

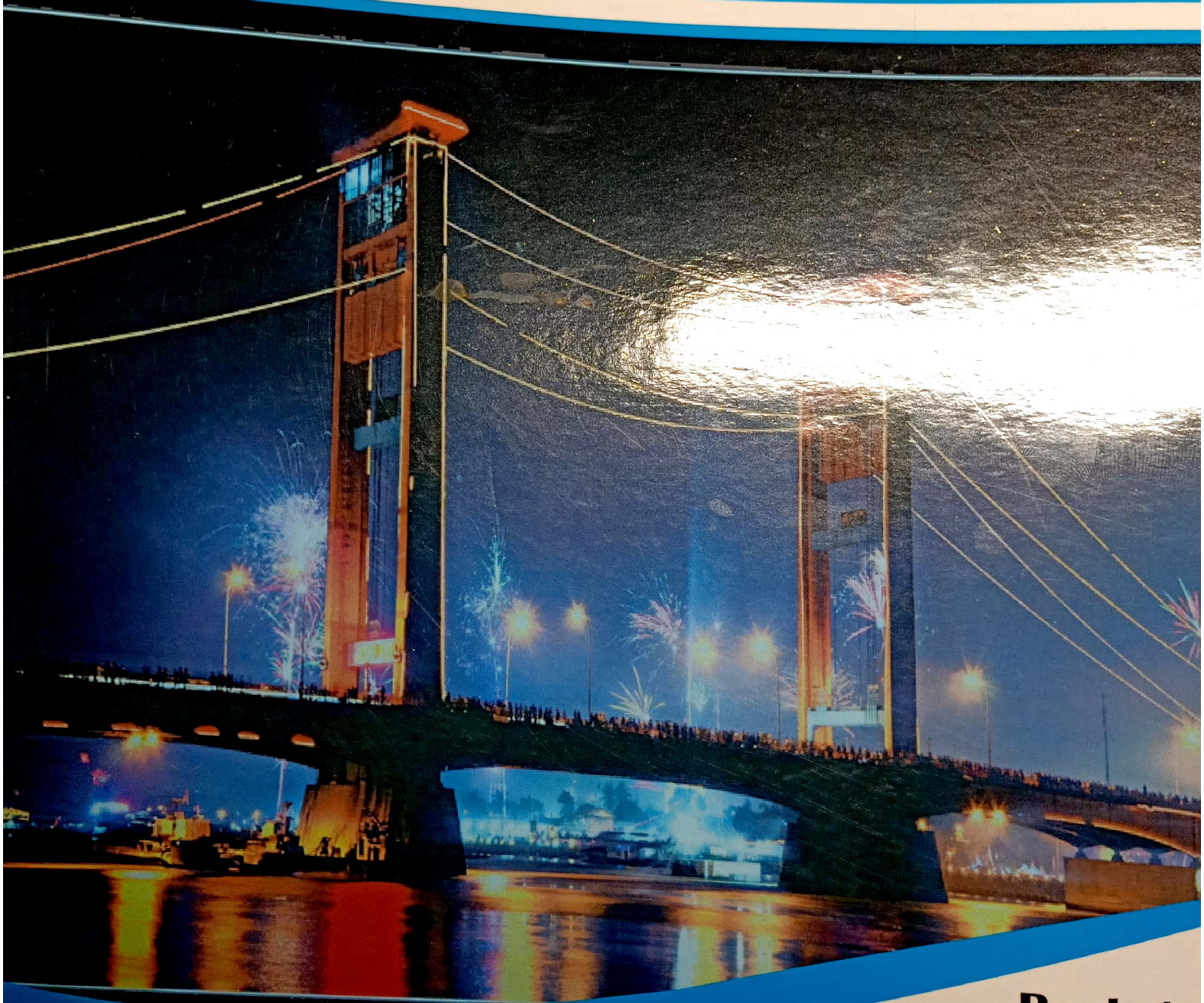
PROCEEDINGS

ISBN : 978-979-3877-25-9

5th ICI B A

2016

INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY & ENGINEERING APPLICATION



Book 1

In Cooperation with



PROGRAM PASCASARJANA



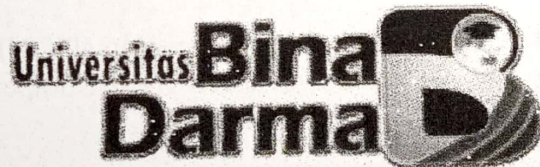
unisel
UNIVERSITI SELANGOR




PROCEEDING

INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY AND
ENGINEERING APPLICATION 2015

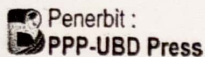
IT and Engineering for Better life



 Penerbit :
PPP-UBD Press

Published by:
Pusat Penerbitan dan Percetakan Universitas Bina Darma Press (PPP-UBD Press) Palembang

Published by:



CONFERENCE COMMITTEE

Muhammad Izman Herdiansyah, PhD, Universitas Bina Darma,
Indonesia
Erna Yuliwati, PhD, Universitas Bina Darma, Indonesia
Dr. Sunda Ariana, M.Pd., M.M. Universitas Bina Darma, Indonesia
Dr. Ahmad Syarifuddin, M.T., Universitas Bina Darma, Indonesia
Prof. Ahmad Fauzi Ismail. P.hD, Universiti Teknologi Malaysia.
Eric H Zhao, Institute & Multimedia Security Laboratory, Kyushu University
William Benton Wedeking, USA
Prof. Dr. Aizaini Maarof, Universiti Teknologi Malaysia.
Prof. Dr. Wan Nasir, Universiti Teknologi Malaysia.
Prof Dr. Eko Indrajit, Higher Education Association Information And
Computer Science (APTIKOM), Indonesia
Prof Zainal A Hasibuan, PhD, Higher Education Association Information
And Computer Science (APTIKOM), Indonesia
Dr. Paulus Sukpto, Ir., MBA, Universitas Katolik Parahyangan,
Indonesia
Dr. Ir. T. Ari Samadhi, Institut Teknologi Bandung, Indonesia.

REVIEWER & EDITOR

Leon Andretti Abdillah
Darius Antoni
Dedy Syamsuar
M. Izman Herdiansyah
Edi Surya Negara

Support by. Bina Darma University

Steering Committee ICIBA

Cover Design by. Deni Erlansyah

Printed in Palembang, Indonesia, Febuari 2016

INFORMATION TECHNOLOGY

- | | | |
|----|---|---------|
| 1. | Application of 36 Cell Zachman Framework for Integrated Spatial Planning Tax On Dinas Pendapatan Daerah Kota Palembang
Paisal, M. Izman Herdiansyah, Afriyudi | 1 - 5 |
| 2. | Design of Security Systems Cabin Car From Danger Gas CO (Carbon Monoxide) With SMS Gateway Information and Data Logger
Slamet Widodo, Ahyar Supani | 6 - 14 |
| 3. | Implementation Felder Silverman Learning Style Model for Content Support based on Ontology in Indonesia Learning Management System
Bernard R. Suteja | 15 - 21 |
| 4. | Steganography Application Bitwise Method of Encrypted Message with Vigenere Cipher
Nazori Agani, Charles Victor B. Saragih, Chris Simon | 22 - 31 |
| 5. | Vector Machine Learning Method for Text Mining Indonesian Social Media Named Entity Recognition
Agus Suryana, Sri Ipnuwati | 32 - 37 |
| 6. | Software Quality Assurance of Learning Game Using Deutsch and Willis Method
Jumdapiokta, Sunda Ariana, Alex Wijaya | 38 - 45 |
| 7. | Implementation Felder Silverman Learning Style Model for Content Support based on Ontology in Indonesia Learning Management System
Adelin, Muhammad Izman Herdiansyah, Afriyudi | 46 - 54 |
| 8. | Characteristics of Users Website Kopertis II Palembang
Eka Hartati, Lin Yan Syah, Linda Atika | 55 - 60 |
| 9. | Analysis of Factors Affecting the Use of Google Classroom to Support Lectures
Andri Wijaya | 61 - 68 |

- | | | |
|-----|---|-----------|
| 10. | Enterprise Architecture Planning Design of Information Systems Technology at PT Kreasi Utama Mandiri Using Zachman Framework
Surahmat, Bochari Rahman, Yesi Novaria Kunang | 69 - 73 |
| 11. | Determining The Quality of Lecturer using Fuzzy Simple Additive Weighting (SAW)
Satria Abadi, Sri Hartati, A. Humaidi | 74 - 79 |
| 12. | Application Location Based Service (LBS) Location Search Palembang Nature-Based Android
Intan Okta Sari, Leon Andretti Abdillah, Kiky Rizky Nova Wardhani | 80 - 85 |
| 13. | Extracted Social Network Mining
Mahyuddin K. M. Nasution | 86 - 91 |
| 14. | Information Systems Architecture Online Learning in School with the Zachman Framework
Hatta Wijaya, M. Izman Herdiansyah, A. Haidar Mirza | 92 - 98 |
| 15. | Improved Models of Wireless Pricing Scheme in Multiple Class QoS Networks by Determining the Base Price Value
Fitri Maya Puspita, Irmeilyana, Iffah Husniah | 99 - 104 |
| 16. | Diabetic Retinopathy Stages Classification Using 3D-GLCM
Rocky Yefrenes Dillak, Sri Andayani | 105 - 112 |
| 17. | Comparison Route Redistribution on Dynamic Routing Protocol (EIGRP into OSPF and EIGRP into IS-IS)
Chairul Mukmin, Darius Antoni, Edi Surya Negara | 113 - 119 |
| 18. | Nonlinear Programming Problem of Bandwidth Based and VolumeBased Call Pricing Scheme in Wireless Networks
Fitri Maya Puspita, Kamaruzzaman Seman, Bachok M. Taib, Ismail Abdullah | 120 - 126 |
| 19. | Survey Application for Telkomsel Customer Satisfaction
Lukman Sunardi, Nta Rosa Damayanti | 127 - 134 |
| 20. | Genetic Algorithms Method On Street Lighting Energy Saving
Jefri Lianda, Hikmatul Amri | 135 - 140 |
| 21. | The Implementation of Knowledge Management Systems in Assets Reconciliation
Meiliya Fitriyani, Leon Andretti Abdillah, Andri | 141 - 147 |

Improved Models of Wireless Pricing Scheme in Multiple Class QoS Networks by Determining the Base Price Value

Fitri Maya Puspita¹, Irmeilyana¹, Iffah Husniah¹

¹ Faculty of Mathematics and Natural Sciences, Sriwijaya University, Inderalaya, South Sumatera, Indonesia 30662

fitrimayapuspita@unsri.ac.id, {imel_unsri, iffah_husniah}@yahoo.co.id

Abstract. This paper aims to determine the improved pricing scheme in wireless networks that can provide the maximum benefit for service providers Internet (ISP) that works in multiple class Quality of Service (QoS) network, which can guarantee a given scheme the satisfaction of consumer service providers and service users. Previous research focusing also on multi class QoS network by fixing the base price shows that by varying the quality premium then, the ISP can gain profit. So, we attempt to improve the models by varying the value of base price. The model used will be transformed into a model optimization which will then be examined by considering as a nonlinear programming problem that can solved using LINGO 13.0. The solutions of the models then are compared to original model proposed by previous research to obtain best results. Of the three models discussed, based on the results of each case, the ISP will get maximum benefit when applying the modified model by varying the base price and quality premium.

Keywords: improved pricing scheme, benefit, multiple class QoS network

1 Introduction

Therefore internet service providers (ISPs) compete in determining the pricing model of wireless internet that can maximize profits, but with the quality of its Internet services. Research on wireless financing scheme of nonlinear modeling are ever conducted by [1-3]. The pricing model of wireless network then carried out using mathematical methods programming [4, 5] and improved by fixing the base price [6, 7]. The wireless pricing models of multiple Class QoS networks utilize the bandwidth and end-to-end delay of QoS attributes and use the improved models in multi class QoS networks [8].

However, the pricing scheme of wireless networks in multiple class QoS network is not limited only to have the base price value to be fixed to recover cost. That goal can be extended to promote certain services offered by ISP while the end users can select the services of their preferences.

Therefore, by collecting all results previously conducted, we attempt to extend the research into multiple Class QoS network by considering the base price value to be determined by ISP to gain certain goals set up by ISP since the profit is also intended to be achieved not only by recovering the cost but also by competing in the market.

Then, the main contribution is to improve the models of wireless in multiple class QoS networks by determining the value of base price to achieve the goal of competing in the market while promoting certain services. Two models are improved by using each QoS attribute. The models obtained are also compared with the original one to show the best results. The proposed models then are transformed into nonlinear programming models and to be solved by LINGO 13.0. With this improved models, the ISP is able to improve the model original by utilizing the total base cost and quality premium as well as utilize the utility function that determines the sensitivity of the user in selecting the appropriate service with a budget that users have.

2 Methodology

In this study, the internet pricing scheme used the model proposed [2] The model will then be modified with the model previously proposed by [9] and improved model of [8, 10] in the objective function and constraint functions as a starting measure in determining the basic QoS, and with pay attention to the premium quality of each class to be fixed or varied. The models formed are based on two assumptions where the first assumption that the base price in the form of variable and premium quality is also constant, and assuming both QoS basic price and quality premium are in the form of variable. Model established will then be processed using the data have been obtained from one server local in Palembang, where the data used consisted of the mail and traffic data traffic which will then be solved using LINGO 13.0 to obtain the optimal solution.

4 Results and Discussion

The model used in this study is originally from [2] which is then modified by model drawn up [6] for QoS bandwidth. So that the resulting model is to maximize

$$\sum_j^m \sum_i^n (PR_{ij} \pm PQ_{ij} + (\alpha_j + W_j \log \frac{\tilde{X}_{ij}}{L_{mj}}) Z_{ij}) \quad (1)$$

with some attentions to some important aspects that can affect the optimum result in the form of quality premium of users who have the service performance I_i . then the model (1) for the objective function is a modified model to maximize

$$\sum_j^m \sum_i^n (PR_{ij} \pm PQ_{ij} + (\alpha_j + \beta_j I_j + W_j \log \frac{\tilde{X}_{ij}}{L_{m_j}}) Z_{ij}) \quad (2)$$

It means that in order to maximize the total amount consists of the cost to connect with QoS available (PR_{ij}), changes in the cost of all the changes in QoS (PQ_{ij}), and the formulation of financing models in the internet multi class QoS network proposed by where α is the base price for each class j , β is a premium quality of i users who have I_i service performance. The set of constraints play a role as limiting the objective function that must be met in the goal of obtaining optimal results. The first constraint states that a change fee depend on the cost factor on bandwidth QoS attributes, the basic cost to the user i and j class, as well as linearity factors By collecting all the information obtained the following constraints.

$$PQ_{ij} = \left(1 \pm \frac{x}{Q_{bij}}\right) PB_{ij} Lx \quad (3)$$

with Q_{bij} is the nominal value of the QoS attributes network operator. In this case the QoS attributes to be measured is bandwidth, where the maximum value for the bandwidth is 2Mbps. PB_{ij} a basic fee for a connection with the user i and class j , and Lx is linearity factor. Defining PB_{ij} namely:

$$PB_{ij} = a_{ij}(e - e^{-xB})T_l/100 \quad (4)$$

a_{ij} define linear cost factor in user i and j class, the linear factor ($e - e^{-xb}$), and T_l is the traffic load.

$$L_x = a(e - e^{-xB}) \quad (5)$$

$$f \leq a_{ij} \leq g \quad (6)$$

$$h \leq t_l \leq k \quad (7)$$

$$0 \leq x \leq 1 \quad (8)$$

$$0.8 \leq B \leq 1.07 \quad (9)$$

$$a = 1 \quad (10)$$

Lx is a factor that depends on the linearity parameters and $(e-e^{-xb})$, assuming $0 \leq x \leq 1$. The linear factor a_{ij} is limited by the service provider, assume as f and g . Allowable traffic load T_i is also determined by the service provider, say h and k . At the constraints (7), x is increment of QoS, which is set between 0 and 1 suggests implicitly that if 0 means to be in conditions best effort and 1 in a state of perfect service. Value B is set to be between 0.8 and 1.07, because in this range the best quality services occur. A linear parameter value is to be determined, with factor a base rate set. Then, constraints continued with constraints improved [8] as follows.

$$\sum_{j=1}^2 \sum_i X_{ij} \leq Q, i = 1, 2 \quad (11)$$

With Q is total *bandwidth* of 100MBps atau sebesar 102400 Kbps.

$$X_{ij} \geq L_{mj} - (1 - Z_{ij}), i = 1, 2; j = 1, 2 \quad (12)$$

$$W_j \leq W_{ij} + (1 - Z_{ij}), i = 1, 2; j = 1, 2 \quad (13)$$

$$X_{ij} \geq V_i - (1 - Z_{ij}), i = 1, 2; j = 1, 2 \quad (14)$$

W_{ij} is the sensitifity price for user i in class j . V_i is minimum bandwidth for each user with $V_1 = 6$ Kbps for user 1 and $V_2 = 5$ Kbps for user 2.

$$X_{ij} \geq X_j - (1 - Z_{ij}), i = 1, 2; j = 1, 2 \quad (15)$$

$$X_{ij} \geq Z_{ij}, i = 1, 2; j = 1, 2 \quad (16)$$

$$X_{ij} \geq 0, i = 1, 2; j = 1, 2 \quad (17)$$

$$L_{mj} \geq 0.01, j = 1, 2 \quad (18)$$

$$W_j \geq 0, j = 1, 2 \quad (19)$$

$$X_{ij} \leq X_j, i = 1, 2; j = 1, 2 \quad (20)$$

$$Z_{ij} = \begin{cases} 1, & \text{user } i \text{ is admitted to class } j \\ 0, & \text{otherwise} \end{cases} \quad (21)$$

For β_j fix, we add the additional constraints as follows.

$$m_j \leq I_j \leq 1; j \in [0,1] \quad (22)$$

$$I_j = I_{j-1}; j = 1, 2 \quad (23)$$

$$\beta_1 = 0.01, \beta_2 = 0.02 \quad (24)$$

For β_i varies, we have Eq.(22)-(23) and the following equations.

$$\beta_j \cdot I_j \geq \beta_{j-1} \cdot I_{j-1}; j > 1 \quad (25)$$

$$l_j \leq \beta_j \leq b_j \quad (26)$$

With l_j as a minimum value for quality premium of class j , and b_j as the maximum value for quality premium of class j .

For α_j varies, we set up the equations as follows.

$$\alpha_j \geq \beta_{j-1} \cdot I_{j-1}; j > 1 \quad (25)$$

$$s_j \leq \alpha_j \leq u_j, [s_j, u_j] \in [0,1] \quad (26)$$

Then, we seek to obtain the optimal solution for each case involving the 2 QoS attributes. Fig. 1, and Fig. 2 show the optimal solutions for each case and comparison to the original model and the number of iterations involved in each model, respectively.

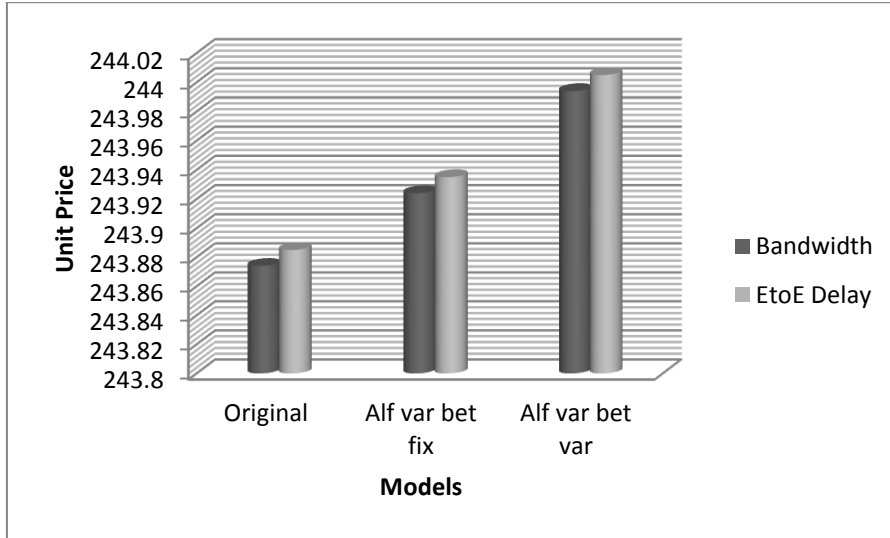


Fig. 1. The comparison of the optimal solutions of three models based on the QoS Attributes

From Fig.1, we can see that by varying the base price and the quality premium, the maximum optimal solution can be reached if applying the End-to End Delay attribute. The improved models by varying and fixing the quality premium and varying the base

price yield the better optimal solutions with the goals to either promote certain services or users are able to select the class. The End to End delay yield maximum results in model of varying base price and quality premium. This means that the ISP can achieve maximum profit by competing in market and users are able to select the class that are on their preferences

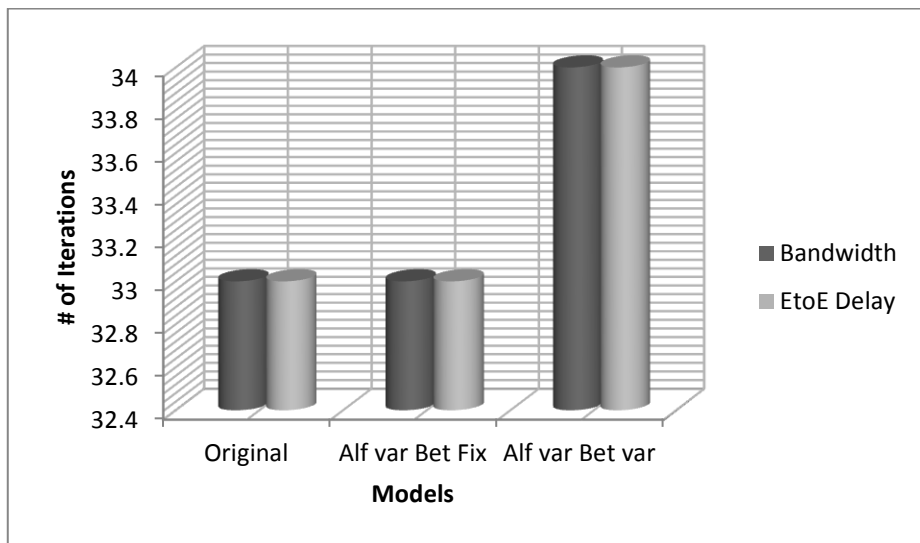


Fig. 2. The comparison of the number of iterations need to complete the computation of three models based on the QoS Attributes

Based on Fig. 2, the number of iterations needed to complete the iterations basically is also close for each model with different QoS attribute. It means that, applying the improved models, ISP obtains the maximum profit with the almost same time to complete the models as in original model. Again, for End to End Delay QoS attribute, we have slightly longer time to finish the iterations.

6 Conclusion

The objectives of the ISP to achieve the maximum profit when they have the chance to varying the base price to compete in the market is by applying varying the quality premium to enable users to select classes suitable with their budgets. Improved models presented here can show better value in terms of the profit gained and utilize only slightly longer time to finish the iterations.

Acknowledgments. The research leading to this paper was financially supported by DIKTI through Hibah Bersaing Tahun I 2015.

References

1. Maiti, R.: A Simplified Pricing Model for the 3G/4G Mobile Networks, in *Global Trends in Computing and Communication Systems*, P.V. Krishna, M.R. Babu, and E. Ariwa, Editors. Springer Berlin Heidelberg. (2012) 535-544
2. Wallenius, E., Hämäläinen, T.: Pricing Model for 3G/4G Networks, in *The 13th IEEE International Symposium on Personal, Indoor, and Mobile Radio Communications*. Lisbon, Portugal. (2002)
3. Maillé, P., Tuffin, B.: Price War in Heterogeneous Wireless Networks. *Computer Networks*, (2010)
4. Puspita, F.M., Seman, K., Taib, B.M, Abdullah, I.: Optimization of Wireless Pricing Scheme, in *International Conference on Information Technology and Business*. Bandar Lampung, Lampung. (2015)
5. Irmeilyana, Puspita, F.M., Indrawati: Nonlinear Programming Approach of Wireless Pricing Models, in *2nd International Conference on Electrical Engineering, Computer Science and Informatics 2015 (EECSI 2015)*. IAES: Palembang, South Sumatera. (2015)
6. Irmeilyana, Puspita, F.M., Indrawati: Mixed Integer Nonlinear Programming Model of Wireless Pricing Scheme with QoS Attribute of Bandwidth and End-to-End Delay, in *2015 Progress in Applied Mathematics in Science and Engineering (PIAMSE)*. Denpasar. (2015)
7. Irmeilyana, Puspita, F.M., Husniah, I.: Optimization of Wireless Internet Pricing Scheme in Serving Multi QoS Network Using Various QoS Attributes. *TELKOMNIKA, Telecommunication, Computing, Electronics and Control* 14(1): (2016).
8. Puspita, F.M., Seman, K., Taib, B.M., Shafii, Z.: Improved Models of Internet Charging Scheme of Single Bottleneck Link in Multi QoS Networks. *Journal of Applied Sciences*, 13(4): (2013) 572-579.
9. Yang, W., Pricing Network Resources in Differentiated Service Networks, in *School of electrical and Computer Engineering*. Phd Thesis. Georgia Institute of Technology. p. 1-111. (2004)
10. Irmeilyana, Puspita, F.M., Indrawati, Amelia, R.T.: Generalized models for internet pricing scheme under multi class QoS networks. *Australian Journal of Basic and Applied Sciences*, August: (2014) 543-550.

Certificate

INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY & ENGINEERING APPLICATION

This is to certify that

Fitri Maya Puspita

has presented the paper in parallel session of
International Conference on Information Technology and Engineering Application

2016 in Palembang, South Sumatera



Palembang, February 19-20th 2016

Prof. Ir. H. Bochari Rachman, M.Sc

Rector Bina Darma University

