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MODIFIED DOUBLE WEIGHT (MDW) CODE FOR AUTOMOTIVE INDUSTRY BASED ON FPGA PLATFORM

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PRODUCT DESCRIPTIONS

MDW-OCDMA network utilizes Field Programmable Gate Array (FPGA), Fibre Bragg Grating (FBG) and optical switch as a code generator. MDW-OCDMA FPGA network offers parallel processing with fast optical switching at low cost. Many optical codes have been proposed for OCDMA network such as DCS, MFH and Hadamard, respectively. MDW code has good performance in terms of high cardinality, low optical received power at the receiver part and less complexity. The MDW-OCDMA FPGA network can be applied in various applications such as Electrical Vehicle (EV) Automotive, Aviation and Fast train industries. This product has a low Electromagnetic Interference (EMI).

APPLICATIONS

Electrical Vehicle (EV) Automotive Industry

- Unlimited sensor applications.
Environmental conditions performance, Fig. 1.

Fast Train

- High capacity data transmission for high-speed internet access.
Wide bandwidth for wide area coverage, Fig. 2.

Aviation

- Offer high bandwidth and inherent security, Fig. 3.
Immune to EMI.
Offer high speed internet services for passengers.

NOVELTIES

- Novel Modified Double Weight (MDW) Code.
New encoder-decoder design using FPGA board as code generator.

INVENTION ADVANTAGES

- Simple code construction.
Large cardinality for permissible BER of 10^-9.
High security of data transmission compared with the existing technologies.
Fast optical switching and low cost.
Easy implementation using an incoherent light source.
Compliance to Restriction of Hazardous Substances directive (RoHS).
Environmental friendliness: - Inmune to EMI radiation exposure for long haul transmission

COMMERCIALIZATION POTENTIALITIES

- Successfully developed MDW-OCDMA FPGA network prototype design.
MDW-OCDMA FPGA network has a great potential to become a part of optical communication transmitter and receiver system for OCDMA to be implemented in automotive and transportation industries.

PUBLICATIONS

Aljunid, S. A., Ismail, M., Ramli, A. R., Borhanuddin M. Ali, & Mohamad Khazani Abdullah. (2004). A new family of optical code sequences for Spectral Amplitude Coding Optical CDMA systems. IEEE Photonics Technology Letters, 16(10), 2383-2385. (IF=1.7)
Aljunid, S. A., Samad, M. D. A., Othman, M., Hisham, M. H., Kasiman, A. H., & Abdullah, M. K. (2005). Development of Modified Double Weight (MDW) code and its implementation in multi-rate transmissions. International Conference on Communication and Networks, 1, 288-292.
A.R. Arief, S.A. Aljunid, M.S. Anuar, M.N. Junita, R.B. Ahmad. (2011). Cardinality enhancement of spectral/spatial Modified Double Weight code optical code division multi-access system by PIIN suppression. Optik, 124(19), 3786-3793. (IF=0.524)



Fig. 1. EV Automotive Application.

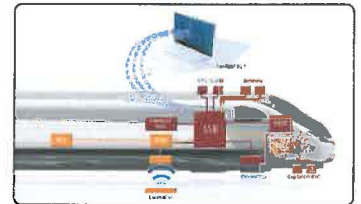


Fig. 2. Fast Train Application.



Fig. 3. Aviation Application.

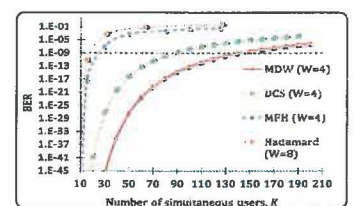


Fig. 4. BER Performance for Various OCDMA Codes.

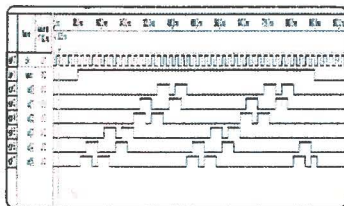


Fig. 5. MDW-OCDMA FPGA Output W=4.

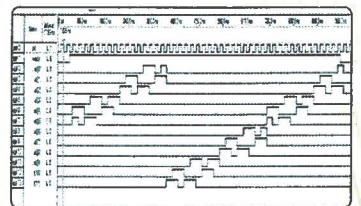


Fig. 6. MDW-OCDMA FPGA Output W=6.