

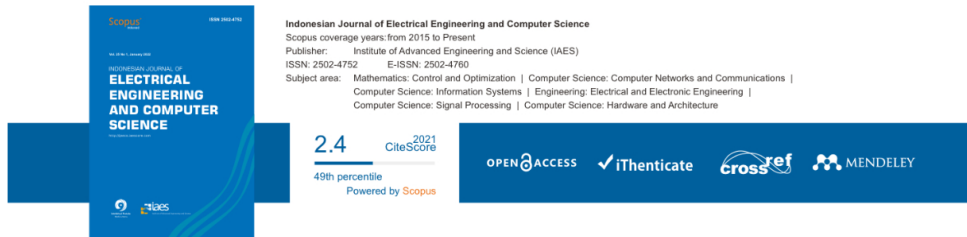
Home > Vol 30, No 3

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Vol 30, No 3: June 2023

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Table of Contents

Design and fabrication of an IoT-based smart electrical meter for residential energy management Thanh Ba Nguyen, Tin Cao Nguyen	PDF 1259-1268
Simulation of photovoltaic station interfacing scada within transmission line Zamzami Zamzami, Nelly Safitri, Muhammad Arhami, Naziruddin Naziruddin	PDF 1269-1278
Lighting level and room temperature audit of a University Campus Enalyn T. Domingo, Ferdinand L. Marcos, Cid L. Lapuz	PDF 1279-1286
Simulation and harmonic analysis of hybrid distributed energy generation based microgrid system using intelligent technique Jaspreet Kaur, Anita Khosla	PDF 1287-1296
Investigating and calculating the temperature of hot-spot factor for transformers Khalid Yahya, Hani Attar, Haltham Issa, Jamal Ali Ramadan Dofan, Nassim A. Iqteit, Adel E. M. Yahya, Ahmed Amin Ahmed Solyman	PDF 1297-1307
Voltage and frequency stabilization by fuzzy integrated droop control of a multi renewable source micro grid Savitri Swathi, Bhaskaruni Suresh Kumar, Jalla Upendar	PDF 1308-1320
Stability analysis of smart grid management system on campus building Dina Maizana, Ahmad Rezky, Syarifah Muthia Putri, Habib Satria, Moranain Mungkin	PDF 1321-1330
A 48-MW floating photovoltaic design and integration to a grid	PDF

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JOURNAL CONTENT

Search

Search Scope

All

[Search](#)

Browse

- By Issue
- By Author
- By Title

INFORMATION

- For Readers
- For Authors
- For Librarians

Adrianti Adrianti, Thoriq Kurnia Agung, Muhammad Nasir, Pinto Anugrah	1331-1338
Assessment of a single-phase single-stage grid-connected photovoltaic system Nurhazwani Anang, Wan Mariam Wan Muda, Muhamad Zalani Daud	PDF 1339-1347
Soil pH periodic assortment with smart irrigation using aerial triboelectric nanogenerator Dhandapani Karthikeyan, Deeba Kannan, Brindha Gunasekaran, Hemalatha Selvaraj, Saurabh Gupta, Ravindran Ramkumar, Krishnasamy Vijayakumar	PDF 1348-1358
Speed control of brushless DCmotors using (conventional, heuristic, and intelligent) methods-based PID controllers Diyah Kammel Shary, Habeeb Jaber Nekad, Mazin Abdulleh Alawan	PDF 1359-1368
An integrated multi-level feature fusion framework for crowd behaviour prediction and analysis Manu Yadakere Murthygowda, Ravikumar Guralamata Krishnegowda, Shashikala Salekoppalu Venkataramu	PDF 1369-1380
Analysis of single-phase cascaded H-bridge multilevel inverters under variable power conditions Subramani Chinnamuthu, Vinothkumar Balan, Krithika Vaidyanathan, Vimala Chinnaiyan, Premalatha Santhanamari	PDF 1381-1388
Harmful gases detection using artificial neural networks of the environment Pratiksha Rai, Syed Hasan Saeed, Shri Om Mishra	PDF 1389-1398
An effective way to generate the shift timing constraints and sanity checks Shaik Mahammad Ameer Afridi, Nagaraja Shylashree, Satish Tunga, Latha Bavikatte Nanjundappa	PDF 1399-1406
A review of solar drying technology for agricultural produce Mohd Khairulnawar Rizalman, Ervin Gubin Mounq, Jamal Ahmad Dargham, Zuhair Jamain, Nurul'azah Mohd Yaakub, Ali Farzamia	PDF 1407-1419
Low leakage decoder using dual-threshold technique for static random-access memory applications R. Krishna, Punithavathi Duraiswamy	PDF 1420-1427
Formalization of risk management in the context of digital business transformation Koshekov Kairat, Alibekkyzy Karylqash, Toiganbayev Beglan, Belginova Saule, Keribayeva Talshyn, Tulaev Viktor, Koshekov Abai	PDF 1428-1439
Knee-joint exoskeleton control system design using adaptive barrier function controller Amer B. Rakan, Mohammed Rashid Subhi, Ali H. Mhmood	PDF 1440-1448
Optimal sensor location for adaptive control system in tropical smart greenhouse Folkes Eduard Laumal, Herry Suhardiyanto, Mohamad Solahudin, Slamet Widodo	PDF 1449-1457
Optimal sliding mode controller for lower limb rehabilitation exoskeleton in constrained environments Mohammad A. Faraj, Boutheina Maalej, Nabil Derbel	PDF 1458-1469
Monitoring of submersible pumps using ESP32 microcontroller and photovoltaic panels Zaidan Didi, Ikram El Azami	PDF 1470-1477
Emotions recognition from human facial images based on fast learning network Majid Razaq Mohamed Alsemawi, Mohammed Hasan Mutar, Essam Hammodi Ahmed, Hatem Oday Hanoosh, Ali Hashim Abbas	PDF 1478-1487
Hammer-shaped slotted antenna design and analysis for wireless applications Gajendran Srihari, Raman Ramamoorthy, Shanmuganantham Thangavelu, Nimmagadda Padmaja	PDF 1488-1497
Sustainable framework for a geostationary satellite control earth station system using parallel configuration Nur Shazana Abdul Rahman, Nadirah Abdul Rahim	PDF 1498-1508
A comparison of the performance of the ad hoc on-demand distance vector protocol in the urban and highway environment Ahmed Eskander Mezher, Atheer Akram AbdulRazzaq, Rajaa Kadhom Hasoun	PDF 1509-1515
Efficient reconfigurable architecture to enhance medical image security Prakash Marakumbi, Satish Bhairannawar	PDF 1516-1524
A new method based on swarm intelligence with encrypted data in wireless sensor networks Dhuha Kh. Altmemi, Basim Sahar Yaseen	PDF 1525-1533
Gaussian kernelized feature selection and improved multilayer perceptive deep learning classifier for software fault prediction Sureka Sivavelu, Venkatesh Palanisamy	PDF 1534-1547
Development and evaluation of a didactic tool with augmented reality for Quechua language learning in preschoolers Joselyn Zapata-Paulini, Saul Beltozar-Clemente, Fernando Sierra-Lifian, Michael Cabanillas-Carbonell	PDF 1548-1557
A comprehensive survey on blockchain-based healthcare industry: applications and challenges Sara Ait Bennacer, Khadija Sabiri, Abdessadek Aaroud, Khalid Akoadi, Bouchaib Cherradi	PDF 1558-1571
A novel hybrid feature extraction and ensemble C3D classification for anomaly detection in surveillance videos Vishnu Priya Thotakura, Purnachand Nalluri	PDF 1572-1585
Improving the efficiency of clustering algorithm for duplicates detection Abdulrazzak Ali, Nurul Akmar Emran, Safiza Suhana Kamal Baharin, Zahriah Othman, Awsan Thabet Salem, Maslita Abd Aziz, Nor Mas Aina Md Bohari, Noraswalza Abdullah	PDF 1586-1595
Design of a optimization algorithm for binary classification Miguel Angel Cano Lengua, Erik Alex Papa Quiroz, Marco Antonio Alvarado Cifuentes, Carlos Antonio Alvarado Cifuentes	PDF 1596-1608
Detecting translation borrowings in huge text collections using various methods Adel Al-janabi, Ehsan Ali Al-Zubaidi, Baqer M. Merzah	PDF 1609-1616
University of Kufa unified laboratories management system using computer application Faris Sattar Hadi, Ali Al Farawn, Ahmed Hazim Alhilali	PDF 1617-1623

Parallel processing of E-Atheer algorithm using pthread paradigm	PDF
Atheer Akram AbdulRazzaq, Mohammed A. Fadhel, Laith Alzubaidi, Omran Al-Shamma	1624-1633
Machine learning prediction of petty corruption intention among law enforcement officers	PDF
Suraya Masrom, Rahayu Abdul Rahman, Nor Asyiqin Salleh, Endang Pitaloka, Mohd Auzan Md Nor, Nor Balkish Zakaria	1634-1642
Sentiment analysis of Twitter data regarding the agni path scheme of the defense forces	PDF
Vijaylakshmi Sajwan, Monisha Awasthi, Ankur Goel, Priyank Sharma	1643-1650
Efficient palm vein authentication encryption technique in wireless implantable medical devices	PDF
Ahlam Almukhlifi, Saad M. Almutairi	1651-1658
Model-driven architecture: generating models from Symphony framework	PDF
M'hamed Rahmouni, Chaymae Talbi, Soumia Ziti	1659-1668
Image encryption based on combined between linear feedback shift registers and 3D chaotic maps	PDF
Salah Taha Allawi, Nada Abdul Aziz Mustafa	1669-1677
Detection of occupancy status from internet connectivity for non-intrusive load monitoring	PDF
Manjula Wickramathilaka, Md Pauzi Abdullah, Mohammad Yusri Hassan, Hayati Abdullah	1678-1688
Toward measuring the usability of decision support applications in fog computing environment	PDF
Oras Abdulkhdhur Hussein, Ayad Hameed Mousa	1689-1698
Anomaly-based intrusion detection system based on feature selection and majority voting	PDF
Mina Eshak Magdy, Ahmed M. Matter, Saleh Hussin, Doaa Hassan, Shaimaa Ahmed Elsaid	1699-1706
Cloud computing virtual learning environment: issues and challenges	PDF
Aminah Rezaqallah Malkawi, Muhamad Shahbani Abu Bakar, Zulkhairi Bin Md Dahlin	1707-1712
Classification of medical X-ray images using supervised and unsupervised learning approaches	PDF
Ranjana Battur, Jagadisha Narayana	1713-1721
Comparing performance of bastion host on cloud using Amazon web services vs terraform	PDF
Sahana Balluguttu, Akshatha S. Chavan, Oorja Pal, Kavya Sannakavalappa, Dipto Chakrabarti	1722-1728
An intelligent road accident reduction system using device-to-device communication	PDF
Taskeed Javid, Nazmul Hasan Rizvy, Fateza Tuj Zohora Mow, Tanjina Zaman Shosy, Md. Sawkat Ali, Maheen Islam, Samia Binta Hassan, Mahamudul Hasan	1729-1739
Robust features extraction from shape signature for fish images classification	PDF
Ali Ahmed, Sherif Hussein, Younis Ibrahim Gali	1740-1747
Do clinical decision support systems for prescribing improve patient safety? a systematic literature review	PDF
Sri Kusumadewi, Isnatin Miladiyah	1748-1761
Principal component analysis in the epidemiology of diarrhoea in calves	PDF
Ablaikhan Kadyrov, Altay Usenbayev, Dariyash Kurenkeyeva, Berdaly Kurenkey, Sarsenbay Abdrakhmanov, Nurlan Tashatov	1762-1770
Distinguishing license plate numbers using discrete wavelet transform technology based deep learning	PDF
Asma Abdullelah Abdulrahman, Fouad Shaker Tahir	1771-1776
Effective resource virtualization for dynamic IoT devices in road network	PDF
Padmanabhan P., Sampath Kumar K., John A.	1777-1785
Estimation of biomass of forage sorghum (sorghum bicolor) Cv. Samurai-2 using support vector regression	PDF
Kahfi Heryandi Suradiradja, Imas Sukaesih Sitanggang, Luki Abdullah, Imran Hermadi	1786-1794
Feature-based approach and sequential pattern mining to enhance quality of Indonesian automatic text summarization	PDF
Dian Sa'adillah Maylawati, Yogan Jaya Kumar, Fauziah Binti Kasmin	1795-1804
Cluster-based denoising autoencoders for rate prediction recommender systems	PDF
Ammar Abdulsalam Al-Asadi, Mahdi Nsaif Jasim	1805-1812
Estimation of coverage and energy in bio-inspired wireless sensors using Harris hawk algorithm	PDF
Hakeem Abdul Wasay, Kavipriya Periyasamy	1813-1820
Collaborative desing in web application development to improve tuberculosis diagnostic	PDF
Freyre Medrano Juan, Calixto Palacios Carolina, Condori Obregon Patricia, Palomino Vidal Carlos	1821-1828
Utilizing deep neural network for web-based blood glucose level prediction system	PDF
Ganjar Alfian, Yuris Mulya Saputra, Lukman Subekti, Ananda Dwi Rahmawati, Fransiskus Tatas Dwi Atmaji, Jongtae Rhee	1829-1837
Students' satisfaction with the service quality of academic advising systems	PDF
Ali M. Ghonmein, Khalidun G. Al-Moghrabi, Tawfiq Alrawashdeh	1838-1845
Facial recognition for partially occluded faces	PDF
Omer Abdulhaleem Naser, Sharifah Mumtazah Syed Ahmad, Khairulmizam Samsudin, Marsyita Hanafi, Siti Mariam Binti Shafie, Nor Zamri Zarina	1846-1855
Malicious attacks modelling: a prevention approach for ad hoc network security	PDF
Hasanien Ali Talib, Raya Basil Alotman, Mazin S. Mohammed	1856-1865
Modeling and automatic generation of data warehouse using model-driven transformation in business intelligence process	PDF
Redouane Esbai, Soufiane Hakkou, Mohamed Achraf Habri	1866-1874



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Vol 23, No 1

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Table of Contents

Secured protection of transmission line by distance relay using data mining approach	PDF
M. Kiruthika, Bindu S.	1-13
Future smart grid communication-deployment of IoT: opportunities and challenges	PDF
Payal Soni, J. Subhashini	14-22
Monte Carlo analysis for solar PV impact assessment in MV distribution networks	PDF
Dilini Almeida, Jagadeesh Pasupuleti, Shangari K. Raveendran, M. Reyasudin Basir Khan	23-31
Balanced islanding detection of integrated DG with phase angle between voltage and current	PDF
M Krishna Goriparthi, B Geetha Lakshmi	32-40
Optimal integration of wind energy with a shunt-FACTS controller for reductions in electrical power loss	PDF
I Made Wartana, Ni Putu Agustini, Sasidharan Sreedharan	41-53
Energy management in connected and disconnected mode of a photovoltaic system with a battery storage using an artificial neural network technique	PDF
Ezzitouni Jarmouni, Ahmed Mouhsen, Mohammed Lamhammedi, Zakarya Benizza	54-62
Experimental design for an enhanced parametric modeling of supercapacitor equivalent circuit model	PDF
Ali Mohsen Alsabari, M. K Hassan, Azura CS, Ribhan Zafira	63-74
Optimising monthly tilt angles of solar panels using particle swarm optimisation algorithm	PDF
Namruta S. Kanianthara, Swee Peng Ang, Ashraf Fathi Khalil Sulayman, Zainidi bin Hj. Abd. Hamid	75-89
Dynamic response enhancement of BDFIG using vector control scheme based internal model control	PDF
Ahsanullah Memon, Mohd Wazir Mustafa, Shadi Khan Baloch, Attaullah Khidrani, Touqeer Ahmed	90-97
Intelligent voltage regulator for distributed generation-based network	PDF
Zwawi Hamadouche, Mounir Khiat, Muhammad Asad Iqbal	98-109
Management switching angles real-time prediction by artificial neural network	PDF
Mohammed Rasheed Jubair Al-Hiealy, Mohammad Shahir Bin Abdul Majed Shikh, Abdurrahman Bin Jalil, Suhaila Abdul Rahman, Muath Jarrah	110-119
Hardware implementation and performance evaluation of microcontroller-based 7-level inverter using POD-SPWM technique	PDF
Hajar Chadli, Sara Chadli, Mohamed Boutouba, Mohammed Saber, Abdelwahed Tahani	120-131
Design of circular inductive pad couple with magnetic flux density analysis for wireless power transfer in EV	PDF
Syasya Azra Zaini, Mohd Shahrin Abu Hanifah, Siti Hajar Yusoff, Nadia Nazieha Nanda, Ahmed Samir Badawi	132-139
Password authentication scheme based on smart card and QR code	PDF
Mushtaq Hasson, Ali A. Yassin, Abdullah J. Yassin, Abdullah Mohammed Rashid, Aqeel A. Yaseen, Hamid Alasadi	140-149
Work function variations on electrostatic and RF performances of J1SDGM Device	PDF
K K. E. Kaharudin, F. Salehuddin, A. S. M. Zain, Ameer F. Roslan, I Ahmad	150-161
Geolocation based air pollution mobile monitoring system	PDF
Aya Mazin Talib, Mahdi Nsaif Jasim	162-170
Flight parameters improvement for an unmanned aerial vehicle using a lookup table based fuzzy PID controller	PDF
Abderrahmen Benbouali, Fayçal Chabni, Rachid Taleb, Nouredine Mansour	171-178
Automatic control of motors through Simocode pro. and its effect on the performance of the process of filling and dispensing of chemical inlets	PDF
Omar Chamorro-Atalaya, Augusto Sanchez-Ayte, Carlos Dávila-Ignacio, Orlando Ortega-Galicio, Nestor Alvarado-Bravo, Almintor Torres-Quiroz, Florcita Aldana-Trejo	179-187
Vibration harvesting integrated into vehicle suspension and bodywork	PDF
Souad Toudain, Mustapha Mabrouki	188-196
Measuring the accuracy of LSTM and BiLSTM models in the application of artificial intelligence by applying chatbot programme	PDF
Prasnurzaki Anki, Alhadi Bustamam	197-205
Detection of anthropogenic objects based on the spatial characteristics of their contour in aerial image	PDF
Hayder Makki Hamed, Osama Hajeed Hilal Almiahi, Oksana Shauchuk	206-215
ROI-based features for classification of skin diseases using a multi-layer neural network	PDF
Thanh-Hai Nguyen, Ba-Viet Ngo	216-228
Temporal analysis of air pollutants in the most affected monsoon region	PDF
Omar Kairan, Nur Nasehah Zainudin, Nurul Hasya Mohd Hanafiah, Nur Emylia Arissa Mohd Jafri, Fukayyah Fatihah @Suhami, Mohd Firdaus Mustapha	229-236

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INFORMATION

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Efficient hearing aid algorithm using DCT with uniformly re-sampled and recursively modified audiogram values K. Ayyappa Swamy, Zachariah C. Alex	PDF 237-246
Vehicle tracker system design based on GSM and GPS interface using arduino as platform Narcisca T. Morallo	PDF 258-264
Towards using UAV for improving 5G cellular communication systems Mohamed El Sayed Kotb, Wagdy R. Anis, Ahmed A. Abd-Elhafez	PDF 265-272
Energy efficient WSN using hybrid modification PEGASIS with ant lion optimization Ahmed Abdul Azeez Asmael, Basman Al-Nedawe	PDF 273-284
An improvement to hybrid beamforming precoding scheme for mmWave massive MIMO systems based on channel matrix Zahra Amirifar, Jamshid Abouei	PDF 285-292
A survey on advanced transmission technologies for high bandwidth and good signal quality for high-speed railways Abdul Rafay, Sevia Mahdaliza Idrus, Kamaludin Mohamad Yusof, Siti Hasunah Mohammad	PDF 293-301
Influence of loopback interference channel in energy harvesting full-duplex relaying network over block rayleigh fading channel: performance analysis Phu Tran Tin, Van-Duc Phan, Le Anh Vu	PDF 302-307
NB-IoT and LTE-M towards massive MTC: Complete performance evaluation for 5G mMTC Adil Abou El Hassan, Abdelmalek El Mehdi, Mohammed Saber	PDF 308-320
A novel compact dual band RFID handheld reader antenna for microwave ISM band application Wahiba Belgacem, Miloud Bousahla, Sidi Mohammed Meriah	PDF 321-329
Design of high power amplifier based on wilkinson power combiner for wireless communications Tran Van Hoi, Ngo Thi Lanh	PDF 330-337
A new parameter in three-term conjugate gradient algorithms for unconstrained optimization Alaa Saad Ahmed, Hisham M. Khudhur, Mohammed S. Najmuldeen	PDF 338-344
Sentiment classification of user's reviews on drugs based on global vectors for word representation and bidirectional long short-term memory recurrent neural network Hadab Khalid Obayed, Firas Sabah Al-Turaihi, Khaldoon H. Alhussayni	PDF 345-353
Numerical comparison between DPSK 33_DPSK 66 and duo binary in WOC system Mustafa H. Ali, Hazim M. Ali, Tariq A. Hassan	PDF 247-257
Performance analysis routing protocol between RIPv2 and EIGRP with termination test on full mesh topology D. R. Prehan, A. D. Indriyanti, G. S. Permadi	PDF 354-361
Formulation of city health development index using data mining Bertalya Bertalya, Prihandoko Prihandoko, Lilis Setyowati, Febrian Iftikhar Irawan, Syahifa Rahmita Irlianti	PDF 362-369
Modeling virus spread on a network using NetLogo for optimum network management Catherine R. Alimboyong	PDF 370-377
Harumanis mango leaf disease recognition system using image processing technique R. A. JM. Gining, S. S. M. Fauzi, N. M. Yusoff, T. R. Razak, M. H. Ismail, N. A. Zaki, F. Abdullah	PDF 378-386
Semantic feature extraction method for hyperspectral crop classification M. C. Girish Baabu, Padma M. C.	PDF 387-395
Development of a model for evaluating the effectiveness of innovative startups based on information cycles and using neural networks Morozov Viktor, Kolomiets Anna, Mezentseva Olga	PDF 396-404
Bangla numerical sign language recognition using convolutional neural networks (CNNs) F. M. Javed Mehedi Shamrat, Sovon Chakraborty, Md. Masum Billah, Moumita Kabir, Nazmus Shakib Shadin, Silvia Sanjana	PDF 405-413
MATLAB modeling to evaluate the ratio of packed cell volume Zena Ahmed Alwan, Suhair Mohammed Yaseen, Huda Farooq Jameel	PDF 414-420
Logistics tracking system based on decentralized IoT and blockchain platform Marouane El Midaoui, El Mehdi Ben Laoula, Mohammed Qbadou, Khalifa Mansouri	PDF 421-430
An improved vigenere algorithm based on circular-left-shift key and MSB binary for data security Aso Ahmed Majeed, Banaz Anwer Qader	PDF 431-437
S-CDCA: a semi-cluster directive-congestion protocol for priority-based data in WSNs Marwan Ihsan Shukur	PDF 438-444
Hybrid model for movie recommendation system using content K-nearest neighbors and restricted Boltzmann machine Dayal Kumar Behera, Madhabananda Das, Subhra Swetanisha, Prabira Kumar Sethy	PDF 445-452
An analysis of CRM practices in the telecommunication industry in Iraq Hosam Alden Riyadh, Salsabila Aisyah Alfaiza, Abdulsatar Abduljabbar Sultan, Munadil K. Faeq, Radyan Dananjoyo	PDF 453-462
Sentiment analysis on twitter tweets about COVID-19 vaccines using NLP and supervised KNN classification algorithm F. M. Javed Mehedi Shamrat, Sovon Chakraborty, M. M. Imran, Jannatun Naeem Muna, Md. Masum Billah, Protiva Das, Md. Obaidur Rahman	PDF 463-470
Performance of similarity explicit group iteration for solving 2D unsteady convection-diffusion equation Nur Afza Mat Ali, Jumat Sulaiman, Azali Saudi, Nor Syahida Mohamad	PDF 471-478
Designing a secure campus network and simulating it using Cisco packet tracer Alaa H. Ahmed, Mokhaled N. A. Al-Hamadani	PDF 479-489

A survey of various intelligent home applications using IoT and intelligent controllers Mustafa Asaad Omran, Wasaan Kadhim Saad, Bashar Jabbar Hamza, Ahmed Fahem Al-baghdadi	PDF 490-499
Software process improvement initiative in medium size IT organization: a case study Mohammad Zarour, Mamdouh Alenezi	PDF 500-509
Efficient multi-keyword similarity search over encrypted cloud documents Ayad I. Abdulsada, Dhafer G. Honi, Salah Al-Darraji	PDF 510-518
A deep web data extraction model for web mining: a review Ily Amalina Ahmad Sabri, Mustafa Man	PDF 519-528
Payload and quality augmentation using steganographic optimization technique based on edge detection Mafaz Alanezi, Iman Subhi Mohammed Altaay, Saja Younis Hamid Malla'alo	PDF 529-539
Analysis of design goals of cryptography algorithms based on different components Ali Mohammad Norouzzadeh Gil Mol, Mohammad Reza Aref, Reza Ramazani Khorshiddoust	PDF 540-548
Application project task scheduling using dolphin swarm technology Baraa S. Mostafa, Firdews A. Alsaman	PDF 549-557
An ensemble feature selection approach using hybrid kernel based SVM for network intrusion detection system Gaddam Venu Gopal, Gatram Rama Mohan Babu	PDF 558-565
Blood donors appointment booking and managing system using PC and mobile web browsers in current pandemic (COVID-19) Mustafa Abdulsatar Noori, Sura Abed Sarab Hussien, Thair Abed Sarab Al-Janabi	PDF 566-574
Optimized routing algorithm for maximizing transmission rate in D2D network Marwa K. Farhan, Muayad S. Croock	PDF 575-582
Smart system for monitoring ammonium nitrate storage warehouse Maha Khalil Ibrahim, Nadia Mahmood Hussien, Saad Najim Alsaad	PDF 583-589
Numerical solution of Drinfeld-Sokolov-Wilson system by using modified Adomian decomposition method Badran Jasim Salim, Oday Ahmed Jasim, Zeiad Yahya Ali	PDF 590-599
Busway distribution system-sizing and planning aspects for automotive weld shop Sana Zaheer, Sana Zaheer, Raja Masood Larik	PDF 600-611
Modelling consumer's intention to use IoT devices: role of technophilia Nusrat Jahan, Md. Abu Hosen Shawon, Farzana Sadia, Dilara Khanom Nitu, Md. Enam Kobir Ribon, Imran Mahmud	PDF 612-620



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Performance analysis routing protocol between RIPv2 and EIGRP with termination test on full mesh topology

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ABSTRACT

Data access on a company is a very important part of an institution or a college. Especially in the present time, the internet has become an important thing in human life. With the existence of certain means there is a problem that will arise, needed solution or way out on a network that can be called protocol. Because an institution needs to choose network methods properly and safely. This study focuses on addressing the path/route of data packets to be sent will be governed by this routing protocol in the form of table routing. Routing used adip routing information protocol version 2 (RIPv2) with enhanced interior gateway routing protocol (EIGRP) which will be compared on both routing protocol which is better against predetermined situation previous. The result of the research using cisco packet tracer 7.10 software shows that EIGRP routing run on two topologies has faster convergence time speed with an average time of 0.01-0.02 seconds as well as the change of its routing table at once. Unlike RIPv2 routing that takes longer than EIGRP routing is with the time range from 0.01 to 0.19.

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1. INTRODUCTION

Computer network technology in an institution or college is a very important part [1]. With the means there must be a problem that will emerge, needed solutions or solutions on a network that can be called a protocol, which regulates traffic on a network. Likewise with the use of the internet certainly requires a protocol that regulates the course of packets on the internet network [2]. There are various kinds of algorithms in managing the routing process, these rules are known as routing protocols [3].

This study aims to determine the best topology in each routing protocol. Because each routing protocol has different properties, research is done using enhanced interior gateway routing protocol (EIGRP) and routing information protocol version 2 (RIPv2) routing protocols that are tested through simulation using cisco packet tracer 7.1 software [4] and 10 routers will be configured using full mesh and half mesh topology with serial cable media to connect between routers and Straight-Through type Fast Ethernet cable to connect the router to the switch and connect the switch to the personal computer (PC) [5].

Tests focused on, among others, the resulting routing table list, the stability of the network through the ping command, and examining the path that is passed by a data packet using trace routes [6]. Then a comparative analysis is performed based on the results of several aspects of the test. So, conclusions will be obtained that show a superior routing protocol [7]. This research tries to compare the routing protocol, RIPv2

with open shortest path first (OSPF) which will be sought in both protocols which are better in a predetermined situation [8].

2. RESEARCH METHOD

2.1. Routing

Routing is the process of choosing the path that must be passed by package [9]. Good path depends on network load, datagram length, type of service requested and traffic patterns. In general, the routing scheme only consider the shortest path. There are 2 form of routing, namely, direct routing and indirect routing [10].

2.2. EIGRP

Referring to the CCNA lab guide nixtrain, EIGRP is also called as a routing protocol distance vector [11], sometimes also called advanced distance vector or hybrid routing protocol [12]. EIGRP maintains three tables [13].

- Neighbor table: a table that stores information about the router others that run EIGRP routing and connect directly with the router itself, because EIGRP only shares information routing with a router that only exists in this table [14].
- Topology table: a table that stores all information about the path learned from neighbors. In this table are stored all destinations and paths shared by neighbor routers.
- Routing table; the table that only stores the fastest destinations for get to every destination.

2.3. RIPv2

Routing information protocol (RIP) is a term that often comes out in the world of distance vector routing protocol internet networks whose routing metrics use hops. The hold time for the stop is 180 seconds. The rules for the number of jumps allowed from source path to destination path. The maximum number of hops allowed for RIP is 15. This hop limit is intended to limit the size of the network that can perform RIP support [15]. RIP implements split horizon, route poisoning and holddown mechanisms [16].

In most of today's network environments, EIGRP, OSPF, or IS-IS is more of a choice than RIP for routing as diffuse time and scalability [17]. However, it is easy to configure, because RIP is not need parameters on a router in another protocol oppo. This is assigning a statutory protected port number 520. There are 3 versions from routing information protocol: RIPv1, RIPv2, and RIPv2 [18].

Departing from the shortcomings in the previous RIP, it became the basis for the development of RIPv2 in 1993 and later developed in 1998. RIPv2 supports classless inter-domain routing (CIDR) because it has the ability to carry subnet information. For compatibility, the hop limit of 15 is fixed. One of the perks of RIPv2 to fully operational with initial specifications if all protocols must be Zero fields in RIPv1 messages are specified correctly [19]. Also, activate feature compatibility enables smooth interoperability adjustments [20]. This 224.0.0.9 address is at the address IP version 4 class D. RIPv2 is the STD-56 Internet Standard [21].

2.4. Full mesh topology

Physical topology is a physical description of the relationships between network components. Refer to the cisco CCNA and computer networks book. Mesh topology describes each computer connected point-to-point. This means that each computer is directly connected to all computers on the network [22]. Mesh topology is divided into 2 types, namely fully connected mesh topology and partially connected mesh topology [23]. For example, if there are 5 device in the network, one device will be connected to 4 other device, this topology is also called a full mesh topology [24], as shown in Figure 1.

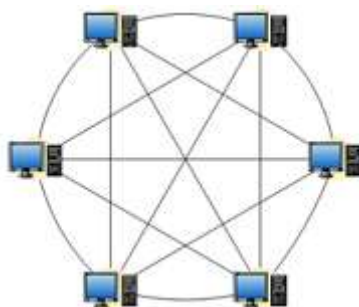


Figure 1. Full mesh topology

3. RESULTS AND ANALYSIS

3.1. Scenario analysis

After all the settings and configurations in the system design have been The next stage is completed, namely testing of the system that has been made. What will be tested in the system will be explained in Figure 2. From Figure 2, testing the scenarios that can be explained are:

- In this study using cisco packet tracer version 7.1 and simulation configuration using full mesh topology with EIGRP and RIPv2 routing protocols as Figure 3.
- The underlying arrangement made a full lattice geography recreation utilizing 10 switches, every switch is associated straightforwardly to different switches that are neighbors to the switch. Also, every one of these switches will have one customer, as ashown in Table 1. The customer will be utilized for information transmission, for example, Figure 4. Next the IP customer on the other PC is likewise decided, appeared in the Figure 5.
- The next experiment was to test network connectivity with the ping command on each network. After that the process of sending data packets from one network to another network, then do traceroute such as Figure 6.
- Subsequent experiments will be carried out to determine the speed of data transmission based on the time taken by the routing in the condition of the path will be broken one of them will then be calculated time for the path to find how much time is needed such as Figure 7.

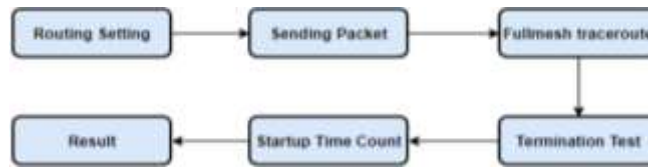


Figure 2. Testing the scenarios

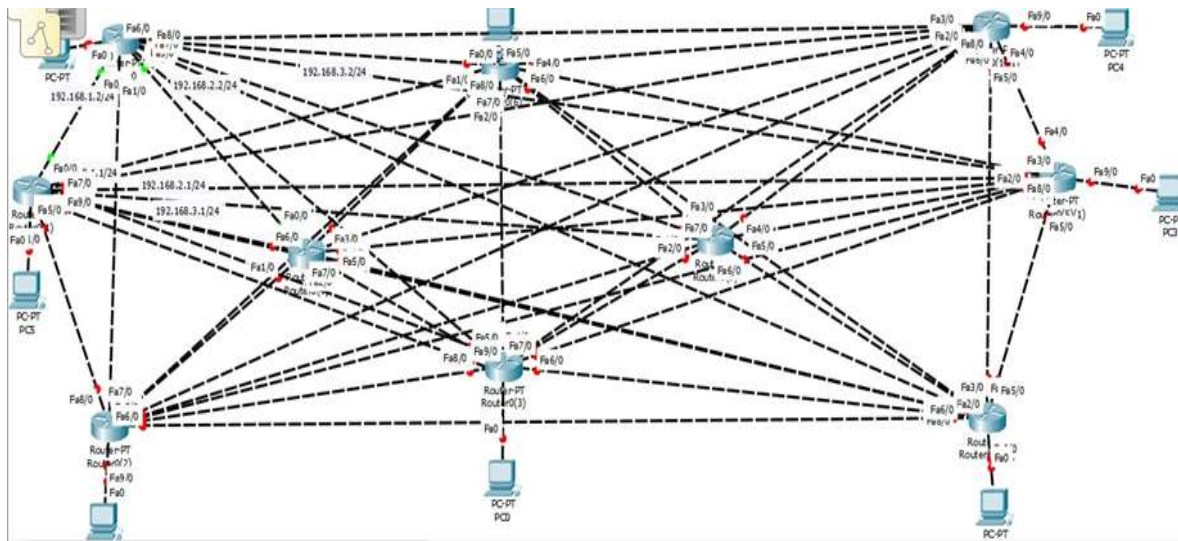


Figure 3. Full mesh topology

From that point forward, the way test is completed with the tracert order. Following conditions after the way is broken when a tracert is performed. To discover which ways switch will pass. It very well may be found in Figure 8.

Testing with traceroute on full lattice geography with steering RIPv2. Ping from PC-1 to PC-8, the outcomes can be found in the Figure 9. Replay results show that the customer is now associated with PC-1. From that point forward, the way test is done with the tracert order. Here's the condition before the way is broken when a tracert is performed. To discover which ways switch will pass. Can be found in Figure 10. The implementation phase is the stage of applying the results of the analysis and research design that have been made before. The requirements needed for the system to run optimally are cisco packet tracer software.

Table 1. Router configuration

Router 1		Router 2		Router 3		Router 4		Router 5	
F0	192.168.1.1/24	F0	192.168.1.2/24	F0	192.168.2.2/24	F0	192.168.3.2/24	F0	192.168.4.2/24
F1	192.168.2.1/24	F1	192.168.10.1/24	F1	192.168.19.1/24	F1	192.168.20.2/24	F1	192.168.19.2/24
F2	192.168.3.1/24	F2	20.20.20.1/24	F2	192.168.20.1/24	F2	192.168.27.1/24	F2	192.168.27.2/24
			PC=20.20.20.2/24						
F3	192.168.4.1/24	F3	192.168.12.1/24	F3	192.168.21.1/24	F3	192.168.28.1/24	F3	192.168.34.1/24
F4	192.168.5.1/24	F4	192.168.13.1/24	F4	192.168.22.1/24	F4	192.168.29.1/24	F4	192.168.35.1/24
F5	192.168.6.1/24	F5	192.168.14.1/24	F5	192.168.23.1/24	F5	192.168.30.1/24	F5	192.168.36.1/24
F6	192.168.7.1/24	F6	192.168.15.1/24	F6	192.168.24.1/24	F6	192.168.15.2/24	F6	192.168.37.1/24
F7	192.168.8.1/24	F7	192.168.16.1/24	F7	192.168.25.1/24	F7	192.168.31.1/24	F7	192.168.38.1/24
F8	192.168.9.1/24	F8	192.168.17.1/24	F8	192.168.10.2/24	F8	192.168.32.1/24	F8	40.40.40.1/24
									PC=40.40.40.2/24
F9	10.10.10.1/24	F9	192.168.18.1/24	F9	30.30.30.1/24			F9	192.168.17.2/24
	PC=10.10.10.2/24				PC=30.30.30.2/24				
Router 6		Router 7		Router 8		Router 9		Router 10	
F0	192.168.6.2/24	F0	192.168.5.2/24	F0	192.168.8.2/24	F0	192.168.7.2/24	F0	192.168.9.2/24
F1	192.168.25.2/24	F1	192.168.21.2/24	F1	192.168.24.2/24	F1	192.168.22.2/24	F1	192.168.23.2/24
F2	192.168.36.2/24	F2	192.168.34.2/24	F2	192.168.37.2/24	F2	192.168.35.2/24	F2	192.168.38.2/24
F3	192.168.39.1/24	F3	192.168.42.2/24	F3	192.168.39.2/24	F3	192.168.41.2/24	F3	192.168.40.2/24
F4	192.168.40.1/24	F4	192.168.43.1/24	F4	192.168.46.1/24	F4	192.168.48.1/24	F4	192.168.48.2/24
F5	192.168.41.1/24	F5	192.168.44.1/24	F5	192.168.47.1/24	F5	192.168.46.2/24	F5	192.168.47.2/24
F6	192.168.42.1/24	F6	192.168.45.1/24	F6	192.168.45.2/24	F6	192.168.43.2/24	F6	192.168.30.2/24
F7	192.168.28.2/24	F7	192.168.16.2/24	F7	192.168.14.2/24	F7	192.168.29.2/24	F7	192.168.44.2/24
F8	192.168.12.2/24	F8	192.168.32.2/24	F8	192.168.31.2/24	F8	192.168.13.2/24	F8	192.168.18.2/24
F9	50.50.50.1/24	F9	60.60.60.1/24	F9	70.70.70.1/24	F9	80.80.80.1/24	F9	90.90.90.1/24 PC
	PC=50.50.50.2/24		PC=60.60.60.2/24		PC=70.70.70.2/24		PC=80.80.80.2/24		90.90.90.2/24

Another sample

```

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.2.1
(FastEthernet0/0) is up: new adjacency

router-3(config-router)#network 192.168.19.0 255.255.255.0
router-3(config-router)#network 192.168.20.0 255.255.255.0
router-3(config-router)#network 192.168.21.0 255.255.255.0
router-3(config-router)#network 192.168.22.0 255.255.255.0
router-3(config-router)#network 192.168.23.0 255.255.255.0
router-3(config-router)#network 192.168.24.0 255.255.255.0
router-3(config-router)#network 192.168.25.0 255.255.255.0
router-3(config-router)#network 192.168.10.0 255.255.255.0
router-3(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.10.1
(FastEthernet8/0) is up: new adjacency

router-3(config-router)#network 30.30.30.0 255.255.255.0
router-3(config-router)#no aut
router-3(config-router)#no auto-summary
router-3(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.2.1
(FastEthernet0/0) resync: summary configured

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.10.1
(FastEthernet8/0) resync: summary configured

router-3(config)#router rip
router-3(config-router)#version 2
router-3(config-router)#network 192.168.2.0
router-3(config-router)#network 192.168.19.0
router-3(config-router)#network 192.168.20.0
router-3(config-router)#network 192.168.21.0
router-3(config-router)#network 192.168.22.0
router-3(config-router)#network 192.168.23.0
router-3(config-router)#network 192.168.24.0
router-3(config-router)#network 192.168.25.0
router-3(config-router)#network 192.168.10.0
router-3(config-router)#network 30.30.30.0
router-3(config-router)#no auto
router-3(config-router)#no auto-summary
router-3(config-router)#do write
Building configuration...
[OK]
    
```

Figure 4. Sample configuration network and router on Route 3 using EIGRP and RIPv2

IP Configuration

IP Configuration

DHCP Static

IP Address: 30.30.30.2

Subnet Mask: 255.255.255.0

Default Gateway: 30.30.30.1

DNS Server: 0.0.0.0

IPv6 Configuration

DHCP Auto Config Static

IPv6 Address:

Link Local Address: FE80::2D0:BCFF:FE4A:3AB4

Figure 5. Sample configuration IP client

```

Packet Tracer PC Command Line 1.0
C:\>ping 90.90.90.2

Pinging 90.90.90.2 with 32 bytes of data:

Request timed out.
Reply from 90.90.90.2: bytes=32 time<1ms TTL=126
Reply from 90.90.90.2: bytes=32 time<1ms TTL=126
Reply from 90.90.90.2: bytes=32 time=1ms TTL=126

Ping statistics for 90.90.90.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
    
```

Figure 6. Sample test sending packet route 2 to route 10

```

Command Prompt
C:\>tracert 90.90.90.2

Tracing route to 90.90.90.2 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    30.30.30.1
  1  0 ms    0 ms    0 ms    192.168.23.2
  2  3 ms    0 ms    0 ms    90.90.90.2

Trace complete.
    
```

Figure 7. Sample result EIGRP routing on router 3 to router 10 before tracert

```

Command Prompt

  4  0 ms    0 ms    1 ms    90.90.90.2

Trace complete.

C:\>tracert 90.90.90.2

Tracing route to 90.90.90.2 over a maximum of 30 hops:

  0  1 ms    0 ms    0 ms    30.30.30.1
  1  0 ms    0 ms    0 ms    192.168.24.2
  2  0 ms    0 ms    0 ms    192.168.40.2
  3  0 ms    0 ms    0 ms    90.90.90.2

Trace complete.
    
```

Figure 8. Sample result EIGRP routing on router 3 to router 10 after tracert

```

Command Prompt

Packet Tracer PC Command Line 1.0
C:\>ping 70.70.70.2

Pinging 70.70.70.2 with 32 bytes of data:

Reply from 70.70.70.2: bytes=32 time<1ms TTL=126
Reply from 70.70.70.2: bytes=32 time<1ms TTL=126
Reply from 70.70.70.2: bytes=32 time=3ms TTL=126
Reply from 70.70.70.2: bytes=32 time<1ms TTL=126

Ping statistics for 70.70.70.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 0ms
    
```

Figure 9. Sample result RIPv2 routing on router 1 to router 8 before tracert

```

Command Prompt

  1  1 ms    0 ms    1 ms    10.10.10.1
  2  0 ms    0 ms    0 ms    192.168.8.2
  3  1 ms    0 ms    0 ms    70.70.70.2

Trace complete.

C:\>tracert 70.70.70.2

Tracing route to 70.70.70.2 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    10.10.10.1
  1  1 ms    0 ms    0 ms    192.168.8.2
  2  0 ms    0 ms    0 ms    70.70.70.2

Trace complete.
    
```

Figure 10. Sample result RIPv2 routing on router 1 to router 8 after tracert

3.2. Time testing

Time testing is carried out on line termination after termination when sending packages. The following table results from the time tests conducted in Table 2 for fullmesh with EIGRP routing and Table 3 for fullmesh with RIPv2. Perform ping tests continuously then break up, a delay time will appear. The results of the experiment for routing EIGRP on full topology the mesh is shown in Table 2. The results of the experiments for EIGRP routing in full mesh topology are shown in Table 3.

Table 2. Fullmesh EIGRP

No	Experiment	Time
1	PC 2 → PC 3	0.01 ms
2	PC 2 → PC 7	0.02 ms
3	PC 2 → PC 8	0.02 ms
4	PC 2 → PC 9	0.02 ms
5	PC 2 → PC 10	0.01 ms

Table 3. Fullmesh RIPv2

No	Experiment	Time
1	PC 2 → PC 9	0.15 ms
2	PC 2 → PC 10	0.19 ms
3	PC 2 → PC 7	0.07 ms
4	PC 2 → PC 6	0.16 ms
5	PC 2 → PC 8	0.17 ms
6	PC 2 → PC 5	0.12 ms
7	PC 2 → PC 3	0.11 ms
8	PC 2 → PC 1	0.05 ms

Furthermore, time testing is carried out on the line termination after termination when sending the package. The following table results from half-timesh time testing with EIGRP routing and table. The time-testing test is performed on the termination of the lane after termination when sending the packet. The following Table 4 results from half-timesh time testing with RIPv2 and table routing. Doing a continuous pinging test then breaking up, a delay time will appear. Explanation of the termination process. Furthermore, time testing is carried out on the line termination after termination when sending the package. The following Table 5 results from halfmesh time testing with EIGRP routing.

Table 4. Half mesh RIPv2

No	Experiment	Time
1	PC 6 → PC 9	0.17 ms
2	PC 8 → PC 1	0.06 ms

Table 5. Half mesh EIGRP

No	Experiment	Time
1	PC 1 → PC 10	0.01 ms
2	PC 2 → PC 6	0.01 ms

3.1. Analysis results

The results of the analysis obtained from experiments conducted include:

- From EIGRP and RIPv2 routing experiments tested on 2 topologies there is a difference in the way messages are delivered to the package in each-respective router [25]. EIGRP routing characteristics that are classified as hybrid routing (distance vector and link state) which can make selections faster vector-based paths. EIGRP uses hello packet. Unlike the RIPv2 routing that has characteristics in distance vector routing. RIPv2 uses the request message for build relationships with neighboring routers.
- From the experiments conducted at the time of termination of the route/route in order to package which was tested on two topologies namely fullmesh and halfmesh. That package sent to its destination by testing carried out line termination, routing EIGRP has a better convergence time than routing RIPv2.
- Try using the ping command to send data packets by 32 bytes. EIGRP results are obtained in 1 ms and when on breaking up has time to replay with time 0.01, and 0.02 which shows the speed of time is very good. As for RIPv2 when after being disconnected, the time needed for replays return range between 0.01-0.19 which shows the speed of time the good one.
- When routers do a routing table update on each topology, EIGRP only on routers that are directly affected from network changes. Whereas RIPv2 updates the table routing to all routers.

4. CONCLUSION

Based on research conducted, conclusions can be drawn including, from EIGRP and RIPv2 routing experiments it can be applied to topology fullmesh and halfmesh. The results of the discussions obtained indicate EIGRP has better convergence than RIPv2. Convergence is the time taken by the router to go through alternative path in order to reach the destination

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Performance analysis routing protocol between RIPv2 and EIGRP with termination test on full mesh topology

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ABSTRACT

Data access on a company is a very important part of an institution or a college. Especially in the present time, the internet has become an important thing in human life. With the existence of certain means there is a problem that will arise, needed solution or way out on a network that can be called protocol. Because an institution needs to choose network methods properly and safely. This study focuses on addressing the path/route of data packets to be sent will be governed by this routing protocol in the form of table routing. Routing used adip routing information protocol version 2 (RIPv2) with enhanced interior gateway routing protocol (EIGRP) which will be compared on both routing protocol which is better against predetermined situation previous. The result of the research using cisco packet tracer 7.10 software shows that EIGRP routing run on two topologies has faster convergence time speed with an average time of 0.01-0.02 seconds as well as the change of its routing table at once. Unlike RIPv2 routing that takes longer than EIGRP routing is with the time range from 0.01 to 0.19.

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1. INTRODUCTION

Computer network technology in an institution or college is a very important part [1]. With the means there must be a problem that will emerge, needed solutions or solutions on a network that can be called a protocol, which regulates traffic on a network. Likewise with the use of the internet certainly requires a protocol that regulates the course of packets on the internet network [2]. There are various kinds of algorithms in managing the routing process, these rules are known as routing protocols [3].

This study aims to determine the best topology in each routing protocol. Because each routing protocol has different properties, research is done using enhanced interior gateway routing protocol (EIGRP) and routing information protocol version 2 (RIPv2) routing protocols that are tested through simulation using cisco packet tracer 7.1 software [4] and 10 routers will be configured using full mesh and half mesh topology with serial cable media to connect between routers and Straight-Through type Fast Ethernet cable to connect the router to the switch and connect the switch to the personal computer (PC) [5].

Tests focused on, among others, the resulting routing table list, the stability of the network through the ping command, and examining the path that is passed by a data packet using trace routes [6]. Then a comparative analysis is performed based on the results of several aspects of the test. So, conclusions will be obtained that show a superior routing protocol [7]. This research tries to compare the routing protocol, RIPv2

with open shortest path first (OSPF) which will be sought in both protocols which are better in a predetermined situation [8].

2. RESEARCH METHOD

2.1. Routing

Routing is the process of choosing the path that must be passed by package [9]. Good path depends on network load, datagram length, type of service requested and traffic patterns. In general, the routing scheme only consider the shortest path. There are 2 form of routing, namely, direct routing and indirect routing [10].

2.2. EIGRP

Referring to the CCNA lab guide nixtrain, EIGRP is also called as a routing protocol distance vector [11], sometimes also called advanced distance vector or hybrid routing protocol [12]. EIGRP maintains three tables [13].

- Neighbor table: a table that stores information about the router others that run EIGRP routing and connect directly with the router itself, because EIGRP only shares information routing with a router that only exists in this table [14].
- Topology table: a table that stores all information about the path learned from neighbors. In this table are stored all destinations and paths shared by neighbor routers.
- Routing table; the table that only stores the fastest destinations for get to every destination.

2.3. RIPv2

Routing information protocol (RIP) is a term that often comes out in the world of distance vector routing protocol internet networks whose routing metrics use hops. The hold time for the stop is 180 seconds. The rules for the number of jumps allowed from source path to destination path. The maximum number of hops allowed for RIP is 15. This hop limit is intended to limit the size of the network that can perform RIP support [15]. RIP implements split horizon, route poisoning and holddown mechanisms [16].

In most of today's network environments, EIGRP, OSPF, or IS-IS is more of a choice than RIP for routing as diffuse time and scalability [17]. However, it is easy to configure, because RIP is not need parameters on a router in another protocol oppo. This is assigning a statutory protected port number 520. There are 3 versions from routing information protocol: RIPv1, RIPv2, and RIPv2 [18].

Departing from the shortcomings in the previous RIP, it became the basis for the development of RIPv2 in 1993 and later developed in 1998. RIPv2 supports classless inter-domain routing (CIDR) because it has the ability to carry subnet information. For compatibility, the hop limit of 15 is fixed. One of the perks of RIPv2 to fully operational with initial specifications if all protocols must be Zero fields in RIPv1 messages are specified correctly [19]. Also, activate feature compatibility enables smooth interoperability adjustments [20]. This 224.0.0.9 address is at the address IP version 4 class D. RIPv2 is the STD-56 Internet Standard [21].

2.4. Full mesh topology

Physical topology is a physical description of the relationships between network components. Refer to the cisco CCNA and computer networks book. Mesh topology describes each computer connected point-to-point. This means that each computer is directly connected to all computers on the network [22]. Mesh topology is divided into 2 types, namely fully connected mesh topology and partially connected mesh topology [23]. For example, if there are 5 device in the network, one device will be connected to 4 other device, this topology is also called a full mesh topology [24], as shown in Figure 1.

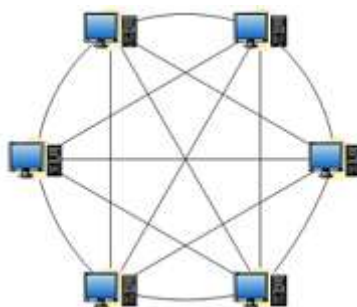


Figure 1. Full mesh topology

3. RESULTS AND ANALYSIS

3.1. Scenario analysis

After all the settings and configurations in the system design have been The next stage is completed, namely testing of the system that has been made. What will be tested in the system will be explained in Figure 2. From Figure 2, testing the scenarios that can be explained are:

- In this study using cisco packet tracer version 7.1 and simulation configuration using full mesh topology with EIGRP and RIPv2 routing protocols as Figure 3.
- The underlying arrangement made a full lattice geography recreation utilizing 10 switches, every switch is associated straightforwardly to different switches that are neighbors to the switch. Also, every one of these switches will have one customer, as ashown in Table 1. The customer will be utilized for information transmission, for example, Figure 4. Next the IP customer on the other PC is likewise decided, appeared in the Figure 5.
- The next experiment was to test network connectivity with the ping command on each network. After that the process of sending data packets from one network to another network, then do traceroute such as Figure 6.
- Subsequent experiments will be carried out to determine the speed of data transmission based on the time taken by the routing in the condition of the path will be broken one of them will then be calculated time for the path to find how much time is needed such as Figure 7.



Figure 2. Testing the scenarios

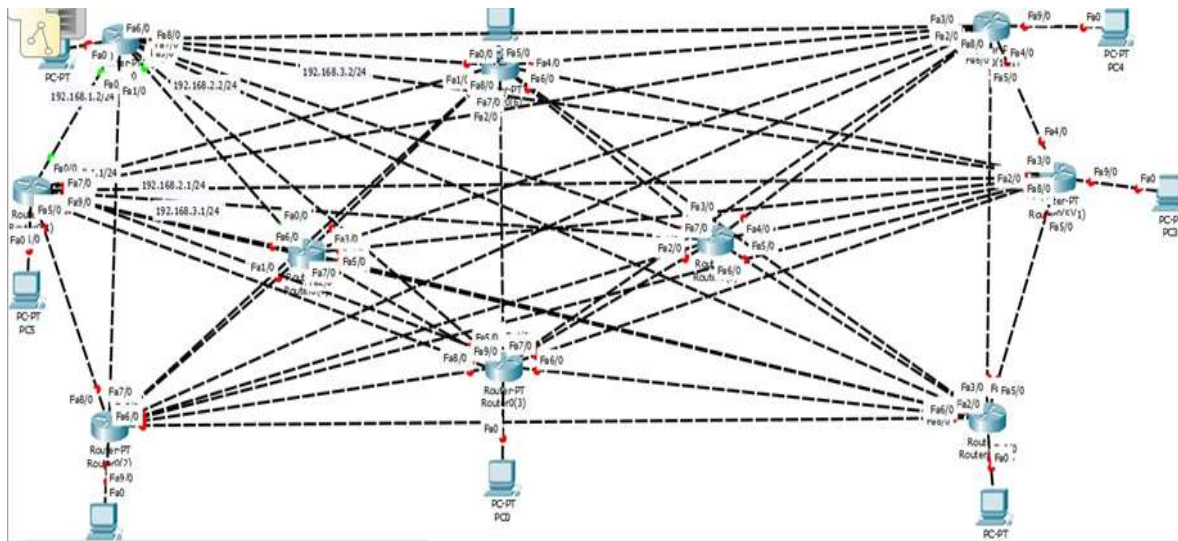


Figure 3. Full mesh topology

From that point forward, the way test is completed with the tracert order. Following conditions after the way is broken when a tracert is performed. To discover which ways switch will pass. It very well may be found in Figure 8.

Testing with traceroute on full lattice geography with steering RIPv2. Ping from PC-1 to PC-8, the outcomes can be found in the Figure 9. Replay results show that the customer is now associated with PC-1. From that point forward, the way test is done with the tracert order. Here's the condition before the way is broken when a tracert is performed. To discover which ways switch will pass. Can be found in Figure 10. The implementation phase is the stage of applying the results of the analysis and research design that have been made before. The requirements needed for the system to run optimally are cisco packet tracer software.

Table 1. Router configuration

Router 1		Router 2		Router 3		Router 4		Router 5	
F0	192.168.1.1/24	F0	192.168.1.2/24	F0	192.168.2.2/24	F0	192.168.3.2/24	F0	192.168.4.2/24
F1	192.168.2.1/24	F1	192.168.10.1/24	F1	192.168.19.1/24	F1	192.168.20.2/24	F1	192.168.19.2/24
F2	192.168.3.1/24	F2	20.20.20.1/24	F2	192.168.20.1/24	F2	192.168.27.1/24	F2	192.168.27.2/24
			PC=20.20.20.2/24						
F3	192.168.4.1/24	F3	192.168.12.1/24	F3	192.168.21.1/24	F3	192.168.28.1/24	F3	192.168.34.1/24
F4	192.168.5.1/24	F4	192.168.13.1/24	F4	192.168.22.1/24	F4	192.168.29.1/24	F4	192.168.35.1/24
F5	192.168.6.1/24	F5	192.168.14.1/24	F5	192.168.23.1/24	F5	192.168.30.1/24	F5	192.168.36.1/24
F6	192.168.7.1/24	F6	192.168.15.1/24	F6	192.168.24.1/24	F6	192.168.15.2/24	F6	192.168.37.1/24
F7	192.168.8.1/24	F7	192.168.16.1/24	F7	192.168.25.1/24	F7	192.168.31.1/24	F7	192.168.38.1/24
F8	192.168.9.1/24	F8	192.168.17.1/24	F8	192.168.10.2/24	F8	192.168.32.1/24	F8	40.40.40.1/24
									PC=40.40.40.2/24
F9	10.10.10.1/24	F9	192.168.18.1/24	F9	30.30.30.1/24			F9	192.168.17.2/24
	PC=10.10.10.2/24				PC=30.30.30.2/24				
Router 6		Router 7		Router 8		Router 9		Router 10	
F0	192.168.6.2/24	F0	192.168.5.2/24	F0	192.168.8.2/24	F0	192.168.7.2/24	F0	192.168.9.2/24
F1	192.168.25.2/24	F1	192.168.21.2/24	F1	192.168.24.2/24	F1	192.168.22.2/24	F1	192.168.23.2/24
F2	192.168.36.2/24	F2	192.168.34.2/24	F2	192.168.37.2/24	F2	192.168.35.2/24	F2	192.168.38.2/24
F3	192.168.39.1/24	F3	192.168.42.2/24	F3	192.168.39.2/24	F3	192.168.41.2/24	F3	192.168.40.2/24
F4	192.168.40.1/24	F4	192.168.43.1/24	F4	192.168.46.1/24	F4	192.168.48.1/24	F4	192.168.48.2/24
F5	192.168.41.1/24	F5	192.168.44.1/24	F5	192.168.47.1/24	F5	192.168.46.2/24	F5	192.168.47.2/24
F6	192.168.42.1/24	F6	192.168.45.1/24	F6	192.168.45.2/24	F6	192.168.43.2/24	F6	192.168.30.2/24
F7	192.168.28.2/24	F7	192.168.16.2/24	F7	192.168.14.2/24	F7	192.168.29.2/24	F7	192.168.44.2/24
F8	192.168.12.2/24	F8	192.168.32.2/24	F8	192.168.31.2/24	F8	192.168.13.2/24	F8	192.168.18.2/24
F9	50.50.50.1/24	F9	60.60.60.1/24	F9	70.70.70.1/24	F9	80.80.80.1/24	F9	90.90.90.1/24 PC
	PC=50.50.50.2/24		PC=60.60.60.2/24		PC=70.70.70.2/24		PC=80.80.80.2/24		90.90.90.2/24

Another sample

```

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.2.1
(FastEthernet0/0) is up: new adjacency

router-3(config-router)#network 192.168.19.0 255.255.255.0
router-3(config-router)#network 192.168.20.0 255.255.255.0
router-3(config-router)#network 192.168.21.0 255.255.255.0
router-3(config-router)#network 192.168.22.0 255.255.255.0
router-3(config-router)#network 192.168.23.0 255.255.255.0
router-3(config-router)#network 192.168.24.0 255.255.255.0
router-3(config-router)#network 192.168.25.0 255.255.255.0
router-3(config-router)#network 192.168.10.0 255.255.255.0
router-3(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.10.1
(FastEthernet8/0) is up: new adjacency

router-3(config-router)#network 30.30.30.0 255.255.255.0
router-3(config-router)#no aut
router-3(config-router)#no auto-summary
router-3(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.2.1
(FastEthernet0/0) resync: summary configured

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.10.1
(FastEthernet8/0) resync: summary configured

router-3(config)#router rip
router-3(config-router)#version 2
router-3(config-router)#network 192.168.2.0
router-3(config-router)#network 192.168.19.0
router-3(config-router)#network 192.168.20.0
router-3(config-router)#network 192.168.21.0
router-3(config-router)#network 192.168.22.0
router-3(config-router)#network 192.168.23.0
router-3(config-router)#network 192.168.24.0
router-3(config-router)#network 192.168.25.0
router-3(config-router)#network 192.168.10.0
router-3(config-router)#network 30.30.30.0
router-3(config-router)#no auto
router-3(config-router)#no auto-summary
router-3(config-router)#do write
Building configuration...
[OK]
    
```

Figure 4. Sample configuration network and router on Route 3 using EIGRP and RIPv2

IP Configuration

IP Configuration

DHCP Static

IP Address: 30.30.30.2

Subnet Mask: 255.255.255.0

Default Gateway: 30.30.30.1

DNS Server: 0.0.0.0

IPv6 Configuration

DHCP Auto Config Static

IPv6 Address:

Link Local Address: FE80::2D0:BCFF:FE4A:3AB4

Figure 5. Sample configuration IP client


```

Packet Tracer PC Command Line 1.0
C:\>ping 90.90.90.2

Pinging 90.90.90.2 with 32 bytes of data:

Request timed out.
Reply from 90.90.90.2: bytes=32 time<1ms TTL=126
Reply from 90.90.90.2: bytes=32 time<1ms TTL=126
Reply from 90.90.90.2: bytes=32 time=1ms TTL=126

Ping statistics for 90.90.90.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
    
```

Figure 6. Sample test sending packet route 2 to route 10

```

Command Prompt
C:\>tracert 90.90.90.2

Tracing route to 90.90.90.2 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    30.30.30.1
  1  0 ms    0 ms    0 ms    192.168.23.2
  2  3 ms    0 ms    0 ms    90.90.90.2

Trace complete.
    
```

Figure 7. Sample result EIGRP routing on router 3 to router 10 before tracert

```

Command Prompt

  4  0 ms    0 ms    1 ms    90.90.90.2

Trace complete.

C:\>tracert 90.90.90.2

Tracing route to 90.90.90.2 over a maximum of 30 hops:

  0  1 ms    0 ms    0 ms    30.30.30.1
  1  0 ms    0 ms    0 ms    192.168.24.2
  2  0 ms    0 ms    0 ms    192.168.40.2
  3  0 ms    0 ms    0 ms    90.90.90.2

Trace complete.
    
```

Figure 8. Sample result EIGRP routing on router 3 to router 10 after tracert

```

Command Prompt

Packet Tracer PC Command Line 1.0
C:\>ping 70.70.70.2

Pinging 70.70.70.2 with 32 bytes of data:

Reply from 70.70.70.2: bytes=32 time<1ms TTL=126
Reply from 70.70.70.2: bytes=32 time<1ms TTL=126
Reply from 70.70.70.2: bytes=32 time=3ms TTL=126
Reply from 70.70.70.2: bytes=32 time<1ms TTL=126

Ping statistics for 70.70.70.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 0ms
    
```

Figure 9. Sample result RIPv2 routing on router 1 to router 8 before tracert

```

Command Prompt

  1  1 ms    0 ms    1 ms    10.10.10.1
  2  0 ms    0 ms    0 ms    192.168.8.2
  3  1 ms    0 ms    0 ms    70.70.70.2

Trace complete.

C:\>tracert 70.70.70.2

Tracing route to 70.70.70.2 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    10.10.10.1
  1  1 ms    0 ms    0 ms    192.168.8.2
  2  0 ms    0 ms    0 ms    70.70.70.2

Trace complete.
    
```

Figure 10. Sample result RIPv2 routing on router 1 to router 8 after tracert

3.2. Time testing

Time testing is carried out on line termination after termination when sending packages. The following table results from the time tests conducted in Table 2 for fullmesh with EIGRP routing and Table 3 for fullmesh with RIPv2. Perform ping tests continuously then break up, a delay time will appear. The results of the experiment for routing EIGRP on full topology the mesh is shown in Table 2. The results of the experiments for EIGRP routing in full mesh topology are shown in Table 3.

Table 2. Fullmesh EIGRP

No	Experiment	Time
1	PC 2 → PC 3	0.01 ms
2	PC 2 → PC 7	0.02 ms
3	PC 2 → PC 8	0.02 ms
4	PC 2 → PC 9	0.02 ms
5	PC 2 → PC 10	0.01 ms

Table 3. Fullmesh RIPv2

No	Experiment	Time
1	PC 2 → PC 9	0.15 ms
2	PC 2 → PC 10	0.19 ms
3	PC 2 → PC 7	0.07 ms
4	PC 2 → PC 6	0.16 ms
5	PC 2 → PC 8	0.17 ms
6	PC 2 → PC 5	0.12 ms
7	PC 2 → PC 3	0.11 ms
8	PC 2 → PC 1	0.05 ms

Furthermore, time testing is carried out on the line termination after termination when sending the package. The following table results from half-timesh time testing with EIGRP routing and table. The time-testing test is performed on the termination of the lane after termination when sending the packet. The following Table 4 results from half-timesh time testing with RIPv2 and table routing. Doing a continuous pinging test then breaking up, a delay time will appear. Explanation of the termination process. Furthermore, time testing is carried out on the line termination after termination when sending the package. The following Table 5 results from halfmesh time testing with EIGRP routing.

Table 4. Half mesh RIPv2

No	Experiment	Time
1	PC 6 → PC 9	0.17 ms
2	PC 8 → PC 1	0.06 ms

Table 5. Half mesh EIGRP

No	Experiment	Time
1	PC 1 → PC 10	0.01 ms
2	PC 2 → PC 6	0.01 ms

3.1. Analysis results

The results of the analysis obtained from experiments conducted include:

- From EIGRP and RIPv2 routing experiments tested on 2 topologies there is a difference in the way messages are delivered to the package in each-respective router [25]. EIGRP routing characteristics that are classified as hybrid routing (distance vector and link state) which can make selections faster vector-based paths. EIGRP uses hello packet. Unlike the RIPv2 routing that has characteristics in distance vector routing. RIPv2 uses the request message for build relationships with neighboring routers.
- From the experiments conducted at the time of termination of the route/route in order to package which was tested on two topologies namely fullmesh and halfmesh. That package sent to its destination by testing carried out line termination, routing EIGRP has a better convergence time than routing RIPv2.
- Try using the ping command to send data packets by 32 bytes. EIGRP results are obtained in 1 ms and when on breaking up has time to replay with time 0.01, and 0.02 which shows the speed of time is very good. As for RIPv2 when after being disconnected, the time needed for replays return range between 0.01-0.19 which shows the speed of time the good one.
- When routers do a routing table update on each topology, EIGRP only on routers that are directly affected from network changes. Whereas RIPv2 updates the table routing to all routers.

4. CONCLUSION

Based on research conducted, conclusions can be drawn including, from EIGRP and RIPv2 routing experiments it can be applied to topology fullmesh and halfmesh. The results of the discussions obtained indicate EIGRP has better convergence than RIPv2. Convergence is the time taken by the router to go through alternative path in order to reach the destination

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