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Radio Resource Management Strategy for Mobile Networks Based on QoS Sensible Confederation

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Abstract:

To attain a higher demand for a high quality of service (QoS) and good data rate to support multimedia streaming the extension of wireless networks came to picture with extreme precision levels. This visualization of the wireless networks next-generation is of various types of radio access technologies such as WiMax, Advance LTE, and Wi-Fi. These all extended forms of wireless networks are based on the heterogeneity of the network. For achieving this object, a QoS with optimal confederation-aware technology i.e., QOC-RRM technique is discussed as an important input. Hence, this projected article gives an idea about an LTE network i.e., Long Term Evolution for future generation radio resource management. Our proposed technique makes use of the QOC-RRM method. In this hybrid RDNN method i.e., Recurrent Deep Neural Network we present differentiate operators based on multiple constraints through priority wise. This QOC-RRM method controls the due source through the sink or in some cases base stations. Furthermore, for the direction-finding queuing criterion the information with the other CWO i.e., Chaotic Weed Optimization, an algorithm is anticipated. In this method, the sink schedules the available information once the data received at the base station on the first come first basis. The implementation of the projected work is done by using the Network Simulator (NS2) version 2.34 and its extension NS3 tool. The performance outcome shows that the proposed work outperforms as compared to the existing work i.e the conventional RRM scheme. The parameter used for the contrast is the least rate of the data required, the radio spectrums utilization, and the utmost amount of dynamic user.

Keywords: Wireless Network, QoS, Data Rate, OFDM, System Architecture Evolution, Conventional RRM Scheme.

I. Introduction

The LTE, i.e., Long Term Evolution, utilizes OFDM as its broadcasting way to innovation simultaneously with highly developed aerial skills. A 3GPP is a supportive attempt for understanding, that unite an assortment of broadcast communications patterns, famous as 'Hierarchical Partners'. The 3GPP is an IP-based level arrangement. This designing of 3GPP is the most important feature of the SAE application i.e., System Architecture Evolution [1]. The combination of LTE and SAE has been proposed for the creative application of an IP-based organization [2]. The constrained source systems that are used to manage the system parameters like packet loss, delay, glitch, and bandwidth, are guarantying for making the essential QoS is important for smooth system tasks. On the other hand, for real-time streaming and multi-media applications like online games, explicitly used for IPTV as well as VoIP i.e., Voice over IP [3].

An expository model is proposed by Geels et al. about assessing the SFR i.e., Soft Frequency Reuse and Strict FFR arrangements based on Poisson spatial point process. There results in both catch the non-consistency of heterogeneous organizations and produce tractable articulations that can be utilized for framework structure with Strict FFR and SFR

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[4]. Also, they see that the utilization of Strict FFR groups saved for the clients of every level with the most minimal normal SINR gives the most astounding additions as far as inclusion and rate, while the utilization of SFR takes into consideration increasingly productive utilization of shared range between the levels, while as yet moderating a great part of the obstruction. Also, with regards to multi-level systems with shut access at certain levels [5].
The outstanding part of the exertion is set as, II section will give the literature review, the III section of the work will focus the projected clarification with the proposed model for the designed system, In IV section of the paper derives the numerical representation of the anticipated work with solution, the simulation outcomes of the proposed work is discussed in V section and lastly the section VI will give the conclusion of the proposed work with future scope.

II. Literature Review

As we discussed that the designing of 3GPP is the main characteristic of the System Architecture Evolution (SAE) application. That's why the combination of LTE and SAE has been proposed by various researchers for the creative application of an IP-based organization [6]. The constrained source systems that are used to manage the system parameters like packet loss, delay, glitch, and bandwidth, are guarantying for making the essential QoS is important for smooth system tasks. On the other hand, for real-time streaming and multi-media applications like online games, explicitly used for IPTV as well as VoIP i.e., Voice over IP [7]. Hence, this section will discuss the existing works done by various researchers related to the proposed work. Some of the important works done are discussed below,

A cross-tier interference minimization scheme for the femtocell system, for the two-tier case, is examined by the Park et al. at asymmetrical arbitrary based on the beam framing. To improve the insusceptibility of both macrocell and femtocell users to cross-tier obstruction, additionally, embrace a full-scale cell beam subset determination system [8]. This beam subset choice methodology augments the throughput of the full-scale cell by enhancing the exchange of between the multiplexing gain and the multiuser obstruction. At the same time, the maximum throughput scheduler smothers the cross-tier obstruction with an adaptively decreased number of beams. Furthermore, propose artful channel choice and dispersed power control systems for the femtocell arrangement [9]. Various researchers proposed a downlink, where clients will be booked and to a great extent, yet the portable handset will even now need to adapt to a couple of predominant sinks. Newer outcomes for impedance dropping collectors that utilization regular front-closes are appeared to reduce huge numbers of the inadequacies of earlier strategies, especially for the difficult uplink [10].

To transmit multiple streaming, in mp4form, from a sink to mobile clients various authors examined the scheduling algorithms. Several researchers have given an approach, in an epoch-by-epoch framework, to allocate the transmission slots fairly for the users in a wireless manner [11]. Then they presented a fast lead-aware greedy scheduling algorithm. Zhiqiang et al. present a sub channel design in dense scenarios. Various authors prove that a particular form of power allocation outperforms in contrast with the conventional schemes. Finally, they project an efficient method for jointly allocating power and a sub-channel based on the binary power allocation [12].

III. Proposed Work And Experimental Result

3.1 Methodology and Designing of the proposed Model

This section is divided into two parts as proposed model designing and the problem methodology. By doing so, we can allocate the available resources as well as can identify resource allocation with consequent solutions.

3.1.1 Methodology

The drawback of the current techniques has less improvement in downlink performance in soft-frequency reuse based LTE. To overcome the drawback of the above-mentioned problem methods the proposed work mainly contributes in different ways as:

1. For making a proper solution A hybrid algorithm is proposed i.e., QoS aware optimal confederation algorithm [13].
2. An assumption is made for the QoC that, for upcoming networks, depends on the management techniques for the available radio resource.
3. The allocated resources are directly maintained by the sinks only.
4. The RDNN is introduced by QoC-RRM to classify different terms based on multiple constraints, for the users, of priority and non-priority.
5. CWO algorithm is proposed to share queuing criterion information, for the routing process in the network, with the neighbors used for the QoC-RRM scheme.

3.1.2 Designing of the proposed Model

The radio networks, here parallel with the LTE, with access packet core networks, are evolving into the SAE system architecture. For network performance optimization it is designed and can be used as a new architecture for improving the efficiency of the network along with IP based service facilities for the mass-market. The SAE Gateway is the node in the SAE system architecture with e Node B as a second node for the user plane [14]. The basic structure for the Long Term Evolution is shown in figure 1 below.

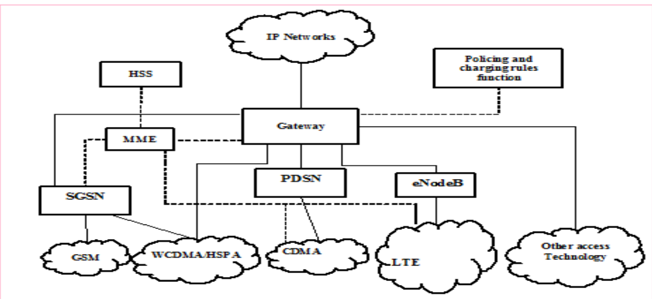

Figure 1. The architecture of Long Term Evolution

3.2 The QOC-RRM.

The LTE networks are implemented by using a different technique called radio resource management for future applications. These proposed RRM schemes designed using quality of services techniques along with aware optimal confederation technique which is nothing but the advanced method of QoS method [15]. So the proposed scheme is designed by using advanced methods for the route-finding metrics such as Chaotic Weed Optimization (CWO) and the well known Recurrent Deep Neural Network (RDNN) algorithms [16].

In this section, the mathematical model of the proposed RDNN and CWO algorithm is described. The modified RDNN technique is presented in section 3.1 and the modified algorithm is presented in section 3.2.

3.3 QoC-RRM using CWO algorithm

In this section, the proposed algorithm is going to discuss briefly. The first recurrent deep neural network is discussed in sec 3.1 and the next chaotic weed optimization algorithm in sec 3.2.

The CWO algorithm comes from invasive weed optimization (IWO) method. The IWO method description for the conventional first procedure explains an arbitrarily scatter the fundamental seeds as $s_i = (x_1, x_2, ..., x_n)$, wherever '$n$' is the number of variables selected. Consequently, all kernels contain unequal behavior for each variable in the space arranged in '$n-D$' manner [17].

That is, the total number of seeds to be made by each weed modifies straightly from $N_{\min}$ to $N_{\max}$ which can be processed utilizing the condition given below

Total Seeds Available are =

$$N_{\min} + \frac{F_i - F_{worst}}{F_{best} - F_{worst}}(N_{\max} - N_{\min}) \qquad (1)$$

Here 'F_i' ith seed fitness, the factor 'F_{worst}' is used for the worst case and the factor 'F_{best}' is used

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for the representation of the best case simultaneously.

In the fourth method seeds produced are generally disseminated through the operating zone by a changing regular deviation of σ_{iter} as well as zero mean and they were designated as,

$$\sigma_{iter} = \left(\frac{iter_{\max} - iter}{iter_{\max}}\right)^n (\sigma_0 - \sigma_f) + \sigma_f \quad (2)$$

To surmount the restrictions of the above problem the disordered assessment is integrated with the help of two CIWO algorithms. The disorganized scrutinization events have an enhanced capacity to discharge through local minima. Hence, this algorithm takes a less important chance of early concurrence connected with the IWO algorithm [18]. Furthermore, due to better-quality scanning and examination abilities, this system prevents the demand of accumulative measures of the available seeds in the resolution space [19]. Therefore, comparatively decreasing the computational charge for the completion of the CIWO algorithm. In this case first and foremost the inspired chaotic maps in the discussed CIWO algorithm are explicated below [20].

3.4 Performance evaluation and comparison

The evaluation of the performance is done in two different ways either by using the Sum Rate or the Guaranteed Rate [21]. These methods i.e., QOC-RRM performance using sum-rate and QOC-RRM performance using guaranteed rate are discussed below with their outcomes.

3.4.1 QOC-RRM performance using sum-rate:

Besides; figure 2 as well as figure 3 shows the basic user performance compared with MOC based SONRRM and with some other techniques. Furthermore, due to the constrained resource for the BSs, the basic CG SON RRM gives the worst performance of interference reading of RRM in the BSs. It is not an accurate illustration of the authentic downlink interference [22].

Table 1. User Sum Rate w.r.t No of users

No of Users	Sum Rate - 3BSs	Sum Rate - 6BSs	Sum Rate - 10BSs	Sum Rate- 15BSs	Sum Rate- 20Bss
10	83	68	51	40	28
12	79	63	48	38	25
14	77	57	44	35	22
16	73	54	38	32	19
18	70	51	35	30	16
20	68	48	32	27	14
22	66	45	28	25	12
24	63	38	25	22	8
26	61	33	24	17	6
28	58	28	22	14	4
30	53	22	18	10	2

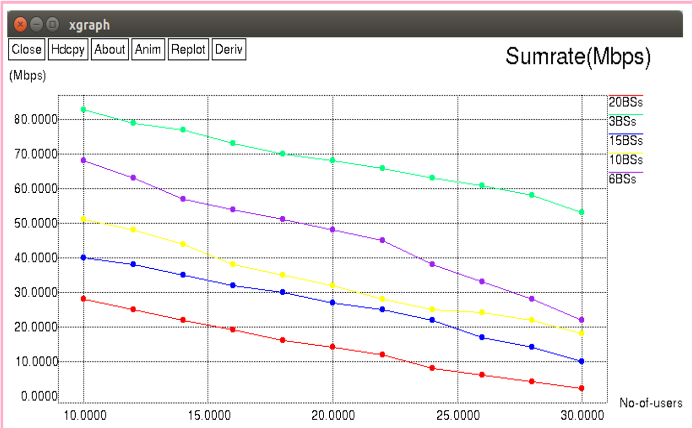

Figure 2. User Sum Rate Presentation

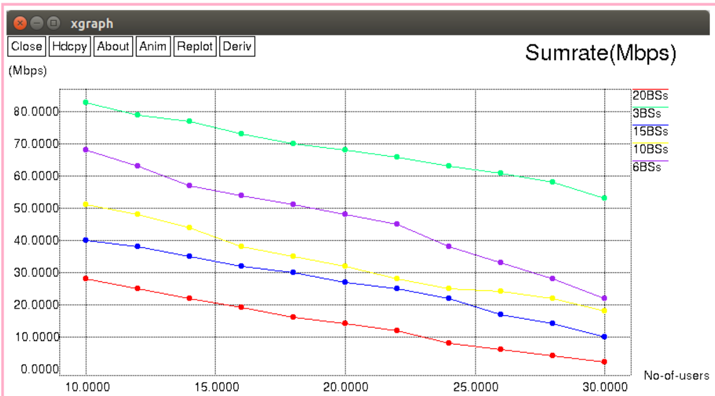

Figure 3. Performance for Threshold Sum Rate

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Table 2. Indoor Sum Rate

Sr. No.	Building Distance	Basic CGSONRRM	Dynamic CGSONRRM	Full spectrum utilization	Moc based SONRRM	QOCRRM	Self organization RRM
		Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)
1	400	20	38	35	35	65	45
2	500	22	39	36	36	66	46
3	600	24	40	37	37	67	47
4	700	25	41	38	38	68	48
5	800	26	42	39	39	69	49
6	900	27	43	40	40	70	50
7	1000	28	44	41	41	71	51
8	1100	29	45	42	42	72	52
9	1200	30	46	43	43	73	53
10	1300	31	47	44	44	74	54
11	1400	32	48	45	45	75	55
12	1500	33	49	46	46	76	56

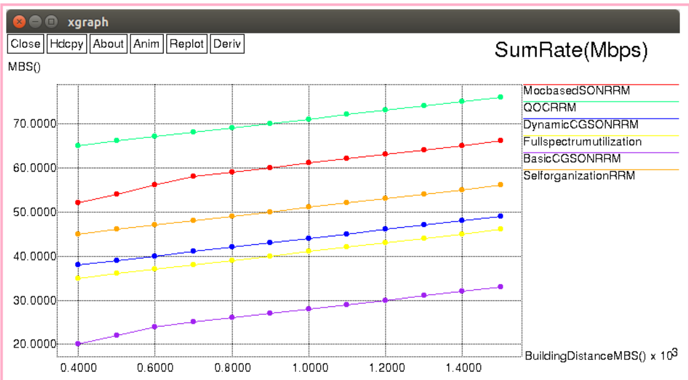

Figure 4. Indoor Sum rate

The figure 4 depicts the presentation of the summation rate with diverse internal users for the indoor case. The performance shows that through this we can get the best sum-rate comparison. When building distance MBS get increased the macro base stations are utmost in the proposed work. Hence, we can say that the proposed gives an incremented 12% performance in contrast with the existing work.

Table 3. Outdoor Sum Rate

Sr. No.	Building Distance	Basic CGSONRRM	Dynamic CGSONRRM~	Full Spectrum Utilization	Moc Based SONRRM	QOCRRM	Self Organization RRM
		Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)	Sum Rate (MBS)
1	400	4	5	6	14	25	7
2	500	3	4	5	13	24	6
3	600	2	3	4	12	23	5
4	700	1	2	3	11	22	4

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5	800	0.9	1	2	10	21	3
6	900	0.8	0.9	1	9	20	2
7	1000	0.7	0.8	0.9	8	19	1
8	1100	0.6	0.7	0.8	7	18	0.9
9	1200	0.5	0.6	0.7	6	17	0.8
10	1300	0.4	0.5	0.6	5	16	0.7
11	1400	0.3	0.4	0.5	4	15	0.6
12	1500	0.3	0.3	0.4	3	14	0.5

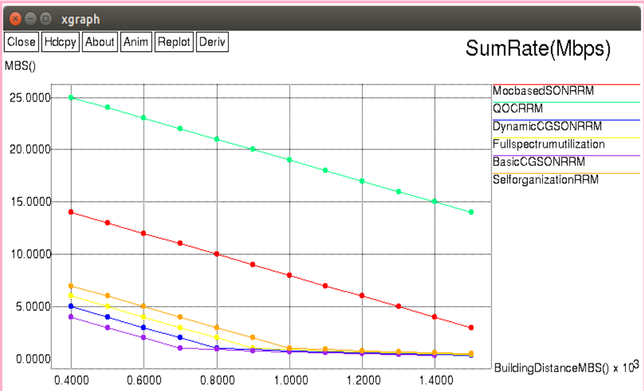

Figure 5. Outdoor presentation for Sum Rate

Hence, by seeing the figure 5 we can say that the building distance MBSs get increased the macro base stations are best in our proposed outdoor sum rate. The resulting outcome shows that the proposed work gives a 17% improved performance in comparison with the existing work.

3.4.2 QOC-RRM performance using Guaranteed rate:

Figure 6th shows that significant guaranteed rate improvement for users is given by the proposed method. Hence, we can say through the figure that the proposed technique can offer at slightest 50% QoS improvement compared to the existing works by users guaranteed rate [23].

Table 4. Guaranted Rate w.r.t Threshold

Sr. No.	Threshold (dB) / Guaranteed Rate (kbps)	4BSs	6BSs	11BSs	15BSs
1	10	410	410	310	210
2	12	444	418	318	218

3	14	467	429	329	229
4	16	480	431	331	231
5	18	493	436	336	236
6	20	523	438	338	238
7	22	559	480	380	280
8	24	580	484	384	284
9	26	597	488	388	288
10	28	625	500	400	300
11	30	640	540	440	360

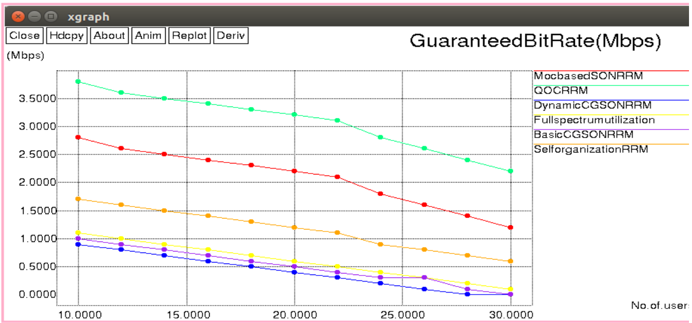

Figure 6. Guaranteed Rate Performance Comparison

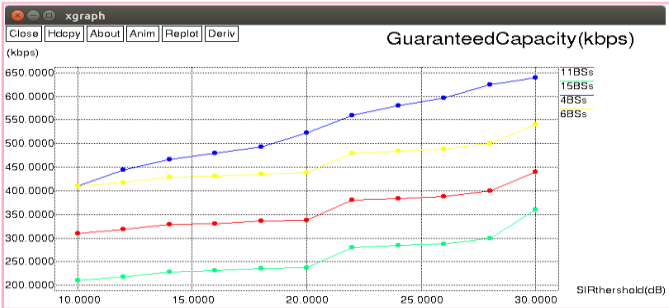

Figure 7. Threshold Guaranteed Rate

Table 5. Performance of Sum Rate w.r.t no. of Users

Sr. No.	Threshold (dB) / Sum Rate (kbps)	3BSs	6BSs	11BSs	15BSs	20BSs
1	10	83	68	51	40	28
2	12	79	63	48	38	25

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3	14	77	57	44	35	22
4	16	73	54	38	32	19
5	18	70	51	35	30	16
6	20	68	48	32	27	14
7	22	66	45	28	25	12
8	24	63	38	25	22	8
9	26	61	33	24	17	6
10	28	58	28	22	14	4
11	30	53	22	18	10	2

Figure 7 shows a threshold presentation for the guaranteed rate that has the most excellent performance compared with the dissimilar station for the sinks. While there is no increment in the consumer number the kbps are at its utmost rate in the proposed work. The projected threshold rate for guaranteed will use 15BSs that give the superlative result in contrast with the existing work.

Table 6. Indoor USERs-Bit Rate

Sr. No.	Building Distance	Basic CGSONRRM	Dynamic CGSONRRM	Full Spectrum Utilization	Mocbased SONRRM	QOC RRM	Selforganization RRM
		Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)
1	400	30	41	39	76	86	64
2	500	31	43	39	78	88	65
3	600	32	45	40	79	89	66
4	700	33	47	41	84	84	67
5	800	34	49	42	86	96	68
6	900	35	50	43	88	98	69
7	1000	36	53	44	90	99	71
8	1100	37	55	45	94	104	72
9	1200	38	57	46	98	120	74
10	1300	39	59	47	100	129	76
11	1400	40	60	48	110	130	77

12	1500	41	62	50	120	140	80

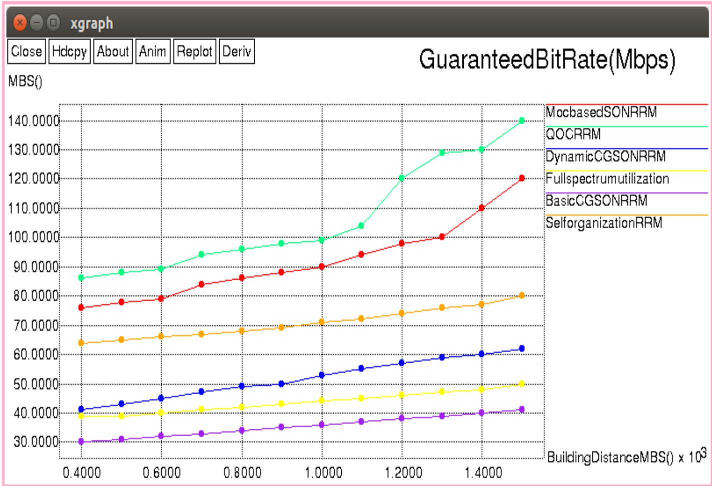

Figure 8. Indoor Guaranteed Rate

Figure 8 shows the Indoor performance of the guaranteed rate which gives the best sum rate compared with the different indoor users. When building distance MBS get increased the macro base stations are maximum in our proposed indoor sum rate. Our proposed indoor sum rate compared with other existing systems 10% improved in our performance.

Figure 9 presents the performance for the outdoor rate that gives the superlative outcome in contrast with dissimilar users for outdoor techniques. When building distance MBSs get increased the macro base stations are best in the proposed outdoor guaranteed method. The projected outdoor guaranteed in comparison with other existing systems 15% improved in our performance.

Table 7. Outdoors Bit Rate

Sr. No.	Building Distance	Basic CGSONRRM	Dynamic CGSONRRM~	Full Spectrum Utilization	Moc Based SONRRM	QOC RRM	Self Organization RRM
		Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)	Bit Rate (MBS)

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1	400	151	150	140	158	168	154
2	500	153	152	138	161	169	158
3	600	155	153	130	165	170	165
4	700	160	154	126	171	171	167
5	800	165	156	121	176	172	168
6	900	170	164	118	180	169	169
7	1000	143	168	110	174	168	171
8	1100	145	160	108	170	167	164
9	1200	147	154	106	165	166	158
10	1300	138	153	97	160	170	154
11	1400	132	152	94	151	174	152
12	1500	130	151	90	149	178	150

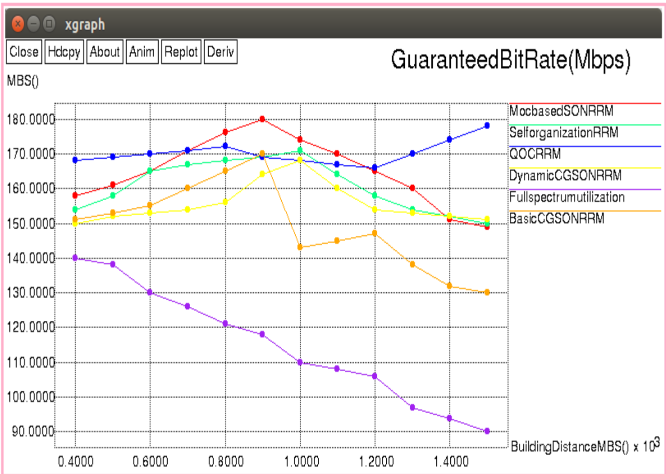

Figure 9. Performance of outdoor Guaranteed rate

CONCLUSION

The proposed work implements an LTE network through QoS along with radio resource management. In this case, the QOC-RRM method is used for QoS. Furthermore, the hybrid RDNN method for making a difference for the operators through precedence based on the numerous constraints with allocated resource controlling through the sink. The CWO algorithms are projected and analyzed with other chaotic weed optimization for queuing principle with the routing process to share the information data. Hence, after receiving the data the sink, based on priority, schedules the priority of the users for the available resources on first come first serve bases. Furthermore, we can say through the outcomes, our proposed work outperforms with 10% better results in comparison with the existing exertion. The projected work is implemented on NS3 and it gives 50% improvement as compared to the obtainable method.

In the future, the proposed QOC-RRM scheme can be used for different applications like in intrusion detection systems in military applications.

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