

37th International Communications Satellite Systems Conference (ICSSC 2019)

Advances in Communications
Satellite Systems

IET Conference Publications 774

Okinawa, Japan
29 October – 1 November 2019

ISBN: 978-1-7138-2880-8

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2019) by the Institution of Engineering and Technology
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact the Institution of Engineering and Technology
at the address below.

Institution of Engineering and Technology
P. O. Box 96
Stevenage, Hertfordshire
U.K. SG1 2SD

Phone: 01-441-438-767-328-328
Fax: 01-441-438-767-328-375

www.theiet.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

COMMUNICATIONS SATELLITE SYSTEMS: RETROSPECT AND PROSPECT	1
<i>Ifiok Otung, Thomas Butash, Tetsushi Ikegami</i>	
THE RESULTS OF WINDS EXPERIMENTS OF NICT	9
<i>Tajkashi Takahashi, Naoko Yoshimura, Kaszuyoshi Kawasaki, Tomoshige Kan, Byeongpyo Jeong, Morio Toyoshima</i>	
REPORT OF 3.2 GBPS TRANSMISSION EXPERIMENT RESULT USING WINDS SATELLITE	22
<i>Kenji Suzuki, Masatomo Yahata, Tetsuya Watanabe, Kenichi Hoshi, Tamio Okui, Yoshiki Arakawa, Toshio Asai, Tomoshige Kan, Takashi Takahashi, Morio Toyoshima</i>	
DISASTER COUNTERMEASURE EXPERIMENTS USING WINDS AND THE RESPONSE OF 2016 KUMAMOTO EARTHQUAKES	32
<i>Byeongpyo Jeong, Hajime Susukita, Tomoshige Kan, Kazuyoshi Kawasaki, Takashi Takahashi</i>	
SATELLITE INTEGRATED COMMUNICATION SYSTEM FOR MARINE ROBOTS OPERATIONS	49
<i>Hiroshi Yoshida</i>	
EVOLUTION OF KA-BAND ON-THE-MOVE TERMINALS FOR LAND AND MARITIME BROADBAND COMMUNICATIONS	60
<i>Marshall Lewis, John Ness, John Logan, Tomoshige Kan, Takashi Takahashi, Naoko Yoshimura, Morio Toyoshima</i>	
MEGA-CONSTELLATIONS AS ENABLER OF AUTONOMOUS SHIPPING	72
<i>Anastasia Yastrebova, Marko Hoyhtya, Mikko Majanen</i>	
ON DECODING STRATEGIES FOR SATELLITE UPLINK ASYNCHRONOUS RANDOM ACCESS CHANNELS	88
<i>Farbod Kayhan, Nader Alagha</i>	
SOFTWARE-DEFINED RADIO IMPLEMENTATION OF UHF RFID TAGS IN 5G INTERNET OF THINGS APPLICATION	97
<i>Gursajan Singh</i>	
ENERGY-EFFICIENT USER TERMINALS FOR INTERNET OF THINGS APPLICATIONS OVER SATELLITE	106
<i>Uyen L. Dang, Henrik Zessin, Christian Rohde, Florian Leschka</i>	
RISING ABOVE THE CLOUD: TOWARD HIGH-RATE DELAY-TOLERANT NETWORKING IN LOW EARTH ORBIT	119
<i>Alan Hylton, Daniel Raible, Gilbert Clark, Rachel Dudukovich, Brian Tomko, Laura Burke</i>	
INTEGRATION OF HIGH-PERFORMANCE V-BAND GAN MMIC HPA FOR THE QVLIFT PROJECT	136
<i>Alejandro Rodriguez, Jaime Cagigas, Noelia Santos, Joel Moron, Fabio Vitobello, Giorgia Parca, Giuseppe Valente, Giuseppe Codispoti</i>	
PERFORMANCE STUDY OF FREQUENCY FLEXIBILITY IN HIGH-THROUGHPUT SATELLITES AND ITS CONTRIBUTION TO OPERATIONS STRATEGY	147
<i>Yuma Abe, Mitsugu Okawa, Amane Miura, Kazunori Okada, Maki Akioka, Morio Toyoshima</i>	

SATELLITE EXPERIMENTS ON DIRECT SPECTRUM DIVISION TRANSMISSION OVER MULTIPLE TRANSPONDERS	157
<i>Fumihiko Yamashita, Daisuke Goto, Yasuyoshi Kojima, Hiroki Shibayama, Hiroyuki Kobashi, Daiki Haraguchi</i>	
USER TERMINAL WIDEBAND MODEM FOR VERY HIGH THROUGHPUT SATELLITES	170
<i>Steven Kisseleff, Nicola Maturo, Symeon Chatzinotas, Helge Fanebust, Bjarne Risløw, Kimmo Kansanen, Matthieu Arzel, Hans C. Haugli</i>	
LICENSED SHARED ACCESS TESTBED FOR INTEGRATED SATELLITE-TERRESTRIAL COMMUNICATIONS: THE ASCENT PROJECT	188
<i>Marko Hoyhtya, Mikko Majanen, Mika Hoppari, Pertti Jarvensivu, Heikki Kokkinen, Arto Reis-Kivinen, Jaakko Ojaniemi, Olivier Pellay, Duc Pham Minh</i>	
COGNITIVE COMMUNICATIONS FOR NASA SPACE SYSTEMS	202
<i>David Chelmins, Janette Briones, Joseph Downey, Gilbert Clark, Adam Gannon</i>	
SUPPORTING NASA ARTEMIS 1 MISSION WITH JAXA UCHINOURA STATION	218
<i>Timothy Pham, Hiroshi Takeuchi, Atsushi Tomiki</i>	
IMPLEMENTATION OF THE METHOD FOR ESTIMATING PROPAGATION DIRECTION OF LASER BEAM TRANSMITTED FROM GROUND TO SATELLITE	226
<i>Hiroki Yamashita, Yoshihisa Takayama</i>	
STUDIES ON SITE DIVERSITY TO MITIGATE CLOUD BLOCKAGE IN SATELLITE- GROUND OPTICAL COMMUNICATIONS BASED ON LONG TERM GROUND METEOROLOGICAL OBSERVATION DATA	236
<i>Yuki Ueda, Tatsuya Mukai, Yoshihisa Takayama</i>	
OVERVIEW OF OPTICAL GROUND SYSTEMS DEVELOPMENTS FOR NETWORK SWITCHING CONTROLS TO AVOID CLOUD BLOCKAGE IN SPACE OPTICAL DIRECT COMMUNICATIONS	250
<i>Tatsuya Mukai, Yoshihisa Takayama, Tomohiro Araki</i>	
DEMONSTRATION OF HIGH-SPEED PIXELATED ACQUISITION AND TRACKING SYSTEM FOR OPTICAL INTERSATELLITE LINKS	264
<i>Alan Scott, Danya Hudson, Hugh Podmore, Elliott Coleshill</i>	
AN EXPERIMENTAL STUDY OF RF OPTICAL TRANSFORMATION FUNCTION	272
<i>Yutaka Oshima, Takuo Goda, Hiroaki Miyoshi, Masahide Hamamoto, Masaki Tanaka</i>	
BEAM-HOPPING SYSTEM CONFIGURATION AND TERMINAL SYNCHRONIZATION SCHEMES	280
<i>Christian Rohde, Doron Rainish, Avraham Freedman, Guy Lesthievant, Nader Alagha, Danielle Delaruelle, Gerhard Mocker, Xavier Giraud</i>	
ANTENNA PATTERN EVALUATION FORMED BY RECONFIGURABLE ANTENNAS WITH THE CONFIGURATION OF AN ARRAY-FED REFLECTOR	293
<i>Yoshio Inasawa, Hitomi Ono, Masaaki Kusano, Arimasa Kanasashi, Toshiyasu Tsunoda, Terumi Sunaga, Nobuyoshi Horie, Eiichi Sakai</i>	
ADAPTIVE CODING AND MODULATION (ACM) AND POWER CONTROL SCHEME FOR RETURN LINK OF DVB-RCS2 SATELLITE SYSTEM	298
<i>Dong-Hyun Jung, Min-Su Shin, Joon-Gyu Ryu</i>	

A STUDY OF FREQUENCY UTILIZATION EFFICIENCY OF OFDMA ADAPTIVE CODING AND MODULATION ON KA-BAND SATELLITE COMMUNICATIONS SYSTEM	308
<i>Mitsugu Ohkawa, Hiromitsu Wakana, Amane Miura</i>	
GALLIUM NITRIDE MMIC POWER AMPLIFIER FOR USE IN KA-BAND HTS APPLICATIONS	325
<i>Jim Sowers, Ghislain Turgeon, Rabindra (Rob) Singh, Hampton Chan</i>	
TECHNOLOGICAL TRENDS AND FUTURE PROSPECTS OF SATELLITE COMMUNICATIONS FOR MEGA-CONSTELLATIONS WITH SMALL SATELLITES.....	336
<i>Morio Toyoshima</i>	
COMMERCIAL COMMUNICATIONS SATELLITES IN THE POST-2020 ERA	344
<i>Bruce R. Elbert</i>	
5G AND BEYOND FOR NEW SPACE: VISION AND RESEARCH CHALLENGES	360
<i>Marko Hoyhtya, Marius Corici, Stefan Covaci, Maria Guta</i>	
DIRECTION OF SATCOM R&D IN JAPAN: WINDS, ETS-IX, AND BEYOND	376
<i>Naoto Kadowaki</i>	
DEVELOPMENT OF HIGHLY MAINTAINABLE AND RELIABLE RF TRANSCEIVER FOR SATELLITE BASE STATIONS	384
<i>Munehiro Matsui, Akira Matsushita, Fumihiko Yamashita</i>	
FAN-FOLD KA-BAND LARGE REFLECTOR AND ITS APPLICATIONS	397
<i>Kentaro Nishi, Satoru Ozawa, Kazuyuki Nakamura, Nobuko Nakamura</i>	
THE REDUCTION OF MEASUREMENT POINT FOR SELF-CALIBRATION METHOD OF SYSTEMATIC ERRORS FOR DBF ANTENNA USING GATING PROCESS	410
<i>Takuya Okura, Amane Miura, Teruaki Orikasa, Shinji Senba</i>	
CALIBRATION METHOD FOR ARRAY ANTENNA CONSIDERING MUTUAL COUPLING IN MOBILE SATELLITE COMMUNICATIONS.....	420
<i>Hiroyuki Tsuji, Yuma Abe, Tomotada Kondo, Yuiko Kikuchi, Shuichi Adachi</i>	
ANALYSIS OF THE IMPACT OF TURBULENCE ON ADAPTIVE OPTICS GROUND STATION PERFORMANCE	428
<i>Kenneth J. Grant, Kerry A. Mudge, Bradley A. Clare, Francis Bennet, Brett D. Nener, Dilusha Silva</i>	
A 40-YEAR CLOUD CLIMATOLOGICAL STUDY FOR AUSTRALIA IMPLICATIONS FOR SITING OF LASER COMMUNICATION INFRASTRUCTURE	441
<i>Helen C. Chedzey, David E. Herne, Mervyn J. Lynch, Brett D. Nener, Kenneth J. Grant, Kerry A. Mudge, Bradley A. Clare</i>	
EXPERIMENTAL RESULTS OF SEASONAL VEGETATION CHANGES ON DATA TRANSMISSION FOR KA-BAND MOBILE SATELLITE COMMUNICATION	456
<i>Tomoshige Kan, Byeongpyo Jeong, Hajime Susukita, Kazuyoshi Kawasaki, Takashi Takahashi, Morio Toyoshima</i>	
EXPERIMENTAL STUDY OF EXTERNAL INTERFERENCE FOR LEO-BASED AUTOMATIC IDENTIFICATION SYSTEM (AIS)	468
<i>Daichi Hirahara, Toshiyuki Nishibori, Toshiyoshi Kimura, Shuji Shimizu, Junichiro Ishizawa, Shinichi Sobue, Satoko Miura, Shinichi Suzuki</i>	

ADVANCED DEMONSTRATION PLANS OF HIGH-SPEED LASER COMMUNICATION “HICALI” MISSION ONBOARD THE ENGINEERING TEST SATELLITE 9	478
<i>Yasushi Munemasa, Yoshihiko Saito, Alberto Carrasco-Casado, Dimitar R. Kolev, Phuc V. Trinh, Hideki Takenaka, Kenji Suzuki, Toshihiro Kubo-Oka, Tetsuharu Fuse, Hiroo Kunimori, Koichi Shiratama, Yasuhiro Takahashi, Morio Toyoshima</i>	
OPTICAL COMMUNICATION EXPERIMENT WITH MICROSATELLITE BODY-POINTING USING VSOTA ON RISESAT	485
<i>Hideki Takenaka, Hiroo Kunimori, Toshinori Kuwahara, Yuji Sakamoto, Shinya Fujita, Homio Tomio, Morokot Sakal, Junichi Kurihara, Toshihiro Kubo-Oka, Tetsu Fuse, Morio Toyoshima</i>	
RESEARCH AND DEVELOPMENT OF AN OPTICAL GROUND STATION SUPPORTING BOTH GEO- AND LEO-TO-GROUND LINKS	492
<i>Dimitar R. Kolev, Koichi Shiratama, Hideki Takenaka, Alberto Carrasco-Casado, Yoshihiko Saito, Morio Toyoshima</i>	
OPTICAL OBSERVATIONS OF NONOPERATIONAL SATELLITES IN GRAVEYARD ORBITS	501
<i>Michelle K Turberfield, Tetsuharu Fuse, Toshihiro Kubo-Oka</i>	
DEVELOPMENT OF KA-BAND DIGITAL BEAM FORMING ANTENNA PAYLOAD FOR THE ENGINEERING TEST SATELLITE-9	511
<i>Eiichi Sakai, Yoshio Inasawa, Masaaki Kusano, Hitomi Ono, Arimasa Kanasash, Nobuyoshi Horie, Terumi Sunaga, Toshiyasu Tsunoda</i>	
THE INITIAL STUDY OF CALIBRATING RECEIVING DIGITAL BEAM FORMING IN ENGINEERING TEST SATELLITE-9	517
<i>Hitomi Ono, Eiichi Sakai, Yoshio Inasawa, Masaaki Kusano, Arimasa Kanasashi, Nobuyoshi Horie, Terumi Sunaga, Toshiyasu Tsunoda</i>	
BEAM PATTERN OPTIMIZATION BASED ON UP/DOWNLINK INFORMATION FOR MULTIBEAM SATELLITE COMMUNICATION SYSTEMS	524
<i>Kazuma Kaneko, Shigenori Tani, Shigeru Uchida, Hiroshi Aruga</i>	
CHANNEL STATE MODELING AND PERFORMANCE EVALUATION OF DVB-S2X BASED BROADBAND LAND MOBILE SATELLITE COMMUNICATION SYSTEMS	537
<i>Burak Unal, Abdulkareem Karasuwa, Ashraf Ali, Nicholas Avlonitis, Jonathan Rodriguez, Ifiok Otung</i>	
IMPACT OF ANTENNA AND PROPAGATION MODELS ON COEXISTENCE OF 5G AND FIXED SATELLITE SERVICES	551
<i>Sahana Raghunandan, Christian Rohde, Jeffrey H. Reed</i>	
INTEGRATED SPACE-ENABLED HYBRID 5G-V2X COMMUNICATIONS LINK MODELING.....	569
<i>Solomon Udeshi, Mfonobong Uko, Muazzam Zafar, Arslan Altaf, Bamidele Adebisi, Sunday Ekpo</i>	
K/KA-BAND TRANSCEIVER SENSITIVITY MODELING AND LINK CHARACTERIZATION FOR INTEGRATED 5G-LEO COMMUNICATION APPLICATIONS	586
<i>Mfonobong Uko, Muazzam Zafar, Arslan Altaf, Solomon Udeshi, Sunday Ekpo, Bamidele Adebisi</i>	

LINK BUDGET DESIGN FOR INTEGRATED 5G-LEO COMMUNICATION APPLICATIONS	597
<i>Mfonobong Uko, Muazzam Zafar, Arslan Altaf, Solomon Udeshi, Sunday Ekpo, Bamidele Adebisi</i>	
SECRET KEY AGREEMENT FOR SATELLITE LASER COMMUNICATIONS	606
<i>Hiroyuki Endo, Masahide Sasaki</i>	
METHODS FOR SECURING SPACECRAFT TASKING AND CONTROL VIA AN ENTERPRISE ETHEREUM BLOCKCHAIN	617
<i>David Hyland-Wood, Peter Robinson, Roberto Saltini, Sandra Johnson, Christopher Hare</i>	
PAPR REDUCTION AND DIGITAL PREDISTORTION FOR 5G WAVEFORMS IN DIGITAL SATELLITE PAYLOADS	633
<i>Ovais Bin Usman, Thomas Delamotte, Andreas Knopp</i>	
EFFECTS OF DIFFERENTIAL OSCILLATOR PHASE NOISE IN PRECODING PERFORMANCE	646
<i>Liz Martinez Marrero, Juan C. Merlano Duncan, Jorge Querol, Symeon Chatzinotas, Adriano J. Camps Carmona, Bjorn Ottersten</i>	
GNSS-ASSISTED ACQUISITION TECHNIQUE FOR LTE OVER SATELLITE	661
<i>Xiangdong Liu, Dilip Gokhale</i>	
INFORMATION RATE AND QUALITY OF SERVICE GUARANTEES FOR END-TO-END DATA FLOWS IN AN NGSO SATELLITE NETWORK.....	670
<i>Dilip S. Gokhale, Anshul Kantawala, Piya Bhaskar</i>	
A NEW OPTIMIZATION TOOL FOR MEGA-CONSTELLATION DESIGN AND ITS APPLICATION TO TRUNKING SYSTEMS	679
<i>Steven Kisseleff, Bhavani Shankar, Danilo Spano, Jean-Didier Gayraud</i>	
ESTIMATION AND COMPENSATION OF TIMING DRIFT FOR NR-BASED NTN SYSTEM	694
<i>Jianwei Zhou, Hejia Luo, Chenlei Xu, Zhenjun Jiang, Jun Wang, Bin Wang, Liang Hu, Rong Li</i>	
SPECTRUM SHARING SCHEMES IN INTEGRATED SATELLITE-TERRESTRIAL NETWORK	706
<i>Yang Mingchuan, Guan Xin, Miao Xinxin</i>	
HYBRID ANALOG–DIGITAL PRECODING DESIGN FOR SATELLITE SYSTEMS	720
<i>Aakash Arora, Christos G. Tsinos, R. Bhavani Shankar, Symeon Chatzinotas, Bjorn Ottersten</i>	
CARRIER PHASE RECOVERY FOR DVB-S2X STANDARD IN VL SNR CHANNEL	733
<i>Pansoo Kim, Joon-Gyu Ryu</i>	
SPECTRUM PREDICTION AND INTERFERENCE DETECTION FOR SATELLITE COMMUNICATIONS	741
<i>Lissy Pellaco, Nirankar Singh, Joakim Jalden</i>	
CHANNEL CAPACITY ANALYSIS OF SATELLITE MIMO SYSTEM DEPENDING ON THE ORBITAL ALTITUDE	759
<i>Chihaya Kato, Mitsuhiro Nakadai, Daisuke Goto, Hiroki Shibayama, Fumihiro Yamashita</i>	
EFFECTS OF CHANNEL PHASE IN MULTIBEAM MULTICAST SATELLITE PRECODING SYSTEMS	775
<i>Xavier Artiga, Miguel Angel Vazquez</i>	

HARDWARE PRECODING DEMONSTRATION IN MULTIBEAM UHTS COMMUNICATIONS UNDER REALISTIC PAYLOAD CHARACTERISTICS	787
<i>Juan Duncan, Jorge Querol, Nicola Maturo, Jevgenij Krivochiza, Danilo Spano, Norshahida Saba, Liz Marrero, Symeon Chatzinotas, Bjorn Ottersten</i>	

Author Index