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# A Novel Technique for Enhancement of Capacity in 5G Wireless Network using C-RAN based on ANN

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## Abstract

*This paper survey various techniques proposed by earlier researchers for the enhancement of capacity in 5G wireless networks using Cloud Radio Access Network (C-RAN) and other techniques. The study is based on the survey of C-RAN using artificial neural networks.*

### Introduction

5G (Fifth Generation)standard provides for a very high speed upto 20 Gbps and has been established with millimeter waves of 15 GHz and higher frequencies. 5G is expected to be broadlyustilized for private network systems having application in engineeringIoT, venture networking, and perilous communications. So as to help expanded throughput requirements of 5G, huge amount of novel spectrum is assigned to 5G, especially in mmWave bands. Radio convergence mightbring about sharing fluctuating from accumulation of cell and Wi-Fi channels to utilization of a solitary silicon gadget for numerous radio access technologies.
Forth generation (4G) deliversmobile broadband internet accessand usual voice as well of 3G. For example laptops having wireless modems, Smartphones, and various mobile devices.

4.5G deliversimproved performance than 4G system. This technology includes LTE Advanced & MIMO. Apart from this as far as 5G is concerned there are some network necessities like:

- Support to numerous number of users a data rate upto tens of Mbps.
- Data rate upto 1Gbpssimultaneously to tens of users on the same floor.
- for enormous sensor placements it should support several lakhs of simultaneous connections.
- Enhanced spectral efficiency as against 4G.
- Improved coverage.

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- Enhanced signaling efficiency.

The major issue in 4G systems right now in the operation is to mark high data rates available in greaterportion of cell, particularly to handlers in exposed position between several base stations.Always Best Connected (ABC) methodology permittingthe user to connect to the services with the help of a personal mobile device.

C-RAN (Cloud-RAN), or Centralized-RAN, is projected architecture to be used in future cellular networks. It is a federal, cloud computing groundeddesign for RAN,which supports 2G, 3G, 4G &upcoming wireless communication principles. Traditional cellular, or RANcontainmany unconnected BTS.Individual BTS shelters small area, little zone, while a cluster BTS gives inclusion over a constant zone.

Peak-to-Average Power Ratio (PAPR) may be given as the ratio of peak amplitude squared and RMS value squared.

$$PAPR = \frac{|x_{peak}|2}{x_{rms}^2}$$

$$PAPR_{dB} = 10\log_{10}\frac{|x_{peak}|2}{x_{rms}^2}$$

When expressed in decibel (dB), PAPR dimensionless quantities. The PAPR is most used in signal processing applications. For example PAPR (dB) of direct current wave is 0.0 dB. Application in electrical engineering for describing the quality of an AC power waveform and in Physiology for analyzing the sound for snoring.

Artificial neural networks (ANN) is a processing framework dubiously invigorated by the organic neural systems that create creature cerebrum.Such frameworks "figure out how to perform undertakings by being thoughtful about models, for maximum part without being modified with assignment explicit principles. An ANN depends on collection of connected units known as artificial neuronsthat freely model neurons in organic mind. Each connection, like synapses in the organic mind, transmit signal from one artificial neuron to another. Artificial neurons that get a signal can process it and afterwards signal extra artificial neurons associated with it. ANN found its application in machine translation, social network filtering,computer vision, speech recognition, and medical field.

**Literature survey**

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There are many researchers who have reported earlier some findings over ANN. Some ofthe useful literatures for this work are presented here.

Baig*et al* [1] provided in its literature a Multicarrier Non-Orthogonal Multiple Access (MCNOMA),which is modifiedform of amalgam NOMA. Here, OFDMAhave been used because of its technical adulthood. The MCNOMA hashuge connectivity, spectral efficacy, improved cell coverage ability and advanced data rate. However, entire OFDMA dependent structuresagonize from problem of great PAPR. Therefore, in this paper, aninnovative FIR filter based Hadamard Transform (HT) pre-coded uplink MCNOMA structure is offered for large PAPR reduction.

Petrut*et al* [2] demonstrated the devices connectivity possibilities and encounters faced in IoT world. The IoT had a very huge impact on the technology but not yet standardized. But, in medical domainIoT faces a largeamount of technical limitations, most of them are in connection with electromagnetic emissions.

Altabas*et al* [3] described a combined NOMA and multiCAP structure. They have proposed the same for capabilityimprovement of 5G mobile networks and experimentally verifiedon W-band millimeter-wave radio-over-fiber scheme.

Altabas*et al* [4] proposed a combined non-orthogonal multiple access (NOMA) and multiband carrierless amplitude phase modulation(multiCAP) schemes for capacity improvement.Proposed structure is experimentally assessedfor a W-band millimeter wave radio-over fiber system. Evaluated NOMACAP system contains six 1.25GHz multiCAP bands and two NOMA levels havingQPSK and can offer agathered transmission rate of 30Gbps.

Pliatsios*et al* [5] come up achieving the 5G vision whichpresenta technology innovation and considerable changes in transporting cutting-edge applications and services. The C-RAN concept arisen as convincing architectures which meet requirements of 5G vision.

Niharika*et al* [6] emphasized that Spectral efficacy in 5G wireless systems can be exploited by means of NOMA. The concept of NOMA was studied theoretically but practically it was not done till then. The paper discussed performance assessment of NOMA for numerous modulation schemes like QPSK, 16QAM and 64 QAM in Downlink system.

Derakhshani*et al* [7] have successfully demonstrated convergence of SDN, SDR, and virtualization on idea of software defined wireless networking (SDWN). It is aauspiciousmethod to support dynamic networks of this kind.

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In this paper, we have focused the survey on reducing PAPR using Heterogeneous C-RAN technology, enhancing system capacity, training proposed network using artificial intelligences technique and utilization of data in increasing the overall performance and reducing delay. We are going to use fuzzy logic for the same. Fuzzy logic is a method of many-valued logic wherein real value of variables may be any real number between 0 and 1. A common algorithm for Defuzzification is cut the membership function at this value. Feature of membership function may be well-defined by three dissimilarproperties like Core, Support, and Boundary. It can yield value between 0 and 1.

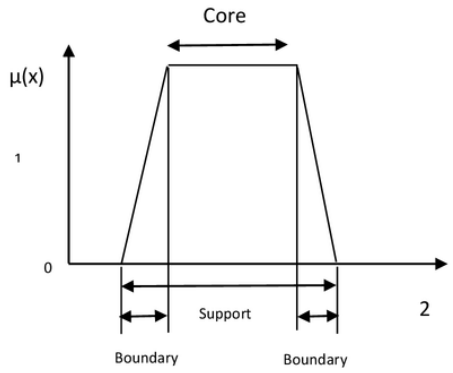


Figure 1: Feature of membership function.

Figure-1 provides detail of these properties.If region of creation is categorized by full membership in set, this provides core of membership function of the fuzzy at point A. If region of universe is categorized by non-zero membership in set A, this describes support of a membership function for fuzzy set A. If the region of universe has a non-zero membership but not full membership, it defines boundary of membership function for fuzzy set A.

There are three approaches to training ANN, one is Supervised, second Unsupervised and third Reinforcement learning. Supervised drillincludes process of providing network with anticipated outcome. In unsupervised drill network has to make sense of input deprived of outside help. In reinforcement learning, data are typically not given, but it is produced by an agent's interactions with environment. C-RAN appears to simply the centralization of base-band units (BBUs). Following inference could be find through literature survey on C-RAN:

- **BBU Centralization is** fundamental component of C-RAN.

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- **Advanced technology facilitation**is an inter-connection switching network of high bandwidth and also, low latency. It is essential for a pool in C-RAN.
- **Resource Virtualization/cloudification:** In conventional RAN system, computation capitals are constrained inside one BBU and consequently, can't be imparted to different hubs. However in C-RAN such resources are accumulated on a pool level andcan be deftly assigned on request. This elementmay be defined as resource utilization efficiency. It improves resource utilizationefficiency as well as power consumption.
- **Soft BBU:**In C-RAN BBU pool BBU is of soft form, which has capability of being dynamically reconfigured and adjusted which further enhance the resource utilization efficiency.

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