



### DataSys 2020 Congress

- September 27, 2020 to October 01, 2020 - Lisbon, Portugal
- **AICT 2020**, The Sixteenth Advanced International Conference on Telecommunications
  - **ICIW 2020**, The Fifteenth International Conference on Internet and Web Applications and Services
  - **ICIMP 2020**, The Fifteenth International Conference on Internet Monitoring and Protection
  - **SMART 2020**, The Ninth International Conference on Smart Cities, Systems, Devices and Technologies
  - **IMMM 2020**, The Tenth International Conference on Advances in Information Mining and Management
  - **INFOCOMP 2020**, The Tenth International Conference on Advanced Communications and Computation
  - **MOBILITY 2020**, The Tenth International Conference on Mobile Services, Resources, and Users
  - **SPWID 2020**, The Sixth International Conference on Smart Portable, Wearable, Implantable and Disability-oriented Devices and Systems
  - **ACCSE 2020**, The Fifth International Conference on Advances in Computation, Communications and Services

### InfoSys 2020 Congress

- September 27, 2020 to October 01, 2020 - Lisbon, Portugal
- **ICNS 2020**, The Sixteenth International Conference on Networking and Services
  - **ICAS 2020**, The Sixteenth International Conference on Autonomic and Autonomous Systems
  - **ENERGY 2020**, The Tenth International Conference on Smart Grids, Green Information Communications and IT Energy-aware Technologies
  - **WEB 2020**, The Eighth International Conference on Building and Exploring Web Based Environments
  - **DBKDA 2020**, The Twelfth International Conference on Advances in Databases, Knowledge, and Data Applications
  - **SIGNAL 2020**, The Fifth International Conference on Advances in Signal, Image and Video Processing
  - **BIOTECHNO 2020**, The Twelfth International Conference on Bioinformatics, Biocomputational Systems and Biotechnologies

### SoftNet 2020 Congress

- October 18, 2020 to October 22, 2020 - Porto, Portugal
- **ICSEA 2020**, The Fifteenth International Conference on Software Engineering Advances
  - **ICSNC 2020**, The Fifteenth International Conference on Systems and Networks Communications
  - **CENTRIC 2020**, The Thirteenth International Conference on Advances in Human-oriented and Personalized Mechanisms, Technologies, and Services
  - **VALID 2020**, The Twelfth International Conference on Advances in System Testing and Validation Lifecycle
  - **SIMUL 2020**, The Twelfth International Conference on Advances in System Simulation
  - **SOTICS 2020**, The Tenth International Conference on Social Media Technologies, Communication, and Informatics
  - **INNOV 2020**, The Ninth International Conference on Communications, Computation, Networks and Technologies
  - **HEALTHINFO 2020**, The Fifth International Conference on Informatics and Assistive Technologies for Health-Care, Medical Support and Wellbeing

### InfoWare 2020 Congress

- October 18, 2020 to October 22, 2020 - Porto, Portugal
- **ICCGI 2020**, The Fifteenth International Multi-Conference on Computing in the Global Information Technology
  - **ICWMC 2020**, The Sixteenth International Conference on Wireless and Mobile Communications
  - **VEHICULAR 2020**, The Ninth International Conference on Advances in Vehicular Systems, Technologies and Applications
  - **INTERNET 2020**, The Twelfth International Conference on Evolving Internet
  - **COLLA 2020**, The Tenth International Conference on Advanced Collaborative Networks, Systems and Applications
  - **INTELL 2020**, The Ninth International Conference on Intelligent Systems and Applications
  - **VISUAL 2020**, The Fifth International Conference on Applications and Systems of Visual Paradigms
  - **HUSO 2020**, The Sixth International Conference on Human and Social Analytics
  - **BRAININFO 2020**, The Fifth International Conference on Neuroscience and Cognitive Brain Information

### NexTech 2020 Congress

- October 25, 2020 to October 29, 2020 - Nice, France
- **UBICOMM 2020**, The Fourteenth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies
  - **ADVCOMP 2020**, The Fourteenth International Conference on Advanced Engineering Computing and Applications in Sciences
  - **SEMAPRO 2020**, The Fourteenth International Conference on Advances in Semantic Processing
  - **AMBIENT 2020**, The Tenth International Conference on Ambient Computing, Applications, Services and Technologies
  - **EMERGING 2020**, The Twelfth International Conference on Emerging Networks and Systems Intelligence
  - **DATA ANALYTICS 2020**, The Ninth International Conference on Data Analytics
  - **GLOBAL HEALTH 2020**, The Ninth International Conference on Global Health Challenges
  - **CYBER 2020**, The Fifth International Conference on Cyber-Technologies and Cyber-Systems

### ComputationWorld 2020 Congress

- October 25, 2020 to October 29, 2020 - Nice, France
- **SERVICE COMPUTATION 2020**, The Twelfth International Conference on Advanced Service Computing
  - **CLOUD COMPUTING 2020**, The Eleventh International Conference on Cloud Computing, GRIDs, and Virtualization
  - **FUTURE COMPUTING 2020**, The Twelfth International Conference on Future Computational Technologies and Applications
  - **COGNITIVE 2020**, The Twelfth International Conference on Advanced Cognitive Technologies and Applications
  - **ADAPTIVE 2020**, The Twelfth International Conference on Adaptive and Self-Adaptive Systems and Applications
  - **CONTENT 2020**, The Twelfth International Conference on Creative Content Technologies
  - **PATTERNS 2020**, The Twelfth International Conference on Pervasive Patterns and Applications
  - **COMPUTATION TOOLS 2020**, The Eleventh International Conference on Computational Logic, Algebras, Programming, Tools, and Benchmarking
  - **BUSTECH 2020**, The Tenth International Conference on Business Intelligence and Technology

### NetWare 2020 Congress

- November 15, 2020 to November 19, 2020 - Valencia, Spain
- **SENSORCOMM 2020**, The Fourteenth International Conference on Sensor Technologies and Applications
  - **SENSORDEVICES 2020**, The Eleventh International Conference on Sensor Device Technologies and Applications
  - **SECURWARE 2020**, The Fourteenth International Conference on Emerging Security Information, Systems and Technologies
  - **AFIN 2020**, The Twelfth International Conference on Advances in Future Internet
  - **CENICS 2020**, The Thirteenth International Conference on Advances in Circuits, Electronics and Micro-electronics
  - **ICQNM 2020**, The Fourteenth International Conference on Quantum, Nano/Bio, and Micro Technologies
  - **FASSI 2020**, The Sixth International Conference on Fundamentals and Advances in Software Systems Integration
  - **GREEN 2020**, The Fifth International Conference on Green Communications, Computing and Technologies

### DigitalWorld 2020 Congress

- November 21, 2020 to November 25, 2020 - Valencia, Spain
- **ICDS 2020**, The Fourteenth International Conference on Digital Society
  - **ACHI 2020**, The Thirteenth International Conference on Advances in Computer-Human Interactions
  - **GEOProcessing 2020**, The Twelfth International Conference on Advanced Geographic Information Systems, Applications, and Services
  - **eTELEMED 2020**, The Twelfth International Conference on eHealth, Telemedicine, and Social Medicine
  - **eLML 2020**, The Twelfth International Conference on Mobile, Hybrid, and On-line Learning
  - **eKNOW 2020**, The Twelfth International Conference on Information, Process, and Knowledge Management
  - **ALLSENSORS 2020**, The Fifth International Conference on Advances in Sensors, Actuators, Metering and Sensing
  - **SMART ACCESSIBILITY 2020**, The Fifth International Conference on Universal Accessibility in the Internet of Things and Smart Environments

### NexComm 2021 Congress

April 18 - 22, 2021 - Porto, Portugal

submission deadline: January 19, 2021

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### Mitigation Factors for Multi-domain Resilient Networked Distributed Tessellation Communications



Authors: Steve Chan

**Keywords:** Transceiver polygons; Signal processing; Beamforming; Non-permissive cyber electromagnetic environment; 5G networks; Smart grids; Covariance matrix; Spatial filtering algorithms; Convex optimization problems; Semidefinite programming solvers; Space-Time A

**Abstract:** Numerous technical calls have converged upon an overarching goal of Resilient Networked Distributed Tessellation Communications (RNDTC) so as to provide long-range communications through the notion of "tessellation" antennas, which are comprised of spatially distributed low Size, Weight, Power, and Cost (SWaP-C) transceiver "polygons." At its core, this approach supplants higher powered amplifiers and large directional antennas with various tessellations of spatially dispersed transceiver polygons. In essence, the transmit power is spatially distributed amongst the polygons, and gain is achieved, via signal processing rather than the use of, by way of example, an antenna aperture so as to concentrate energy. Therefore, signal processing functions enable the various polygons to self-form into an array and enable beamforming, among other techniques, thereby enhancing the desired signals and somewhat obviating intentional/unintentional interference. However, the algorithmic approaches to date have varied pros and cons (e.g., the attainment of reduced sidelobes at the expense of the mainlobe, wherein interference suppression is achieved at the cost of the resolution of the signals). There are promising interference mitigation factor pathways, such as adaptive weight shifting, during the analyzing, transforming, and synthesizing of such signals. However, despite the advantages of adaptive weighting techniques, the computational complexity is extremely high, and the ensuing complexity reduction processes are subject to adversarial exploitation. Accordingly, this paper proposes mitigation factors by way of Artificial Intelligence (AI)-centric Genetic Algorithm (GA) approaches amidst the analysis, transformation, and synthesis amalgam. In particular, preliminary experimental results (to be furthered in future work) indicate promise for the auto-tuning of the Steady State Genetic Algorithm (SSGA) compression factor  $\zeta$  for more optimal convergence.

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