Method and system for interference cancellation in MIMO wireless system

IITM Technology Available for Licensing

Problem Statement

- In the wireless communication system, self-interference from the transmitter is major challenge in same channel full duplex (SCFD) front end circuit.
- In multiple input multiple output (MIMO) SCFD system, **signal leakage** from another transmitting stream **makes the interference even worse**.
- The electrical balance based duplexer(EBD) can suppress the self-interference, but suffers from insertion loss in transmitter(Tx) & receiver(Rx) paths. Many prior arts method discussed, however handling disadvantages like **power consumption, robustness, reliability, integrity issues, complex design** & other issues. Hence, there is a need to address the above disadvantages/other shortcomings.

Technology Category/ Market

Technology: Transceiver system in MIMO full duplex communication system;
Industry: LTE Advance, LTE Advance Pro, 5G Network technology, ICT;
Applications: System for cross talk/interference cancellation in MIMO full duplex system
Market: The global MIMO market is projected to reach **$15.79B by 2027**, growing at a CAGR of 35% during the forecast period (2020-**2027**).

Technology

- Present patent claimed a **transceiver system** for **full duplex communication** (Refer FIG.2).
- Further the patent describes **a method** implemented by an electrical balance based duplexer (**EBD**) for **interference cancellation** using a at least one circulators in full-duplex communication.
- Further the invention is directed to transmitting & receiving two independent signals at the same time enabling a MIMO Full-duplex communication.
- There are only an interconnection of EBD and circulators in the way shown in the figure, which helps to achieve claimed system **without causing cross-talk**.

Images

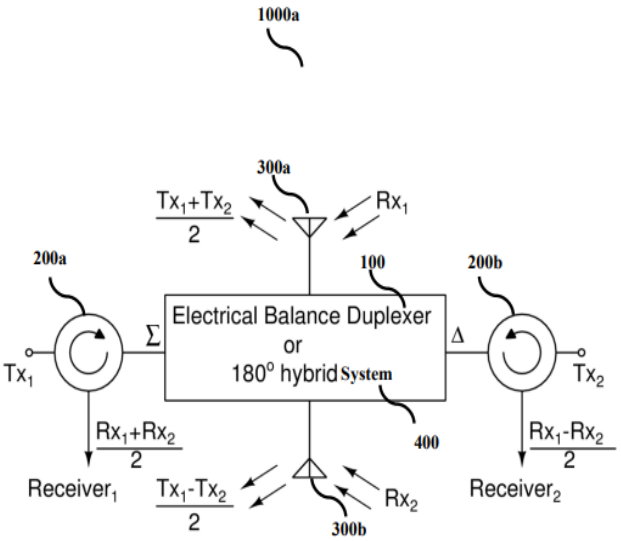

Fig.1: Illustrates 2X2 MIMO SCFD front-end for a MIMO wireless system

Intellectual Property

IITM IDF Ref. 1656;
Patent No: 365675 (Granted)
PCT Application No.PCT/IN2019/050112
US Patent No. US11239878B2 (Granted)

TRL (Technology Readiness Level)

TRL- 3, Proof of Concept ready & validated

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Images (Experimental Images)

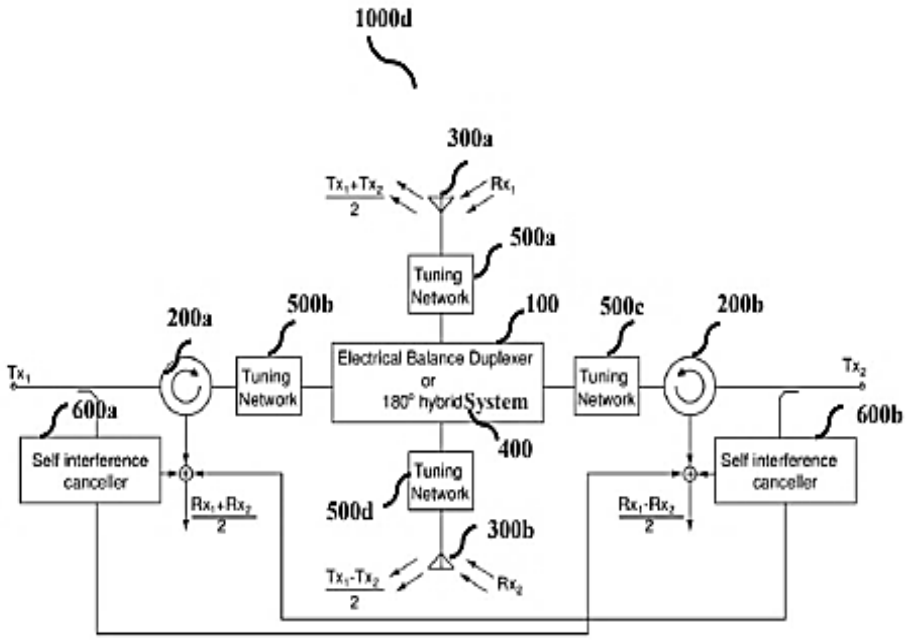

Figure 2: Illustrates 2x2 MIMO SCFD front-end with the tunning network & a multiple o/p vector modulator for the MIMO wireless system.

Key Features / Value Proposition

❖ ***Technical Perspective:***

1. The **EBD is configured** to pass the first signal at a first port from the plurality of ports **through the at least one circulator**, & **pass the second signal** at a second port from the plurality of ports **through the at least one circulator,** shown in figure.

2. The reciprocal nature of the antenna coupling ensures that equal and same phase signal couples to the two antennas, & therefore, the **coupled signal** is **cancelled at the difference port** & appear only at a receiver connected to the sum port which can be treated as **self-interference**.

3. The signal from Tx2 during couples back to the antennas, only appears at the receiver connected to the difference port & since, the two antennas will have closely matched input impedance, **this configuration** results a **wide band isolation** between the **two Tx/Rx pair** under a **balanced condition**.

❖ ***Industrial Perspective:***

1. Present patent provides the claimed **EBD configuration which solves cross-talk problems** by using **circulator** in a **MIMO full duplex system**.

2. The EBD is configured in such a manner which provides **an isolation** between the transmitting signals & the receiving signals in a same channel full duplex (SCFD) front end circuit using the at least one circulators.
3. Provides a cost-effective system in **simple design, reliable,** & mitigate other issues in efficient manner.

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