Digitally Pre-Distorted Millimeter-Wave PAM4 Transceiver for Contactless Connectors
Tech ID: 29750 / UC Case 2018-170-0

SUMMARY
Researchers in the UCLA Department of Electrical Engineering have proposed a digitally pre-distorted, non-coherent, millimeter-wave PAM4 (pulse amplitude modulation-4) system to be implemented as part of a contactless connector.

BACKGROUND
Contactless connectors for chip-to-chip or board-to-board communications may be used in lieu of physically connected copper wires to transfer electromagnetic energy over a short-distance air gap. Although inductive and capacitive coupling offer a compact and integrated circuit solution for such connectors, the increased bandwidth required for coupled communication channels necessitates a larger form factor. The trade-off between bandwidth and form factor limits bandwidth scalability and inhibits system integration.

INNOVATION
Researchers in the UCLA Department of Electrical Engineering have proposed a digitally pre-distorted, non-coherent, millimeter-wave PAM4 (pulse amplitude modulation-4) system to be implemented as part of a contactless connector. The contactless connector addresses the trade-off between bandwidth and form factor discussed above by utilizing a wide fractional bandwidth, reducing the footprint of the coupling antenna, and eliminating carrier recovery circuitry. As compared to existing technologies, the proposed PAM4 system exhibits an increased energy efficiency of 3.98 pJ/bit and an increased data rate of 20 Gb/s.

APPLICATIONS
- Wireless connectors
- Chip-to-chip and board-to-board communications

ADVANTAGES
- Increased energy efficiency over existing technology
- Increased data rate over existing technology
- Addresses challenge of bandwidth and form factor trade-off in existing contactless connectors

RELATED MATERIALS

PATENT STATUS
Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS
- Self-synchronized RF Interconnect for 3-dimensional Circuit Integration
- Submillimeter-wave Signal Generation by Linear Superimposition of Phase-shifted Fundamental Tone Signals
- Digital Regenerative Receiver for Millimeter-Wave and Sub-Millimeter-Wave Imaging and Communication
- Phase Coherent Frequency Divider
- Organicic Topology for Analog and Mixed-Signal Circuit Applications
- Digital Oscillator Method to Implement Non-Contact Sensors for Gesture Detection Displays
- Interference Tolerant Radar System for Self-Driving Vehicles
- Grouping Algorithm For Touchscreen Finger Position Detection
- On-Chip Tunable Artificial Dielectrics
- Interleaved 3D On-Chip Differential Inductor And Transformer
- Sub-Carrier Successive-Approximation Mm-Wave Radar For High-Resolution 3D Imaging
- Millimeter-Wave CMOS Transceiver with PCB Antenna for Contactless Wave-Connectors
- Hollow Plastic Waveguide ("Wave Cable") Based High Speed And Low Power Data Center Inter-Server Link
- Reduction Of Unmodulated Ambient Blockers In Reflected Data Links Through Manipulation Of Replication Of The Illuminating Signal Source
- Frequency Translating Backscatter Modulator With Envelope Control To Support OFDM/QAM And Other Envelope Modulated Wireless Protocols