

AP WiMob

IEEE Asia Pacific Conference on
Wireless and Mobile 2016

PROGRAM BOOK

13-15 September 2016, Grand Royal Panghegar Hotel, Bandung - Indonesia

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Welcome Message from the Conference Chair

Welcome to APWiMob 2016, Bandung - Indonesia

It is our great pleasure to invite you to attend the 2016 IEEE Asia Pacific Conference on Wireless and Mobile (APWiMob 2016), which is the 3rd of the consecutive series initiated in 2014 in Bali, followed in 2015 in Bandung.



APWiMob 2016 is international: papers have been submitted not only from Asia-Pacific countries but also from America, Europe and Africa. We cordially welcome you to APWiMob 2016. Besides, we would like to take this opportunity to take this opportunity to express our sincere appreciation to the leading scientists, session organizers and all contributors for their great help and valuable supports to APWiMob 2016. Many thanks also to the Technical Program Committee, the Organizing Committee, and the International Steering Committee as well as the sponsors, the IEEE Communications Society Chapter Indonesia, for their efforts to bring all the participants an excellent technical program and an opportunity to spend a pleasant time at the conference.

APWiMob 2016 provides an international forum for researchers, academicians, professionals, and students from various engineering fields and with cross-disciplinary interests in wireless communications and mobile technologies, networks, services, and applications to interact and disseminate information on the latest developments. It is expected that the attendees will bring many benefits to the scientific and technological development for all countries and to formation of new international cooperation and strengthening of established international collaborations. The committee is doing its best effort for the inclusion of the conference proceedings to the IEEE Xplore Data Base. The presentations of this conference will be accessible to a wider range of readers and will have continual impact to this research field.

Bandung is the capital city of West Java Province. It is the historic site of the first university in Indonesia. It is also popular place for leisure activities for people not only from Jakarta, the capital of Indonesia, but also from Malaysia and Singapore thanks to its strategic location that is reachable by railways, highways, as well as air plane. We hope all of attendees an enjoyable and memorable stay in Bandung, Indonesia.

Bandung, 13 September 2016

Chair of APWiMob 2016,

Sigit Yuwono, PhD
Telkom University



Welcome Message from TPC Chair

Dear Ladies and Gentlemen,



It has always been a pleasure to host and to welcome researchers, academics, practitioners, and students from across national borders for a shared, prestigious event like APWiMob 2016, the IEEE Asia Pacific Conference on Wireless and Mobile 2016, in Bandung, where the high qualified papers in wireless communications and mobile technologies, networks, services, and applications to interact and disseminate information on the latest developments, will be presented. The conference received 55 papers from 130 authors of 14 countries and through high qualification of reviewing process and tight registration process APWiMob

2016 will publish 25 papers from 79 authors of 10 countries with high qualified papers.

The research in advanced information and communication technologies and services, and also communications networks with advanced technologies are very important since it represents a great achievement in topics of interest, which the best contributors coming from excellent laboratories and schools throughout the world, precipitate to come and contribute their finest works. Therefore, this conference will become the landmark for engineering society to express their thoughts and skills in finding best algorithms or modern mathematical modeling for the future technology. Not only the high qualified papers, the conference is supported by 3 experts in tutorial sessions and 3 distinguished experts in keynote sessions.

We would like to express special appreciation for 218 technical program committee (TPC) that supported the review process, thus enable us to present high qualified conference in communications technology. We congratulate the authors of papers that made it into the proceedings and to IEEE Xplore, for the job well done.

We wish to express strong appreciation to our most important sponsors: IEEE ComSoc Indonesia Chapter and Telkom University, especially School of Electrical Engineering. We are also blessed to have three distinguished Guest Speakers: Prof. Dr.-Ing. Abdelhak M. Zoubir, Prof. Haruhiro Fujita and Sigit P. Wigati Djarot, PhD.

As always, many thanks are due to all members of APWiMob 2016 committee for their dedication for making this conference a success. Above all, thank you to all of you for coming to this conference.

We warmly invite you to taste Bandung food, walk its streets, and bring from Bandung some memorable items that will keep your heart in touch with this historical and pleasant city of Bandung.

Best regards,

TPC Chair,
Rina Pudji Astuti

Program at a Glance

Day One: Tuesday, 13 September 2016

TIME	AMARTAPURA C	MADHUKARA A	MADHUKARA B
07.00 - 08.30	Registration		
08.30 - 08.45	Opening Speech		
08.45 - 09.00	Speech from the Chair of ICCEREC and APWiMob		
09.00 - 09.15	Launching IEEE SPS Indonesia Chapter		
09.15 - 10.00	Keynote Session I		
10.00 - 10.30	Coffee Break & Photo Session		
10.30 - 11.15	Keynote Session II		
11.15 - 12.00	Keynote Session III		
12.00 - 13.00	Lunch Break		
13.00 - 15.00		Tutorial Session I	Technical Session I
15.00 - 15.15		Coffee Break	Coffee Break
15.15 - 17.00		Tutorial Session II	Technical Session II
18.30 - 21.00	GALA DINNER at AMARTAPURA C		

Program at a Glance**Day Two: Wednesday, 14 September 2016**

TIME	MADHUKARA A	MADHUKARA B
08.00 - 09.30	Tutorial Session III	Technical Session III
09.30 - 09.45	Coffee Break	Coffee Break
09.45 - 11.00	SPS (Signal Processing Society) Indonesia Chapter 1 st Meeting	Technical Session IV



Keynote Sessions



Prof. Abdehak M. Zoubir

Signal Processing Group, TU Darsmtadt, Germany

Advances in Robust Statistics for Signal Processing

Day One, 13 September 2016,
MADHUKARA A (09.15-10.00)

Abstract: Robust statistics continue to gain importance due to an increase of impulsive measurement environments and outliers in practical engineering systems. Classical estimation or detection theory does not apply in such situations and robust statistical methods are sought for. The talk aims at discussing the most recent advances in robust statistics and at showing their power to solving signal processing problems. First, we highlight the motivation for using robust statistics in real-life situations and how robust statistics can be expected to remedy problems in such practical systems. We then introduce some definitions of robustness and discuss some robust estimators. We briefly touch upon robust detection in the fixed sample size case. The theoretical treatment is supported by applications in various areas of signal and antenna array processing.



Keynote Sessions

**Prof. Haruhito Fujita**

Niigata University of International and Information Studies

Variable Renewable Energies for Development

Day One, 13 September 2016,

MADHUKARA A (10.30-11.15)

Abstract: The Fukushima nuclear accident caused by unforeseen tsunami events and human errors has forced to change the highly nuclear dependent Japanese government energy policy, stopping all nuclear power plants for rebuilding disaster tolerance and emergency governance. The lecture covers the global efforts to build "nuclear and carbon free" renewable energies, largely referencing the "Renewables 2016, Global Status Report" of Renewable Energy Policy Network for the 21st Century, the international efforts on summarizing the global trends.

Due to the huge national investments on the renewables, China leads the world both in total renewable powers with and without the hydro generation. However, if one considers per capita, Denmark is leading the world, followed by other EU members of Germany, Sweden, Spain and Portugal.

The share of renewable electricity was 23.7% of the global electricity generated in 2015, of which the hydro power was 16.6%, followed by the wind of 3.7%, the biomass of 2.0, the solar PV of 1.2%, and others (geo-thermal, concentrating solar thermal and ocean powers) of 0.4%, illustrating the high share of the hydro power among the renewables due to the high outputs of hydro power plants.

The variable renewable energies have been recently focused as methods to compensate fluctuate natural energies such as the solar PV and the wind, via some energy storage system(s). A simple design of the variable renewables applying the solar PV for pumping water up to an upper reservoir and on demand hydro power generation by discharging stored water to a down reservoir, being deployed in Sado island, the largest but off grid one, previously reported in ICCEREC 2015. An estimation of 3.5 households' power independency can be achieved by a 1200 m³ micro-pump storage system using two nearby reservoirs, very common in hilly regions of Asia.

The lecture will be closing by introducing two development projects of biomass powers from human and agricultural wastes (waste cooking oil and empty fruit bunch of Oil Palm) in Indonesia and Thailand, which solve social and environmental problems in the region, followed by the conclusions.



Keynote Sessions



Sigit P. Wigati Jarot, PhD

School of Electrical Engineering, Telkom University, Indonesia

5G-IoT: Challenges and Opportunities

Day One, 13 September 2016,

MADHUKARA A (11.15-12.00)

Abstract: Mobile communication continues to evolve rapidly. 5G and Internet-of-Things (IoT) are among the most important topics in the mobile communications today. 5G will be the key enabler for massive Internet of Things (IoT), particularly the cellular IoT. It is predicted that by 2024 around 10 million IoT connections will be 5G-based. This keynote will explore the challenges and requirements of 5G-IoT from technological and policy perspectives, and also discuss the potential research directions of 5G-IoT.



Tutorial Sessions



Prof. Abdehak M. Zoubir

Signal Processing Group, TU Darsmtadt, Germany

Time-Frequency Signal Analysis and Applications

Day One, 13 September 2016,
MADHUKARA A (13.00-15.00)

Abstract: Signal processing is the art to extracting information from measurements for further analysis and interpretation. In some situations where the spectral content of signals does not vary with time, Fourier based methods suffice to perform such a task. However, many signals encountered in engineering practice today are non-stationary in that their spectral content is time-varying. These measurements maybe deterministic frequency modulated signals in noise or non-stationary stochastic signals. Thus, Fourier based methods are unable to extract the useful information. Time-frequency signal analysis methods have been an area of extensive research for several decades. They have proven their power to solving problems that traditional signal processing is unable to tackle. This tutorial covers fundamentals of both parametric and non-parametric time-frequency signal analysis, as well as recent advances, including robust time-frequency array processing. The tutorial will also provide some examples of modern real-life engineering problems we encounter in today's advanced applications.



Prakash Suthar,

Principal Architect, Cisco Systems Inc, USA

Deploying Information Centric Networking in Mobile Networks

Day One, 13 September 2016,
MADHUKARA A (15.15-17.00)

Abstract: Mobile networks using 2G, 3G, or Long Term Evolution (LTE) are complex, and managing mobility and seamless handover are the key characteristics which result in protocol heavy and very complex architecture. For delivery of multimedia contents to end devices, IP unicast streams are used from server to clients where each user gets separate stream. From bandwidth and routing perspective it is highly inefficient. Multicast and broadcast technologies have emerged recently for content delivery but their deployments are very limited or experimental due to complex architecture and radio spectrum issues. Information Centric Networking (ICN) is a rapidly evolving technology for efficient multimedia contents delivery to end devices but majority of the research is focused on fixed devices. In this tutorial we will discuss about ICN features. Protocols details and how it can be deployment in mobile network for efficient delivery of contents.



Tutorial Sessions



Dr Muhamad Reza

Power System Specialist and Business Development Manager,
Solvina International, Sweden

Smart Grid: Reliable Power Systems with Integration of
Renewable Energy

Day Two, 14 September 2016,
MADHUKARA A (08.00-09.30)

Abstract: Electricity is very crucial for modern society. Especially in urban areas, people are becoming more dependent on electricity supply to perform activities within businesses, commercials, industries, transportations and households.

In the past few decades, the electricity power grid has experienced rapid developments. On one hand, the massive utilization of sensitive electronic equipment within industries and households request reliable electricity supply with both adequate quantity as well as quality. On the other hand, people's awareness to go green towards preservation of environment demand that electricity should be supplied sustainably including with renewable energy sources. This combination has challenged engineers who later, among other things, come with Smart Grid concept. Smart Grid concept focuses on integrating renewable energy generation and other new technology likes electric vehicles to existing power grid while keeps and improves whenever necessary the reliability and stability of the grid. In some countries, the concept includes to design and to operate power grid that is robust against natural disasters as well as sabotages from internal- or external sources. The complexity of the matters around Smart Grid requires cross-disciplinary approaches. In this tutorial, introduction to power systems will be given, followed by presentation about trends and challenges of smart grid and the grid integration of renewable energy.



Technical Session I

Tracks: Communications PHY and Fundamentals

Day One, 13 September (Room: MADHUKARA B)

[13.00] Design, Implementation and Characterization of an RF Translator for TVWS Communication

Patth Rick Ramirez (University of the Philippines Diliman & Wireless Communications Engineering Laboratory, Philippines); Joel Joseph Jr. S. Marciano (University of the Philippines & Wireless Communications Engineering Laboratory, Philippines)

Abstract: This study describes a radio frequency (RF) front-end add-on module that enables direct RF translation of an IEEE 802.11 signal at 2.4GHz ISM band to UHF. Specifically, the intention is to allow 2.4GHz IEEE 802.11 or WiFi-compliant radios to be used for opportunistic communication at TV white space (TVWS) frequencies. A major design criterion is to be able to faithfully translate WiFi communication at TVWS frequencies while also preventing undue interference to the primary users in said licensed TV band. In this regard, the spurious response of the RF translator is a critical consideration. The wideband nature of the UHF TV band poses a major design challenge in terms of addressing filtering requirements to suppress the unwanted responses. The flexible use of available frequency channels on the primary radio (i.e. WiFi) presents one way to address such challenge, i.e. varying the input frequencies to the mixer can provide improvement in the spurious response. Furthermore, the use of high-linearity mixer has considerable trade-offs with providing high LO power. An average TCP throughput of 6.5Mbps was achieved using a 5-MHz WiFi signal when translated to TV band. Lastly, it was emphasized that careful power and frequency planning is critical in achieving seamless and reliable TVWS communication using direct RF translation.

[13.15] Diversity Maximal Combining for Transparent Protocol with Cooperative Network Coding (CNC)

Muhammad Iqbal (Telkom University & Institut Teknologi Sepuluh November Surabaya, Indonesia); Suwadi Suwadi and Iwan Wirawan (ITS, Indonesia); Rina Pudjiastuti (Telkom University, Indonesia)

Abstract: Cooperative communication system is not able fully to solve the problems all about multipath fading, there are many parameters to decrease signal level to the receiver. The author brings the solution to embedded with network coding, this paper focus to enhance research about cooperative with network coding (CNC), using transparent protocol i.e amplify-and-forward (AF) with BPSK and QPSK modulation. We proposed system at the receiver we used diversity maximal combining as known as maximal ratio combining (MRC), that combined two parameters between source-destination (S-D) and source-relay-destination (S-R-D). Component parameters were bit error rate (BER) and throughput. The simulation results throughput showed that cooperative communication systems with network coding better than cooperative system without network coding.



Technical Session I

Tracks: Communications PHY and Fundamentals

Day One, 13 September (Room: MADHUKARA B)

[13.30] Improving LTE Throughput with Iterative Water-Filling Algorithm

Dwi Samekto Bawono, Achmad Muayyadi and Ida Wahidah (Telkom University, Indonesia)

Abstract: The frequency spectrum is an expensive and limited resource while the massive demand of telecommunication services both of data and number of connection continue to raise. The ordinary network becomes denser to meet the growing needs of the services. It can be done by introducing more cells in the network, with lower coverage than the ones that already exist or simply by splitting the existing cell, to allows a better spatial reuse of the spectrum. However, the introduction of more cells also leads to high-interference between cells (low values of Signal to Interference and Noise Ratios (SINRs)). In order to maximize the use of spectrum, it is necessary to study that behaviour and help to mitigate the interference. The research presented here focus on the use of the iterative water-filling algorithm to improve network cell throughput in LTE network. In the context of spectrum management, iterative water filling is a technique to adjust power as needed according to the conditions in the environment of interference. The results show that the proposed method can increase the overall cell throughput.

[13.45] Performance Analysis of Generalized Frequency Division Multiplexing in Various Pulse-shaping Filter for Next Generation Communication Systems

Sumarsana Sumarsana and Erna Sugesti (Telkom University, Indonesia)

Abstract: Currently, the technology of multicarrier system used by 4th generation of digital communications system is based on Orthogonal Frequency Division Multiplexing (OFDM). In one hand, this system produces multicarrier signal that robust in mitigating the destructive effect of frequency - selective fading by dividing wideband into many small/tiny frequency band to get a flat fading response. In addition they also inherit the orthogonality characteristic that not only protecting the system from Inter Symbol Interference (ISI) but by utilizing certain amount of header called cyclic prefix also can reduce the risk of Inter Carrier Interference (ICI). On the other hand, OFDM systems have downsides in emitting a high out of band (OOB) signal and high peak to average power ratio (PAPR). These characteristics are very harmful and so do not suitable in low power and higher data rate environment in the next generation communication systems. This paper exploring the impact of filters in reducing the OOB, PAPR and signal received performance by utilizing many types of pulse (which is rectangular pulse in OFDM systems). This is the more general model of frequency division multiplexing, the GFDM (generalized frequency division multiplexing), will not take the advantage of signal's orthogonality. Otherwise, it will use a type of pulse that has more effective characteristic in both time and frequency domain (time-frequency localization - TFL) to improve the system performance. Three types of filter will be exercised in this simulation i.e. raised cosine, root raised cosine, and gaussian filter.



Technical Session I

Tracks: Communications PHY and Fundamentals

Day One, 13 September (Room: MADHUKARA B)

[14.00] Optimal Full-Duplex Cooperative Spectrum Sensing in Asynchronous Cognitive Networks

Teddy Febrianto (King's College London, United Kingdom); Mohammad Shikh-Bahaei (Kings college London, United Kingdom)

Abstract: Spectrum sensing and sharing are challenging task in asynchronous cognitive networks (CNs), where there is no synchronization between primary and secondary users (PUs and SUs). In this paper, we propose combination of cooperative spectrum sensing and full-duplex communication for improving quality and throughput of both primary and secondary users in asynchronous CNs. More specifically, we have studied two types of full-duplex schemes, namely full-duplex receive-sense (FDr) and full-duplex sense (FDs). FDr allows SUs to transmit and receive data simultaneously whereas in FDs the SUs continuously sense the channel during transmission time. The average throughput is derived for secondary and primary users under both schemes and for different levels of residual self-interference (SI). We demonstrate the respective trade-offs and obtain the optimal scheme based on cooperative full-duplex spectrum sensing.

[14.15] Finite-Length Analysis for Wireless Super-Dense Networks Exploiting Coded Random Access Over Rayleigh Fading Channels

Khoirul Anwar (Telkom University, Indonesia & Japan Advanced Institute of Science and Technology, Japan); Rina Pudjiastuti (Telkom University, Indonesia)

Abstract: This paper presents finite-length performance analysis for wireless super-dense networks comprising two multiway relays (SDN-2MWR) to support full data exchange among massive number of users/devices over Rayleigh fading channels. In practice, finite-length analysis is important since the networks should serve users/devices with low latency indicated by short number of time-slots. Due to the nature of massive number of users/devices, where scheduling over massive number of users (usually in hundred or thousand) is difficult, we exploit random access with a capability of error correction resembling low density parity check (LDPC) codes. In this paper, we show that the dynamic of Rayleigh fading is even beneficial to generate two independent graphs captured by the first and the second relay without requiring all users send messages independently to each relay. Independent graphs are essential in SDN-2MWR to ensure the probability of successful decoding as high as possible and to significantly reduce error-floor in finite-length setting. Based on the theoretical network capacity bound indicating the maximum achievable traffic supported by the networks, we found that for SDN-2MWR a significant gain closer to the bound with lower packet-loss-rate (compared to the dense network with a single relay) is achievable without assuming ideal independent graph even with simple degree distributions without irregularity.



Technical Session I

Tracks: Communications PHY and Fundamentals
Day One, 13 September (Room: MADHUKARA B)

[14.30] Design of a 5 Bit Digital Phase Shifter for 1.27 GHz Phased Array L-Band SAR
Muhsin Muhsin, Bambang Nugroho and Heroe Wijanto (Telkom University, Indonesia)

Abstract: PALSAR (Phased Array L-Band SAR) is a kind of L-Band SAR (Synthetic Aperture Radar) with each antenna in the system is varied by its phase to improve its performance. The PALSAR works in 1.27 GHz with varying bandwidth according to specified PALSAR system. Phased shifter is used to control each antenna's phase. In this paper, 5 bit digital phase shifter for L-Band SAR is designed using delay line topology and PIN diode switches. The phase shifter was evaluated in 14 MHz and 28 MHz bandwidth. The result shows error less than 10% error and it has more than 90% efficiency.

[14.45] Design and Realization of A Triple Biquad Micro strip Antenna with Flat Reflector for Access Point on Site WLAN 2,4 Ghz

Muhammad Aziz and Tengku Ahmad Riza (Telkom University, Indonesia); Yuyu Wahyu (LIPI, Indonesia)

Abstract: Antenna has a high gain is one of the vital components that instrumental in long-distance wireless communication system. Antenna that is realized in this paper form microstrip antenna with the addition of flat reflector. The radiation pattern is used so that the power emitted Unidirectional focused in one direction. Triple biquad antenna with a flat reflector that has been made in accordance with the simulation modeling. VSWR is gained that is 1,104 at a frequency of 2.4 GHz. This antenna has unidirectional radiation pattern and elliptical polarization. The maximum gain that can be achieved antenna fabrication result is 10.42 dBi. The influence of the reflector antenna gain of 3.95 dBi



Technical Session II

Tracks: Communications Services and Applications
Day One, 13 September (Room: MADHUKARA B)

[15.15] RouteBoxer Library for Google Android Platform

Aryo Pinandito (Universitas Brawijaya & Fakultas Ilmu Komputer, Indonesia); Mochamad Chandra Saputra and Rizal Setya Perdana (Universitas Brawijaya, Indonesia)

Abstract: Several Android applications such as Google Maps provides map-based location information, directions, and turn-by- turn navigation to assists user while driving. The RouteBoxer algorithm to identify areas along particular route is mostly implemented as web based application whereas it quite needed in several mobile applications. This research implements the RouteBoxer algorithm as a library based on Google Maps Android API on Google Android platform using Android Studio IDE. The compiled library file or the library project source code can be imported into an Android application project as an Android application project module. This is research also describes on how the algorithm would perform based on the amount of data provided and the results show that the RouteBoxer algorithm has exponential growth rate.

[15.30] Examine Influence Factors of Webinar Adoption (Case Study At ABC University)

Muhammad Nicky Has Has, Nick (University of Telkom & Telkom, Indonesia); Indrawati Indrawati (Telkom University, Indonesia)

Abstract: Colleges and universities are entering a new era where more students' learning are outside of the classroom than within it. This learning is enriched by new instructional technologies and online interaction that enables the spectrum of in-classroom, distance and blended learning. Students benefit from the ability to choose the mix of course types that best fits their learning style and available time. The primary contribution of this research is understanding the influencing variable of students' intention on adopting technology. The study was conducted by giving a questionnaire to 170 students who expressed in writing their willingness to be respondents and some of the students through deep interview. The reliability of the questionnaire is tested by the Cronbach's Alpha technique, the Validity by Pearson Product Moment Correlation technique using SPSS 17. The analysis technique to test the hypothesis based on Partial Least Square Structural Equation Modelling (PLS SEM) by using SmartPLS 2.0. The result shows that the proposal model of performance expectancy, effort expectancy, social influence, facilitating condition, attitude toward behavior, content quality and pedagogy have strong predictive power for measuring the students' behavioral intention with $R^2=61\%$. Behavioral intention has strong predictive power for measuring the students' use behavior with $R^2=52\%$. Following to the results, one of the challenges of distance learning program is the distance between the students and the lecturer. The researcher believes that the distance makes the communication has bigger possibility for any distraction and the engagement between students and lecturer are lesser than in conventional class.



Technical Session II

Tracks: Communications Services and Applications

Day One, 13 September (Room: MADHUKARA B)

[15.45] Human Tracking in Certain Indoor and Outdoor Area by Combining the Use of RFID and GPS

Daniel P Hutabarat, Robby Saleh and Santoso Budijono (Bina Nusantara University, Indonesia); Rinda Hedwig (University of Bina Nusantara, Indonesia)

Abstract: A similar research experiment on the use of global positioning system (GPS) had successfully been published in 2014 [1]. In this paper, the research was continued by combining radio-frequency identification (RFID) and GPS in order to get better human tracking in both indoor and outdoor area. For indoor tracking, an RFID tag was carried by a user and continually read whenever he/she accessed a room while GPS was used mainly when the user was staying outdoor. GPS would be automatically activated whenever the user leaved the room 3 meters away. The accuracy of this tracking was 100% and the GPS could allocate the user every 3.27 meters. Thus this application is suitable to track the human position for both indoor and outdoor.

[16.00] Automatic Arowana Raiser Controller Using Mobile Application Based on Android

Nurliani Ritonga and Agung Nugroho Jati (Telkom University, Indonesia); Rifki Wijaya (Institut Teknologi Bandung, Indonesia)

Abstract: There is a lot of hobbyist of Arowana. Even though raising an Arowana is not as easy as the other fishes, people tend to keep it as a hobby. It somehow makes the hobbyist spend a lot of time to make sure their Arowana is raised properly. The purpose of this research is to make an Android application that will make raising an Arowana so much easier. It can take control and monitor the devices such as temperature sensor, feeding equipment, the aerator for water treatment and webcam for capturing an image inside the aquarium.

[16.15] Performance Evaluation of HTTP-CoAP Proxy for Wireless Sensor and Actuator Networks

Adika Sulaeman and Fransiskus Ekadiyanto (Universitas Indonesia, Indonesia); Riri Fitri Sari (University of Indonesia, Indonesia)

Abstract: One of the main challenges in integrating wireless sensor networks with the Internet is the need of intermediary mechanism for interconnecting two different protocols, i.e. Hypertext Transfer Protocol (HTTP) and Constrained Application Protocol (CoAP), allowing users to access the sensors over standard Unified Resource Locator (URL). Such mechanism can be implemented using a cross-protocol reverse proxy. This paper focuses on the design, implementation and evaluation of the HTTP-CoAP proxy prototype for wireless sensor and actuator networks with HTTP-CoAP mapping and caching mechanism. The designed proxy was able to handle 25 requests per second in real time. The proxy had a linear increment of latency with respect to the number of clients by the scale of 23.667. The caching mechanism in the proxy was proven to effectively reduce the latency with the effective value of 5 to 20 seconds of the maximum age of the data in the cache.



Technical Session II

Tracks: Communications Services and Applications

Day One, 13 September (Room: MADHUKARA B)

[16.30] SDN Controller Placement Design for Large Scale Production Network
Muhammad Effendy (Telkom University & PT Telekomunikasi Indonesia, Indonesia); Rendy Munadi (Telkom University, Indonesia); Sofia Hertiana (Institut Teknologi Bandung & Telkom University, Indonesia)

Abstract: Software-Defined Network (SDN) architecture offers many advantages related to flexibility, higher network programmability and simplicity of application service development. On the other hand, this architecture leaves a number of issues related to scalability, reliability and performance (such as delay and control communication overhead) to be applied to large-scale networks such as the Service Provider / Wide Area Networks (WAN). This research proposes design solutions of controller placement on well-established traditional existing legacy network with a large number of nodes, million of users and various services. SDN design topology created by taking into consideration the configuration of traditional existing network to ensure reliability, the design begins by setting a 'candidate' where to place the controller selected based router/switch with high processing bandwidth on a legacy network and taking into account the maximum propagation delay and other parameters of POCO framework and load of the controller to ensure that every controller load on the network can not exceed the capacity of the controller itself. Controller placement design that taking into account controller candidate with high processing bandwidth gives more optimal placement when desingning SDN Network. The simulation results give better controller load balancing and resiliency.

[16.45] Enhancing Spam Detection on Mobile Phone Short Message Service (SMS) Performance Using FP-Growth and Naive Bayes Classifier
Shaufiah Shaufiah, Dea Delvia Arifin and Moch Arif Bijaksana (Telkom University, Indonesia)

Abstract: SMS (Short Message Service) is still the primary choice as a communication medium even though nowadays mobile phone is growing with a variety of communication media messenger applications. However, nowadays along with the sms tariff reduction leads to the increase of SMS spam, as used by some people as an alternative to advertise and fraud. Therefore, it becomes an important issue as it can bug and harm the users and one of its solution is with automatic sms spam filtering. One of most challenging in sms spam filtering is its accuracy. In this research we proposed to enhanced sms spam filtering performance by combining two of data mining task association and classification. FP-growth in association is utilized for mining frequent pattern on sms and Naive Bayes Classifier is used to classify whether sms is spam or ham. Training data was using sms spam collection from previous research. The result of using collaboration of Naive Bayes and FP-Growth performs the highest average accuracy of 98, 506% and 0,025% better than without using FP-Growth for dataset SMS Spam Collection v.1, and improves the precision score; thus, the classification result is more accurate.



Technical Session III

Tracks: Mobile and Wireless Networks
Day Two, 14 September (Room: MADHUKARA B)

[08.00] Performance Analysis of a Novel Decentralised MAC Protocol for Cognitive Radio Networks

Wajdi Alhakami, Ali Mansour and Ghazanfar A. Safdar (University of Bedfordshire, United Kingdom)

Abstract: Due to the demand of emerging Cognitive Radio (CR) technology to permits using the unused licensed spectrum parts by cognitive users (CUs) to provide opportunistic and efficient utilization of the white spaces. This requires deploying a CR MAC with the required characteristics to coordinate the spectrum access among CUs. Therefore, this paper presents the design and implementation of a novel Medium Access Control (MAC) protocol for decentralized CRNs (MCRN). The protocol provides efficient utilizations of the unused licensed channels and enables CUs to exchange data successfully over licensed channels. This is based on the observation procedure of sensing the status of the Licensed Users (LUs) are ON or OFF over the licensed channels. The protocol is validated with the comparison procedure against two different benchmark protocols in terms of the network performance; communication time and throughput. Therefore, performance analysis demonstrated that the proposed MCRN perform better and achieve higher throughput and time benefits than the benchmarks protocols.

[08.15] User Cooperation in a Multi-Hop Network with Multi-Interface Devices for Energy Efficiency

Riyanto Jayadi (National Taiwan University of Science and Technology, Taiwan); Yuan-Cheng Lai (Information Management, NTUST, Taiwan)

Abstract: Battery-operated mobile devices may lose their freedom of mobility because of their dependence on being in close proximity to a power outlet as applications with higher computation and processing capabilities consume more energy and drain battery life faster. One of the techniques used to minimize energy consumption in battery-operated mobile devices is user cooperation at the time of wireless transmission. In this paper, we formulate minimization of energy consumption through user cooperation routing in mobile devices that have multi-interfaces under a multi-hop network. User cooperation optimization will be exploited by selecting a short-range wireless communication that has the lowest energy consumption as a proxy for establishing long-range wireless communication. Two algorithms are proposed to solve the problem. Simulation results show that both algorithms are able to solve this cooperation problem and optimize energy efficiency.



Technical Session III

Tracks: Mobile and Wireless Networks

Day Two, 14 September (Room: MADHUKARA B)

[08.30] Analysis Effect of Discrete Wavelet Transform in Multi Carrier Code Division Multiple Access

Julika Givary, Rina Pudjiastuti and Ledy Novamizanti (Telkom University, Indonesia)

Abstract: Multicarrier Code Division Multiple Access (MC-CDMA) is a solution for high speed data transfer and reliable system quality. MC-CDMA have advantage that robust to frequency selective fading and Multiple Access Interference (MAI) so can be used for system that need high bandwidth and high capacity of users. The conventional MC-CDMA system using Discrete Fourier Transform (DFT) still has flaws, there are high Peak to Average Power Ratio (PAPR) and low mitigation to interference. This paper will analyze MC-CDMA using Discrete Wavelet Transform (DWT) instead of the Discrete Fourier Transform (DFT). The different that DWT have is not requiring the use of cyclic prefix (CP) to mitigate inter symbol interference (ISI). DWT MC-CDMA and MC-CDMA DFT will be tested in multipath Rayleigh Fading channels to analyze which system has a better quality with the parameters of the test are the BER and PAPR.

[08.45] Performance Comparison of Orthogonal Wavelet Division Multiplexing (OWDM) System Using Discrete Wavelet Transform and Wavelet Packet Transform on Rayleigh Channel

Yuyun Siti Rohmah (Telkom University, Indonesia); Dwi Andi Nurmantris (Telkom University, Indonesia); Irwan Dinata (University of Bangka Belitung, Indonesia)

Abstract: Orthogonal Wavelet Division Multiplexing is a multicarrier technique base on wavelet transform. It is an alternative technique of Orthogonal Frequency Division Multiplexing System in wireless communication. Fourier transform and inverse Fourier transform of OFDM is exchanged by wavelet transform and inverse wavelet transform. The Scheme of OWDM is consist of decomposition filter bank as modulator on transmitter and reconstruction filter bank as demodulator on receiver. The advantage of OWDM system is reduces complexity Fourier Transform of OFDM system, flexibility and optimal resolution. This paper compared two schemes of OWDM system using discrete wavelet transform and packet wavelet transform. The result show that performance of OWDM system based discrete wavelet is better than wavelet packet. However, the number of sub-band in discrete wavelet cannot be more like in OWDM that is using wavelet packet. This is because the division bandwidth on OWDM based discrete wavelet is not same for each level of decomposition and reconstruction process.



Technical Session III

Tracks: Mobile and Wireless Networks
Day Two, 14 September (Room: MADHUKARA B)

[09.00] MIMO MC-CDMA with Differential Unitary Space Time Frequency Modulation for Fast Fading Environment

Dhoni Setiawan and Rina Pudjiastuti (Telkom University, Indonesia); Sugi Sugihartono (Bandung Institute of Technology, Indonesia)

Abstract: Transmission technique with coherent receiver that widely employed nowadays needs good channel estimation to give good transmission performance. However, there are conditions where channel information practically cannot be acquired, for example if the channel condition is rapidly changing (fast fading channel). Non coherent scheme without channel information is considered as the most potential scheme to combat this kind of channel. In this paper the combination between MC-CDMA and Differential Unitary Space Time Frequency Modulation (DUSTFM) with non-coherent detection process for downlink transmission side is analysed. The simulations result show non-coherent transmission scheme combining MIMO MC-CDMA and DUSTFM is a very potential scheme to combat the fast fading channel.



Technical Session IV

Tracks: Mobile and Wireless Networks
Day Two, 14 September (Room: MADHUKARA B)

[09.45] The Efficiency-Fairness Trade-Off of Social-Rank-based Forwarding in Social Opportunistic Networks

Bambang Soelistijanto (Sanata Dharma University, Indonesia)

Abstract: Social-rank-based forwarding algorithms favour the most popular nodes as the most likely relay nodes to deliver messages to the destinations. When these strategies are able to deliver messages with a high success rate and a low delay in social opportunistic networks (SONs), this however creates unbalanced load distribution, where the most popular nodes carry a much heavier burden compared to others. In this paper, we analyze the efficiency and fairness trade-off of social-rank-based forwarding strategies in SONs. Initially, we investigate the node popularity distribution in real-life SONs. We confirm that the node popularity is power-law distributed, with the existence of a few hub nodes that have many connections with other nodes and therefore are much popular in the entire network. Subsequently, we apply a social-rank-based forwarding algorithm on these human-centric networks. Moreover, we perform two distinct scenarios as follows. In the first scenario, we consider absolute delivery efficiency and examine the impact that hub nodes have on the network delivery performance. We show that these nodes enable the network to deliver messages with a high probability in a low delay; however, this consumes much resources on the central nodes. In the second scenario, in contrast, we consider the absolute fairness of resource allocation across the network nodes. We confirm that maintaining this fairness significantly degrades the network delivery performances.

[10.00] Optimization of Channel Allocation in Wireless Body Area Networks by Means of Reinforcement Learning

Tauseef Ahmed, Faisal Ahmed and Yannick Le Moullec (Tallinn University of Technology, Estonia)

Abstract: In this paper, we propose a novel algorithm for channel assignment in wireless body area networks. The proposed approach is based on the machine learning sub-domain known as reinforcement learning, and is named reinforcement learning - channel assignment algorithm (RL - CAA). RL - CAA interacts with the environment in an unsupervised way and selects the optimal frequency channel for the wireless sensor nodes. RL-CAA also takes into consideration the traffic load conditions and assigns the optimal number of channels to fulfill the minimum throughput requirement of the system. The algorithm is evaluated by means of a simulator tool based on IEEE 802.15.6 specifications and developed in MATLAB. The simulator allows comparing our algorithm with classical static channel assignment algorithm. Our proposed algorithm gives better error rate performance which is average 30% better than static channel assignment. Since the error rate is reduced, hence it algorithm also proves better in terms of throughput by giving an average of 77.3 kbps over static channel assignment. Our proposed algorithm proves better in the terms of traffic load considerations and is more dynamic to the change in the load.



Technical Session IV

Tracks: Mobile and Wireless Networks

Day Two, 14 September (Room: MADHUKARA B)

[10.15] Homogeneous Interference Mitigation Techniques for Wireless Body Area Network Under Coexistence: A Survey

Sajid Farid (Bahria University, Islamabad Pakistan, Pakistan); Yousaf Zia (Bahria University, Pakistan); Arshad Farhad (COMSATS Institute of Information Technology, Pakistan); Faisal Bashir Hussain (Bahria University, Islamabad, Pakistan)

Abstract: Wireless Body Area Network (WBAN) enables the monitoring of vital human parameters using on and in body sensor devices. IEEE 802.15.6 standard defines the medium access and physical layer characteristics for WBANs. Body area networks use the unlicensed 2.4 GHz frequency band and have very limited communication power. Communication of WBAN is affected severely by interference due to coexistence with WBANs and/or other wireless networks. Different solutions are proposed in existing literature for interference mitigation due to coexistence. To the best of our knowledge, a comprehensive survey of interference mitigation techniques especially compiled for IEEE 802.15.6 is not present. In this paper, we discuss and categorize the existing interference mitigation strategies for WBAN. Furthermore, this paper evaluates the performance of various existing strategies in terms of their mitigation capacity, communication overhead, processing overhead and energy consumption.

[10.30] Deploying Information Centric Networking in LTE Mobile Networks

Prakash Suthar and Milan Stolic (Cisco Systems, USA)

Abstract: Mobile networks using 2G, 3G, or Long Term Evolution (LTE) are complex, and managing mobility and seamless handover are the key characteristics which result in protocol heavy and very complex architecture. For delivery of multimedia contents to end devices, IP unicast streams are used from server to clients where each user gets separate stream. From bandwidth and routing perspective it is highly inefficient. Multicast and broadcast technologies have emerged recently for content delivery but their deployments are very limited or experimental due to complex architecture and radio spectrum issues. Information Centric Networking (ICN) is a rapidly evolving technology for efficient multimedia contents delivery to end devices but majority of the research is focused on fixed devices. Our paper focuses on how ICN can be used in mobile networks for efficient content delivery to mobile devices. This paper discusses about different strategies and options for deploying ICN. This paper also discusses about ICN characteristics for mobile networks including protocols and technology gaps. The findings are based on simulation of different use cases.



Technical Session IV

Tracks: Mobile and Wireless Networks
Day Two, 14 September (Room: MADHUKARA B)

[10.45] Implementation of Stream Cipher Salsa20 Algorithm to Secure Voice on Push to Talk Application

Diyana Afdhila, Surya Michrandi Nasution and Fairuz Azmi (Telkom University, Indonesia)

Abstract: Currently, the development of technology is progressing very fast, as well as information on the media technologies such as Push to Talk. But the level of information security of voice data that is sent is still not assured. Confidential information security should be increased because it is required by cryptography method to maintain data confidentiality of such information. This final research project will also design and make a Push to talk application. In this study the authors will examine the security of voice data using Salsa20 as a stream cipher Cryptography algorithms. This study aims to analyze the performance of the Stream Cipher Salsa20 Algorithm by parameters: encryption and decryption processing time, the avalanche effect. From the result of avalanche effect testing, we can see that salsa20 has a good performance on data security.



Venue

GRAND ROYAL PANGHEGAR

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Grand Royal Panghegar Hotel is located within walking distance of the historic Braga Street (Jalan Braga). It provides free Wi-Fi, a restaurant and ATMs for guest convenience.

The Location

Enjoying a central location in Bandung, Grand Royal Panghegar offers convenient access to the Asia Africa Museum. The property is a 5 minute drive from Bandung's business district and a 15 minute drive from Husein Sastranegara International Airport.

Inside the Rooms

Rooms at Grand Royal Panghegar have a TV, safe and tea/coffee making amenities. Attached bathrooms come equipped with a bathtub and shower. The studios have kitchenettes, a dining area and a flat-screen TV.

Property Highlights

For guests' travel and professional needs, the hotel has a tour desk and a business center. Laundry and dry cleaning services are available.

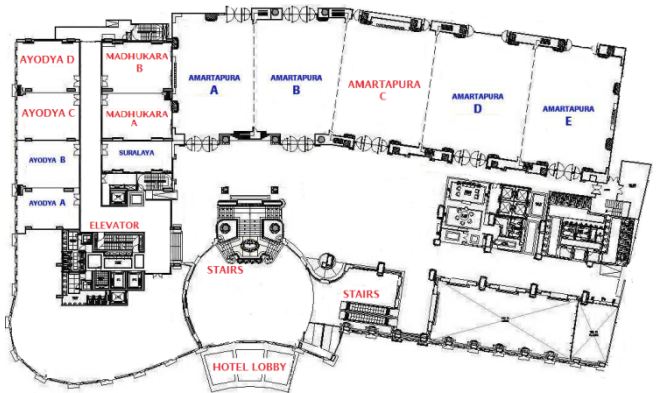
Food & Drink

Grand Royal Panghegar's restaurant serves Indonesia, Chinese and Western dishes. Room service is also available.

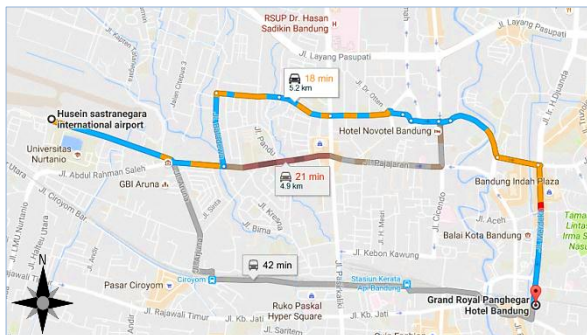


Floor Map of Conference Rooms

The picture below shows the layout of the APWiMob 2016 conference rooms:



Transportation To and From Hotel



In downtown, this refined, art deco-inspired, Grand Royal Panghegar Hotel is a 5-minute walk from the chic cafes and boutiques of Braga Street, a 12-minute walk from Bandung train station and 6 km from Husein Sastranegara International Airport.

From here, guests can enjoy easy access to all that the lively city has to offer. With its convenient location, the hotel offers easy access to the city's must-see destinations.