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Trend Analyses of Critical Values Obtained for Maximum Fairness Proportion Achievable in Ubicomp MANETs Using Location-Aware Transmission Strategies.

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Abstract – **Momentous research is on the way for the fields of location-tracking, ubicomp functionalities and MANET transmission strategies [1-55]. Attempts for their merging are presently not yielding so commendable output yet. One factor over which such merging depends on is correct protocol design approaches, which is presently considered as heuristic and insufficiently adapted for implementation [93]. Progresses in middleware services and ubicomp network architecture are also awaited [94, 95].**

A perspicaciously defined objective along such vision for ubicomp advancement is to attain "realism" in design and evaluation of wireless routing protocols [96]. Such studies may generate technical constituents for further studies of predictability in ubicomp. Such constituents are of utmost importance since "realism" will propagate into every aspect of ubicomp. One such particular aspect was studied previously [24] to assess the trend of Maximum Fairness Proportion (Max_FP) observable for CBRs under different sets of node densities in ubicomp environments. This study was strengthened by the study of Max_FP parameter of equations [40].

To put up "realism" in knowledge of these trends, in this paper, the next study required is stated as: "What are the observable critical values in Max_FP trends over varying node densities and trends of such critical values?" Following these fine-tunings, the design of more realistic ubicomp scenarios will entail. These are esteemed to be more commodious for sustained testing of experimental middleware components and communication protocols. This study is a follow-up of previous research [1-55].

Key terms: Ubicomp- Ubiquitous Computing, MAUC-Mobile and Ubiquitous Computing, Max_FP- Maximum Fairness Proportion, CBR- Constant Bit Rate, MANET-Mobile Adhoc Network, CV- Critical Value.

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1. Introduction

Some of the future ubicomp environments are projected to be impecuniously equipped with networking devices and hence the circumstantial solution would be the use of MANETs. In MANETs, the task of transmission is repartitioned among well-behaving nodes leading to energy consumption being repartitioned. In such resulting situations, the notions of Fairness must be well understood. One such notion is from the viewpoint of metrics, one of which is Max_FP, studied in previous paper [24] for node densities varying between 7 until 56. The trend observed was split into two with respect to a peak value observed.

- Previous to a peak value, the linear tendency is observed of form:
  $$F(x) = d * x + f$$
- From the peak value onwards, the decreasing exponential trend is observed of form:
  $$G(x) = a * \exp(b * (x - k)) + c$$

A follow-up study [40] was conducted to mathematically model the six parameters observed above. Results obtained will plausibly serve towards better understanding of the evolution and predictability of ubicomp environments. These progresses, though sluggishly occurring, will facilitate designers in preparing more realistic simulation scenarios using which testing manoeuvres can be undertaken over experimental components for middleware and communication protocols.

The investigation now required for metric Max_FP is the identification of observable critical values obtained during experiments execution and formulation of corresponding theoretical trend of such CVs over varying node densities. Six such CVs were observed.

The key contribution of this paper is the mathematical formulation of the trends of variations for each of the six CVs observed for metric Max_FP illustrated before [24, 40] over node numbers ranging from 7 until 56. Such kinds of information should inescapably be delivered in the right form to constructively assist ubicomp designers to understand the evolution and predictability of ubicomp behaviour and be appropriately sustained to carry credulous simulation scenarios over which new communication protocol features could be tested. The rest of this paper is organised as follows: section 2- Max_FP Critical Values, section 3- Critical Values Trend Analyses-Metric Max_FP, section 4- Conclusion and References.

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2. Max_FP Critical Values.

2.0 Critical Values Identified.

Six CVs were identified as follows: Column headings are: C1→Max_FP CV, C2→Meaning of Max_FP CV, C3→Corresponding figure number for Max_FP CV.

C1	C2	C3
1	Minimum value of max_FP	1
2	Maximum value of max_FP	2
3	Range of Max_FP	3
4	Modal value of Max_FP	4
5	% CBR at modal value of Max_FP	5
6	% CBR before modal value of Max_FP	6

Table 1: Max_FP Critical Values

2.1 Experimental Critical Values Obtained.

The values obtained during experiments have been summarised below. Values have been rounded to a maximum of 9 decimal places. Column heading NN → Node Number.

NN	CV1	CV2	CV3	CV4	CV5	CV6
7	1.3	7.0	5.7	1.8	8.587301587	15.968253968
8	1.5	8.0	6.5	2.1	7.226997771	19.675262655
9	1.5	9.0	7.5	2.1	6.698412698	20.634920635
10	1.3	10.0	8.7	2.0	6.634920635	13.746031746
11	1.4	11.0	9.6	2.0	5.714285714	14.444444444
12	1.4	12.0	10.6	2.2	6.200317965	24.753577107
13	1.4	13.0	11.6	2.2	5.507936508	22.444444444
14	1.5	14.0	12.5	2.6	5.619047619	40.206349206
15	1.6	15.0	13.4	2.4	5.825396825	28.222222222
16	1.5	16.0	14.5	2.5	5.444444444	31.396825397
17	1.5	17.0	15.5	2.6	5.603174603	34.412698413
18	1.6	18.0	16.4	2.5	5.682539683	28.031746032
19	1.5	19.0	17.5	2.2	5.063492063	14.761904762
20	1.6	20.0	18.4	2.6	4.936507937	30.174603175
21	1.5	21.0	19.5	2.6	4.952380952	29.603174603
22	1.5	22.0	20.5	2.4	4.809523810	18.714285714
23	1.5	23.0	21.5	2.6	4.555555556	24.682539683
24	1.5	24.0	22.5	2.9	4.968253968	35.396825397
25	1.6	25.0	23.4	2.7	4.873015873	26.476190476
26	1.5	26.0	24.5	3.0	4.555555556	40.349206349
27	1.7	27.0	25.3	2.4	4.761904762	14.285714286
28	1.6	28.0	26.4	2.5	4.492063492	18.634920635
29	1.6	29.0	27.4	2.8	5.730158730	28.238095238
30	1.7	30.0	28.3	2.7	4.365079365	24.047619048
31	1.7	31.0	29.3	3.2	4.396825397	41.904761905
32	1.7	32.0	30.3	2.4	4.650793651	10.476190476
33	1.7	33.0	31.3	3.0	4.206349206	31.666666667
34	1.6	34.0	32.4	2.7	4.349206349	19.412698413
35	1.6	35.0	33.4	3.1	4.539682540	33.317460317
36	1.6	36.0	34.4	2.8	3.952380952	20.476190476
37	1.7	37.0	35.3	3.2	4.699158597	33.275123035
38	1.7	38.0	36.3	3.2	4.000000000	32.428571429
39	1.7	39.0	37.3	2.6	3.825396825	11.984126984
40	1.6	40.0	38.4	3.1	4.444444444	28.698412698
41	1.8	41.0	39.2	3.0	4.079365079	24.174603175
42	1.7	42.0	40.3	2.8	4.222222222	16.317460317
43	1.7	43.0	41.3	3.6	4.000000000	45.285714286
44	1.7	44.0	42.3	3.0	4.510800508	23.395806861
45	1.8	45.0	43.2	2.9	4.365079365	18.095238095
46	1.7	46.0	44.3	3.2	4.523809524	29.841269841
47	1.7	47.0	45.3	2.8	3.777777778	15.952380952
48	1.7	48.0	46.3	2.7	3.809523810	11.222222222
49	1.7	49.0	47.3	3.2	4.301587302	27.158730159
50	1.7	50.0	48.3	3.5	3.857142857	32.730158730
51	1.7	51.0	49.3	3.2	4.174603175	22.015873016
52	1.8	52.0	50.2	3.5	4.126984127	32.380952381
53	2.0	53.0	51.0	3.1	3.952380952	17.777777778
54	1.8	54.0	52.2	3.2	4.619047619	20.777777778
55	1.7	55.0	53.3	3.4	3.888888889	27.460317460
56	1.8	56.0	54.2	3.7	3.888888889	36.190476190

Table 2: Experimental Critical Values Obtained

3. Critical Values Trend Analyses- Metric Max_FP.

3.0 General Procedure Adopted.

The initial step is to plot the tabulated data for each Max_FP CV on gnuplot. The successive step is to undertake graphical analyses and report the general observations. As the third step, the applicability of some selected equations of fit is explored. Choice of best fit is made considering values of least reduced chi-square and best extendability produced at node numbers 80, 100 and 120 for all CVs. In the fourth step, the values of parameters for each Max_FP CV equation is recorded.

3.1 Trend Analysis – Max_FP CV1.

Here, some staircase feature is observed. Generally, the smooth bezier depicts an increasing linear trend.

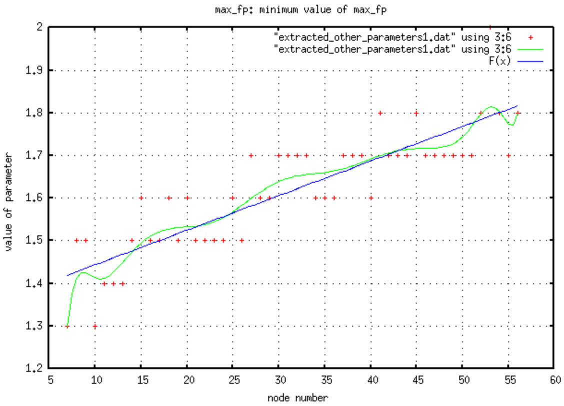

Figure 1: Max_FP Critical Value 1

`F(x) = d * x + f`

Ch_sq = 0.005 184 85 F(80) = 2.011 356 542

F(100) = 2.173 565 426 F(120) = 2.335 774 309

Parameters of fit are: d = 0.008 110 44 , f = 1.362 52 .

Here a tolerance of ±1 may be applied.

3.2 Trend Analysis – Max_FP CV2.

A very clean linear increase is depicted. A maximum value of Max_fp is exactly equal to node number.

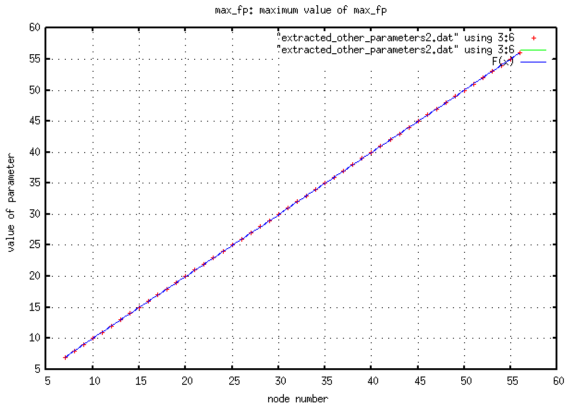

Figure 2: Max_FP Critical Value 2

F(x) = x

Sum square residuals = 0 F(80) = 80.0
F(100) = 100.0 F(120) = 120.0

3.3 Trend Analysis – Max_FP CV3.

Here, a clean linear increase is depicted. Range of Max_fp is proportional to node number.

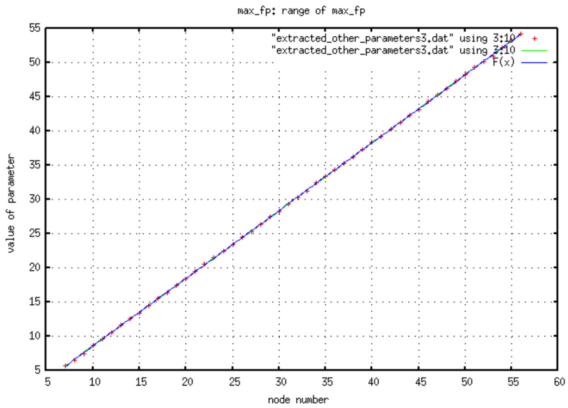

Figure 3: Max_FP Critical Value 3

F(x) = d * x + f

Ch_sq = 0.005 184 85 F(80) = 77.988 643 457
F(100) = 97.826 434 573 F(120) = 117.664 225 690
The parameters of fit are: d = 0.991 89 , f = -1.362 52

3.4 Trend Analysis – Max_FP CV4.

The plots are quite scattered. Mostly an increasing tendency at a decreasing rate is observed.
The potentially applicable equations are:

1. F(x) = d * x + f
   Ch_sq = 0.055 603 9 F(80) = 4.043 226 890
   F(100)= 4.568 268 907 F(120)= 5.093 310 924
2. F(x) = a * log ((b*x)+c) + d
   Ch_sq = 0.054 717 8 F(80) = 3.599 308 503
   F(100)= 3.794 151 908 F(120)= 3.955 980 267

Choice of best fit for Max_FP Critical Value 4

The equation in part 2 above has been selected because of smallest ch_sq and good extendability.
The parameters obtained for best fit are:
a = 0.957 794, b = 0.169 014, c = 1.462 49, d = 1.006 6

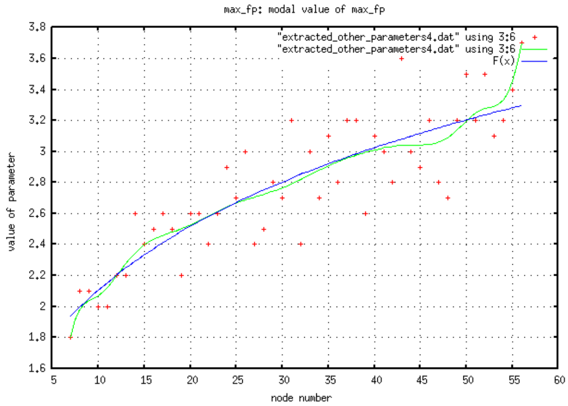

Figure 4: Max_FP Critical Value 4

3.5 Trend Analysis – Max_FP CV5.

Mostly a decreasing curve at decreasing rate is found.

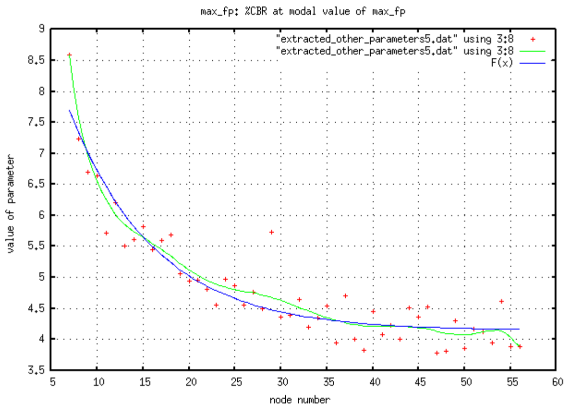

Figure 5: Max_FP Critical Value 5

F(x) = a / exp ((b * x) + c) + d

Ch_sq = 0.124 005 F(80) = 4.143 979 844
F(100)= 4.142 707 191 F(120)= 4.142 557 368

The parameters obtained for best fit are:
a = 2.136 65, b = 0.106 97, c = -1.256 97 , d = 4.142 54
A tolerance of ±0.4 is suggested here.

3.6 Trend Analysis – Max_FP CV6.

The plots are very scattered here. Mostly a mildly decreasing tendency is observed.

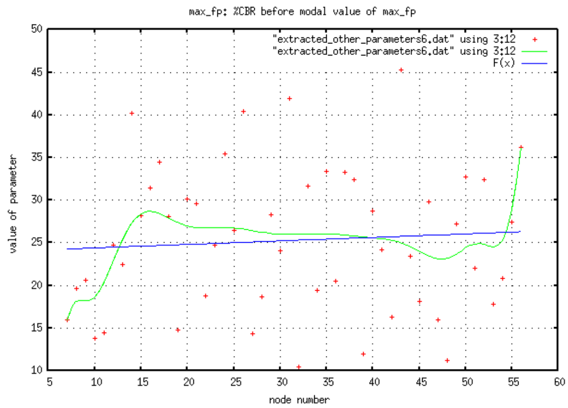

Figure 6: Max_FP Critical Value 6

F(x) = d * x + f

Ch_sq = 74.338 4 F(80) = 27.275 083 680
F(100)= 28.100 117 949 F(120)= 28.925 152 218

The parameters obtained for best fit are:
d = 0.041 251 7 , f = 23.974 9

4. Conclusion.

The aim of this investigation was to identify the prominent CVs observable for metric Max_FP and analyse their corresponding trends over varying node densities in a MANET topography of 300 x 300 m^2. The models described in this paper, are composed of mathematical equations of varying complexity. The output detailed here will add to the set of existing tools for more expert studies of MANETs for ubicomp environments viewed from software engineering. These output can meticulously be implemented in computational algorithms to develop better simulation scenarios which may, in turn, serve for enabling better testing procedures over communication and middleware components.

This experiment was undertaken in NS-2 over Linux. Plottings and "Fit" attempts were done with gnuplot software. Selection of best fit was made using least reduced chi-square and best extendability produced at higher node numbers. Assumptions mentioned in earlier papers [24, 40] are maintained here also.

This study stands as a follow-up of prior studies [1-55]. Upgrades to these results are possible in the future. A possible future work remain the formulation of predictability for metric Max_FP and its trend.

References

[1] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Towards Dependable Pervasive Systems-A Position and Vision Paper, CEET 2014

[2] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Energy Savings achievable with Location-aware Node-to-Node Transmission in UbiComp , CEET 2014

[3] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Energy Savings achievable with Location-aware Node-to-Node Transmission in UbiComp Using Location Refresh Intervals, CEET 2014

[4] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Energy Savings achievable with Location-aware Transmission in UbiComp Using Relays, CEET 2014

[5] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Mathematical modeling of need of exact number of relays to ensure seamless mobility in mobile computing, CEET 2014

[6] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Modelling of need for multiple relays for ensuring seamless mobility, CEET 2014

[7] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Investigation of prominence of placements of relays in a ubicomp topography,

[8] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of energy savings achievable with location-aware transmission in ubicomp using optimised number of relays.

[9] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Investigation of Prominence of Placements of Optimised Number of Relays in a Ubicomp Topography using Location-Aware Transmission, CEET 2015.

[10] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Extending Node Battery Availability in Ubicomp with Location-Aware Transmission, CEET 2015.

[11] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Extending Node Battery Availability in Ubicomp with Location-Aware Transmission using Location Refresh Intervals, CEET 2015.

[12] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Extending Node Battery Availability in Ubicomp with Location-Aware Transmission using Uniformly Placed Relays, CEET 2015.

[13] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Extending Node Battery Availability in Ubicomp with Location-Aware Transmission Using Optimally Placed Relays, CEET 2015.

[14] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Sender Node Energy Savings Achievable with Location-Aware MANET Transmission in Ubicomp. ACCN 2016

[15] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Overall Node Energy Savings Achievable with Location-Aware MANET Transmission in Ubicomp. ACCN 2016

[16] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Sender Node Extra Energy Savings Achievable in MANET Against Direct Node-to-Node Transmission Using Location-Aware Transmission in Ubicomp. ACCN 2016

[17] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Overall Node Extra Energy Savings Achievable in MANET against Direct Node-to-Node Transmission Using Location-Aware Transmission in Ubicomp. ACCN 2016

[18] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Energy Consumption Ratio Achievable in MANET Using Location-Aware Transmission in Ubicomp. ACCN 2016

[19] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Minimum Energy Consumption Ratio Achievable in MANET Using Location-Aware Transmission in Ubicomp. ACCN 2016

[20] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Maximum Energy Consumption Ratio Achievable in MANET Using Location-Aware Transmission in Ubicomp. ACCN 2016

[21] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Overall Energy Consumption Fairness Ratio Achievable in MANET Using Location-Aware Transmission in Ubicomp. ACCN 2016

[22] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Overall Energy Consumption Fairness Proportion Achievable in MANET Using Location-Aware Transmission for Ubicomp, CEET 2016

[23] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Minimum Fairness Proportion Achievable in MANET Using Location-Aware Transmission for Ubicomp, CEET 2016

[24] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Maximum Fairness Proportion Achievable in MANET Using Location-Aware Transmission for Ubicomp, CEET 2016

[25] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Sender Fairness Proportion Achievable in MANET Using Location-Aware Transmission for Ubicomp, CEET 2016

[26] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Distance Travelled by packets in MANETs using Location-Aware Transmission for Ubicomp, CEET 2016

[27] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Maximum CBR Distance Travelled by packets in MANETs using Location-Aware Transmission for Ubicomp, CEET 2016

[28] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Minimum CBR Distance Travelled by packets in MANETs using Location-Aware Transmission for Ubicomp, CEET 2016

[29] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Model of Range CBR Distance Experienced by Transmissions in MANETs using Location-Aware Transmission for Ubicomp, CEET 2016

[30] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Sender Node Energy Savings Achievable in ubicomp MANETs using Location-Aware Transmission, ACCN 2017.

[31] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Overall Node Energy Savings Achievable in ubicomp MANETs using Location-Aware Transmission, ACCN 2017.

[32] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Sender Node Extra Energy Savings Achievable in MANET against Direct Node-to-Node Location-Aware Transmission, ACCN 2017.

[33] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Overall Nodes Extra Energy Savings Achievable in MANET against Direct Node-to-Node Location-Aware Transmission, ACCN 2017.

[34] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Energy Consumption Ratio Achievable in Ubicomp MANET Using Location-Aware Transmission, ACCN 2017.

[35] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Minimum Energy Consumption Ratio Achievable in Ubicomp MANETs Using Location-Aware Transmission, ACCN 2017.

[36] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Maximum Energy Consumption Ratio Achievable in Ubicomp MANETs Using Location-Aware Transmission, ACCN 2017.

[37] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Overall Fairness Ratio Achievable in Ubicomp MANETs Using Location-Aware Transmission, ACCN 2017.

[38] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Energy Consumption Fairness Proportion Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[39] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Minimum Fairness Proportion Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[40] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Maximum Fairness Proportion Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[41] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Sender Fairness Proportion Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[42] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Packets Per Distance Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[43] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Maximum CBR Distance Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[44] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Minimum CBR Distance Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[45] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Parameters of Equations for Range CBR Distance Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[46] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Sender Node Energy Savings Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[47] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Overall Node Energy Savings Achievable in Ubicomp MANETs Using Location-Aware Transmission, CEET 2017

[48] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Sender Node Extra Energy Savings Achievable in Ubicomp MANET Against Direct Node-to-Node Location-Aware Transmission, CEET 2017

[49] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Overall Nodes Extra Energy Savings Achievable in Ubicomp MANET Against Direct Node-to-Node Location-Aware Transmission, CEET 2017

[50] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Energy Consumption Ratio Achievable in Ubicomp MANETs Using Location-Aware Transmission Strategies, CEET 2017

[51] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Minimum Energy Consumption Ratio Achievable in Ubicomp MANETs Using Location-Aware Transmission Strategies, CEET 2017

[52] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Maximum Energy Consumption Ratio Achievable in Ubicomp MANETs Using Location-Aware Transmission Strategies, CEET 2017

[53] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Overall Fairness Ratio Achievable in Ubicomp MANETs Using Location-Aware Transmission Strategies, CEET 2017

[54] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Energy Consumption Fairness Proportion Achievable in Ubicomp MANETs Using Location-Aware Transmission Strategies, ACCN 2017.

[55] M. Kaleem GALAMALI, Assoc. Prof Nawaz MOHAMUDALLY, Trend Analyses of Critical Values Obtained for Minimum Fairness Proportion Achievable in Ubicomp MANETs Using Location-Aware Transmission Strategies, ACCN 2017.

[56] Markus Bylund and Zary Segall, Towards seamless mobility with personal servers, 2004.

[57] Masugi Inoue, Mikio Hasegawa, Nobuo Ryoki and Hiroyuki Morikawa, Context-Based Seamless Network and Application Control, 2004

[58] Xiang Song, Umakishore Ramachandran, MobiGo: A Middleware for Seamless Mobility, College of Computing Georgia Institute of Technology, Atlanta, GA, USA, August 2007

[59] Budzisz, Ferrús, R., Brunstrom A., Grinnemo, K, Fracchia, R., Galante, G., and Casadevall, F. Towards transport-layer mobility: Evolution of SCTP multihoming, March 2008

[60] Paul Dourish & Genevieve Bell, Divining a digital future, 2011.

[61] Xiang Song, Seamless Mobility In Ubiquitous Computing Environments, PhD Thesis, Georgia Institute of Technology, August 2008

[62] Kevin O Mahony, Jian Liang, Kieran Delaney, User-Centric Personalization and Autonomous Reconfiguration Across Ubiquitous Computing Environments, NIMBUS Centre Cork Institute of Technology, Cork, Ireland, UBICOMM 2012

[63] Pablo Vidales, Seamless mobility in 4G systems, *Technical Report*, *University of Cambridge*, Computer Laboratory, Number 656, November 2005

[64] João Pedro Sousa and David Garlan, Aura: An Architectural

Framework for User Mobility in Ubiquitous Computing Environments, School of Computer Science, Carnegie Mellon University, USA, *August 2002*

[65] Dennis Lupiana, Ciaran O'Driscoll, Fredrick Mtenzi, Defining Smart Space in the Context of Ubiquitous Computing, Dublin Institute of Technology, Ireland, Special Issue on ICIT 2009 Conference - Web and Agent Systems, 2009

[66] N.S.V.Shet1, Prof.K.Chandrasekaran2 and Prof. K.C.Shet3, *WAP Based Seamless Roaming In Urban Environment with Wise Handoff Technique*, International Journal of UbiComp (IJU), Vol.1, No.4, October 2010

[67] Yipeng Yu Dan He Weidong Hua Shijian Li Yu Qi Yueming Wang Gang Pan, FlyingBuddy2: A Brain-controlled Assistant for the Handicapped, Zhejiang University, *UbiComp'12,* September 5-8, 2012.

[68] Jing Su, James Scott, Pan Hui, Jon Crowcroft, Eyal de Lara Christophe Diot, Ashvin Goel, Meng How Lim, and Eben Upton, Haggle: Seamless Networking for Mobile Applications, 2007

[69] Rui Han, Moustafa M. Ghanem, Li Guo, Yike Guo∗, Michelle Osmond, Enabling cost-aware and adaptive elasticity of multi-tier cloud applications, Future Generation Computer Systems, 2012

[70] Byrav Ramamurthy, K. K. Ramakrishnan , Rakesh K. Sinha, Cost and Reliability Considerations in Designing the Next-Generation IP over WDM Backbone Networks, 2012.

[71] Bhavish Aggarwal, Aditya Akella, Ashok Anand, Athula Balachandran, Pushkar Chitnis, Chitra Muthukrishnan, Ram Ramjee and George Varghese, EndRE: An End-System Redundancy Elimination Service for Enterprises, NSDI 2010, San Jose, CA

[72] Ashok Anand, Vyas Sekar and Aditya Akella, SmartRE: An Architecture for Coordinated Network-wide Redundancy Elimination, SIGCOMM 2009, Barcelona, Spain

[73] John Breeden II, "Smart-phone battery life could double – without better batteries", Nov 14, 2012

[74] Andy Boxall, "When will your phone battery last as long as your kindle", December 5, 2012.

[75] Imielinski, T. and Navas, J.C. (1999). GPS-based geographic addressing, routing, and resource discovery. *Comms. ACM*, Vol. 42, No. 4, pp. 86-92.

[76] Hightower, J. and Borriello, G. (2001). Location Systems for Ubiquitous Computing. *IEEE Computer*, Vol. 34, No. 8, August, pp. 57-66.

[77] Harter, A., Hopper, A., Steggles, P., Ward, A. and Webster, P. (2002). The Anatomy of a Context-Aware Application. Wireless Networks, Vol. 8, No. 2-3, Mar-May, pp. 187-197.

[78] Hightower, J., Brumitt, B. and Borriello, G. (2002). The Location Stack: A Layered Model for Location in Ubiquitous Computing. *Proceedings of the 4th IEEE Workshop on Mobile Computing Systems & Applications (WMCSA 2002)*, Callicoon, NY, USA, June, pp. 22-28.

[79] Graumann, D., Lara, W., Hightower, J. and Borriello, G. (2003). Real-world implementation of the Location Stack: The Universal Location Framework. *Proceedings of the 5th IEEE Workshop on Mobile Computing Systems & Applications (WMCSA 2003)*, Monterey, CA, USA, October, pp. 122-128.

[80] Ko, Y., & Vaidya, N. H. (2000). Location-aided routing (LAR) in mobile ad hoc networks. *Wireless Networks*, *6*(4), 307-321.

[81] Liao, W.-H., Tseng, Y.-C., & Sheu, J.-P. (2001). GRID: a fully location-aware routing protocol for mobile ad hoc networks. *Telecommunication Systems*, *18*(1), 37-60.

[82] Kuhn, F., Wattenhofer, R., Zhang, Y., & Zollinger, A. (2003). Geometric ad-hoc routing: of theory and practice. In *Proceedings of the ACM (PODC'03)* (pp. 63-72).

[83] Jiang, X., & Camp, T. (2002). Review of geocasting protocols for a mobile ad hoc network. In Proceedings of the *Grace Hopper Celebration (GHC)*.

[84] Ko, Y. & Vaidya, N. H. (1999). Geocasting in mobile ad hoc networks: location-based multicast algorithms. In *Proceedings of the IEEE (WMCSA'99)* (pp. 101).

[85] Mauve, M., Fuler, H., Widmer, J., & Lang, T. (2003). *Position-based multicast routing for mobile ad-hoc networks* (Technical Report TR-03-004). Department of Computer Science, University of Mannheim.

[86] Xu, Y., Heidemann, J., & Estrin, D. (2001). Geography-informed energy conservation for adhoc routing. In *Proceedings of the ACM/IEEE (MOBICOM'01)* (pp. 70-84).

[87] Hu, Y.-C., Perrig, A., & Johnson, D. (2003). Packet leashes: a defense against wormhole attacks in wireless ad hoc networks. In *Proceedings of the INFOCOM' 03* (pp. 1976-1986).

[88] Patwari, N., Hero III, A. O., Perkins, M., Correal, N. S., & O'Dea, R. J. (2003). Relative location estimation in wireless sensor networks. *IEEE Transactions on Signal Processing*, *51*(8), 2137-2148.

[89] Baldauf, M., Dustdar, S., & Rosenberg, F. (2007). A Survey on Context Aware Systems. *International Journal of Ad Hoc and Ubiquitous Computing*, Inderscience Publishers. forthcoming. Pre-print from: http://www.vitalab.tuwien.ac.at/~florian/papers/ijahuc2007.pdf

[90] Hong, D., Chiu, D.K.W., & Shen, V.Y. (2005). Requirements elicitation for the design of context-aware applications in a ubiquitous environment. In *Proceedings of ICEC'05* (pp. 590-596).

[91] Neeraj Tantubay, Dinesh Ratan Gautam and Mukesh Kumar Dhariwal, A Review of Power Conservation in Wireless Mobile Ad hoc Network (MANET)", International Journal of computer Science Issues, Vol 8, Issue 4, No 1, July 2011.

[92] Wenrui Zhao, Mostafa Ammar and Ellen Zegura, "A Message Ferrying Approach for Data Delivery in Sparse Mobile Ad Hoc Networks", *MobiHoc'04,* May 24–26, 2004, Roppongi, Japan.

[93] Sgroi et al., "Designing Wireless Protocols: Methodology and Applications, February 2000.

[94] Gyula et al., "Simulation-based optimization of communication protocols for large-scale wireless sensor networks", 10 October 2002

[95] Rao and Sharma, "Cross Layer Protocols For Multimedia Transmission in Wireless Networks", June 2012

[96] Herms et al, "Realism in Design and Evaluation of Wireless Routing Protocols", 2007.

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