, data Transmission, sending data through the wireless technology to the server and data Storage, an open cloud.

Using sensors and raspberry pi 2 model a network gateway can be created and the sensor data can be transferred, received and monitored by master from different slaves. A centralized monitoring system will collect the data from the network available in cloud and manager can review the collected information to control the entire operation of the plant. The scenario with block description is shown in figure below.

All the nodes are networked using RS485 network where one of the Raspberry pi is considered as master and the other three are slaves. For data transfer simple temperature and the humidity sensor can be used to send the data to the master.

When one of the slave moves out of range from the master network, communication is not broken, instead the adjacent slave is employed through which connection can be established to master to transfer information. This communication is done using MQTT (Message Queuing Telemetry Transport) which is suitable for connections with remote locations.

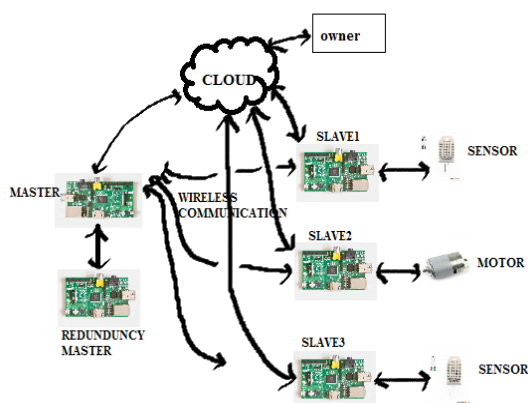


Fig. Block description of M2M ad-hoc network

A publish/subscribe messaging model is used where the master will publish its presence to which the slaves need to be subscribed. Following this, slaves will receive the acknowledge information from master. All the nodes are connected to the open cloud. In this cloud dashboard the machine ID will be displayed and can take the data value and store in the database. Further any disconnection of the slave or if the slave goes down, the buzzer can be used beep to indicate that the slave is in offline. Figure below shows communication between Master and slave using secure shell logins by MQTT publisher code.

```

pi@Master:~/Desktop/Master1 $ python Pub.py
enter your command:'GET S1'
Message Published...
Subscribed to MQTT TopicBlock1/Temp
i am connected to u
enter your command:'GET Temp S1'
Message Published...
Subscribed to MQTT Topic
Temperature is: -999.00C
Temperature is: -999.00C
Temperature is: 31.60C
Temperature is: 31.60C
Temperature is: 31.60C
Temperature is: 31.50C
Temperature is: 31.50C

```

Fig.

```

pi@Master:~$ sudo ping 192.168.1.4
PING 192.168.1.4 (192.168.1.4) 56(84) bytes of data.
64 bytes from 192.168.1.4: icmp_seq=1 ttl=64 time=7.80 ms
64 bytes from 192.168.1.4: icmp_seq=2 ttl=64 time=33.0 ms
64 bytes from 192.168.1.4: icmp_seq=3 ttl=64 time=32.4 ms
64 bytes from 192.168.1.4: icmp_seq=4 ttl=64 time=124 ms
64 bytes from 192.168.1.4: icmp_seq=5 ttl=64 time=12.0 ms
64 bytes from 192.168.1.4: icmp_seq=6 ttl=64 time=8.28 ms
64 bytes from 192.168.1.4: icmp_seq=7 ttl=64 time=9.99 ms
64 bytes from 192.168.1.4: icmp_seq=8 ttl=64 time=8.89 ms
64 bytes from 192.168.1.4: icmp_seq=9 ttl=64 time=8.28 ms
64 bytes from 192.168.1.4: icmp_seq=10 ttl=64 time=8.81 ms
64 bytes from 192.168.1.4: icmp_seq=11 ttl=64 time=34.4 ms
64 bytes from 192.168.1.4: icmp_seq=12 ttl=64 time=13.3 ms
64 bytes from 192.168.1.4: icmp_seq=13 ttl=64 time=8.30 ms
64 bytes from 192.168.1.4: icmp_seq=14 ttl=64 time=14.7 ms
^C
--- 192.168.1.4 ping statistics ---
14 packets transmitted, 14 received, 0% packet loss, time 13012ms
rtt min/avg/max/mdev = 7.804/81.779/828.588/209.193 ms

```

Fig.

One can find out delay by taking difference between sent and received message time and also find number of bytes transferred. For e.g. a signal with strong even harmonics can lead to estimation of time period as $T/2$ (τ_{guess}) (i.e. $2f_0$) in place of T . When we find the Fourier approximation (FA) and compare the coefficients obtained for time periods T and $T/2$, we observe that odd Fourier coefficients are weak and even coefficients are strong w.r.t. T .

The harmonics present at 2, 4, 6, 8, w.r.t. T are present at 1, 3, 5, 7, when FA is obtained with $T/2$ as period. If the number of weak odd harmonics are above a certain threshold as compared to number of strong even harmonics in the case of FA with T , we conclude that $2\tau_{\text{guess}}$ is the best estimate else τ_{guess} is the best estimate of the time period. Similarly, for different harmonic signals by comparing the number of weak and strong harmonics for various multiples of τ_{guess} the structure of the actual signal can be understood and a better estimation of the pitch can be obtained. An example of how the octave correction can be done using FAM is shown in Figure 1. Here the detected pitches are compared with a pitch detection software Tartini and SDF method.

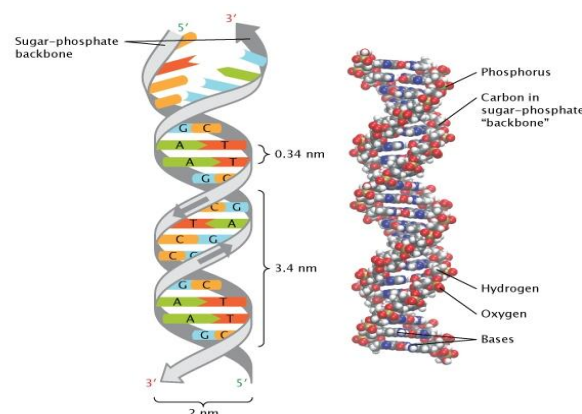


Fig.1: Helical Structure of DNA

NEW DIRECTIONS FOR INFORMATION SECURITY USING DNA COMPUTING

Ms Sreeja C.S [PhD Scholar].

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DNA Computing also known as Molecular Computing got relevant diligence in 1994 due to its computational properties exploited by Dr. Leonard M. Adleman of the University of South California. Adleman's [1] ground breaking experiment solved the complex computational problem of Mathematics- The Hamiltonian Path problem by manipulating DNA, redefined the word computation. The feasibility of computation at molecular level marked the new era of Nanocomputing. DNA computing is an exciting and fast developing interdisciplinary area of research which includes theoretical approaches, experiments and applications [2]. The Fig.1 depicts the helical structure of DNA [3].

Genomic Steganography performed by Carter Bancroft et al. [4] geared up DNA based encryption techniques which led to the growth of DNA Cryptography. DNA Cryptography can be performed in two ways using the wet lab and by simulating the biomolecular concepts. The major biomolecular concepts used for encryption techniques are Central Dogma of molecular biology (CDMB) and Polymerase Chain Reaction (PCR). The biomolecular concepts can be simulated using Digital DNA which is available in the databases in millions as a part of Human Genome Project (HGP). This led cryptographers to simulate the bio-computing concepts using DNA sequences.

Cryptanalysis of DES using a molecular Computer [5] also extended to the research area of DNA Computing. DNA computing has relevance as its considered as one of the nanocomputing technology that can be applied to information security concepts. The triad of Information Security - Confidentiality, Integrity and Authentication can be achieved by using DNA Computing. DNA Computing allows to generate hybridized protocols in conjunction with conventional cryptographic techniques which enhances security by an additional layer of biocomplexity. DNA based cryptography can be broadly classified into Symmetric DNA Cryptography, Asymmetric DNA Cryptography, Pseudo DNA Cryptography and DNA Steganography [6]. Comparing the performance evaluation of DNA cryptography over conventional cryptography is another area of research, this also includes hybridizing the DNA cryptography with modern cryptography to yield better security and efficiency.

Authentication is a critical aspect and considering it as an entry point into the system it needs special attention. DNA based encryption plays a vital role as it can be paired with password-based authentication, image-based authentication [6] and two-factor authentication such as smart card. DNA computing has broad applications in authentication itself such as User authentication, Product authentication are a few to list. Data Integrity and Non-repudiation can be achieved using DNA encryption as the DNA has unique features which make it befitting to complete information security aspects. Many of the DNA encryption algorithms proposed so far concentrates on the confidentiality whereas authentication based on DNA needs more attention especially in the health care and Cloud Computing where data security and privacy are major concerns, and many open challenges exist in these domains.

REFERENCES

- [1] L. M. Adleman, "Molecular Computation of Solutions to Combinatorial Problems," *Nature*, vol. 369, pp. 40. 1994.
- [2] Amos, M., Păun, G., Rozenberg, G., & Salomaa, A. "Topics in the theory of DNA computing," *Theoretical computer Science*, 287(1), pp 3-38.2002.
- [3] The double-helical structure of DNA
<http://www.nature.com/scitable/topicpage/discovery-of-dna-structure-and-function-watson-397> [Accessed on 13/07/2017].
- [4] Clelland, Catherine Taylor, Viviana Risca, and Carter Bancroft. "Hiding messages in DNA microdots", *Nature*, vol.399.6736, pp 533-534, 1999.
- [5] Boneh, Dan, Christopher Dunworth, and Richard J. Lipton. "Breaking DES using a molecular computer," *DNA based computers*, pp: 37-66,1995 .
- [6] MohammedMisbahuddinandSreejaC.S., "A Secure Image-Based Authentication Scheme Employing DNA Crypto and Steganography," *WCI '15Proceedings of the Third International Symposium on Women in Computing and Informatics*, ACM 2015.(DOI: <http://dx.doi.org/10.1145/2791405.2791503>)

NARROWBAND IOT: THE IOT FOR DEVELOPING COUNTRIES

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The Internet of Things (IoT) is now an integral part of the digital ecosystem. It was initially started as a value added system for cellular communication networks. However, now it appears in several forms including sensor networks and independent networks. IoT can be of different types depending on their features. One of the standardized forms of IoT is Narrowband IoT (NB-IoT). As the name suggests, this IoT needs narrow band frequencies for its operations. Due to the narrow band requirement, it has several advantages over other IoTs. In this article, we present its features and functions which make it suitable for developing countries.

NB-IoT needs a frequency band of just around 200 kHz for its operation. It is one of the most popular low power wide area (LPWA) technologies. It has several attractive LPWA features which save both power and bandwidth. The power difference between a server and the end connections in NB-IoT can be as low as -164 dBm which is remarkable for any LPWA network. At this power level single battery can support NB-IoT sensors for more than 10 years. Due to the low power requirements, it is often considered as a green technology. In addition to the power, it can use the vestigial bandwidths of the cellular networks. In Fig., we show the three possible bandwidth scenarios of NB-IoT.

In the first case, we show the standalone allocation of bands in which unused microwaves (normally in the range of 700 – 800 MHz) are provided for NB-IoT. In the second case, the unused guard bands of cellular networks are allocated for it.

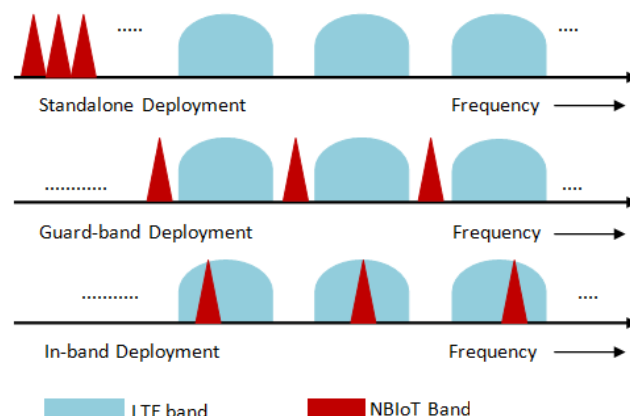


Fig. :NB-IoT deployment options in different bands.

In the third case, it may use the cellular bands if the first and second cases are not possible for its deployment. In-band deployment needs frequency hopping techniques to avoid the common band overlapping in the LTE channels. In fact, for the dense deployment of NB-IoT the combination of the above three may be used simultaneously.

In the developing countries, 5G will not be deployed everywhere in the next decade. Even the deployment of 4G/ 4.5G will take a long time. However, IoT is an essential component of the modern digital ecosystem and it can provide various basic services in the society. It cannot be avoided in the developing countries due to the lack of advanced cellular infrastructure. Therefore, the LTE legacy systems such as GSM (2G) and UMTS (3G) are the main choices for the deployment of IoT in the developing countries. Both GSM and UMTS can support NB-IoT in various forms. NB-IoT has been standardized in 3GPP LTE Release 13. It is suitable for both indoor and outdoor applications. It can support hyper-dense sensor networks. Its components are much cheaper than the broadband IoT devices. NB-IoT can be used for smart cities, manufacturing, utility distributions, smart agriculture, retail industries, safety and privacy monitoring, smart policing, healthcare provisioning, and several other smart applications.

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STUDENT BRANCH CHAPTER INFORMATION

AMRITA SCHOOL OF ENGINEERING, BANGALORE CAMPUS

ASE ComSoc Student Branch Chapter is formed in April 2016. The student branch has largest number of student members over 120 and perhaps the largest Student ComSoc Members. They conduct lot many activities and are very active.



<https://ieee-amrita.firebaseio.com/>



INDIAN INSTITUTE OF SCIENCE

Faculty Advisor – Prof T Srinivas, ECE Dept

RVCE STUDENT BRANCH CHAPTER

RVCE ComSoc Student Branch Chapter is formed in the month of July 2016 with faculty advisor as Dr S Ravishankar, Professor in the Dept. of ECE.

Faculty Coordinator: K S Shushrutha Asst.

Professor, Dept. of ECE, RVCE

Student Chair: Prakhar Jain, Student, Dept. of ECE, RVCE

START COMSOC STUDENT BRANCH CHAPTER IN YOUR ORGANIZATION/INSTITUTION

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INTERNSHIP/JOB OPPORTUNITIES

Internship opportunity available @ Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Bangalore Campus for both M Tech and B Tech. Contact: Dr Navin (navinkumar@ieee.org) for exploring it. Area – ECE, Photonics, Computer, IoT, LiFi (VLC), ITS, etc.

Postdoc Position in Data Center Networks: <https://www.kth.se/en/om/work-at-kth/lediga-jobb/what:job/jobID:178704/where:4/>

Postdoc Position in Multi-Domain Orchestration in 5G Networks

<https://www.kth.se/en/om/work-at-kth/lediga-jobb/what:job/jobID:177623/where:4/>

Deadline for application is February 1, 2018

:<http://www.jobs.ac.uk/job/BFA702/ktpp-associate-cyber-security-in-smart-energy-systems/>

-Temasek Fellowship: (http://www3.ntu.edu.sg/trf/index_trf.html),

- - networking testbeds (both for smart city and for 5G)

Please contact: Dr Navin Kumar (navinkumar@ieee.org)

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Navin Kumar (navinkumar@ieee.org)
or Anand M (anand.m@ieee.org)

THANK YOU NOTE FOR THE CONTRIBUTORS

We would like to thank every author who showed interest and submitted their works. We could not include all of them mainly because of scope and relevance.

IEEE COMMUNICATIONS MAGAZINE

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View from India: GDP picks up, despite DeMo and GST



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or Anand M (anand.m@ieee.org)

View from India:

https://eandt.theiet.org/content/articles/2017/07/view-from-india-eventually-we-all-find-our-bearings/?utm_source=Adestra&utm_campaign=New%20EandT%20News%20-%20Automation%20FINAL%20-%20NON%20MEMBER&utm_medium=Newsletters%20-%20E%26T%20News&utm_content=E%26T%20News%20-%20Non-Members&utm_term=https%3A%2F%2Feandt.theiet.org%2Fcontent%2Farticles%2F2017%2F07%2Fview-from-india-eventually-we-all-find-our-bearings%2F

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