

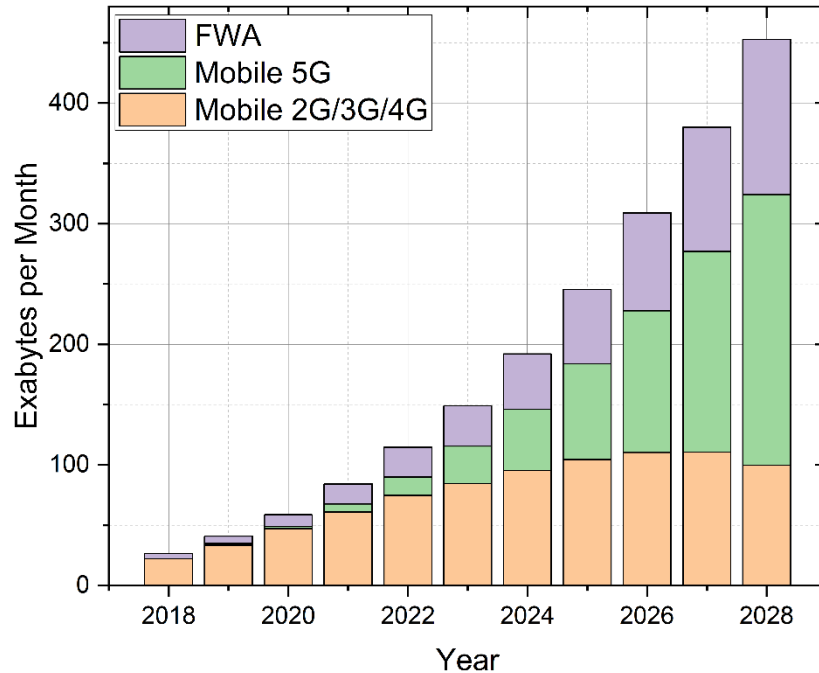
In-Band Full-Duplex Solutions in the Paradigm of Integrated Sensing and Communication

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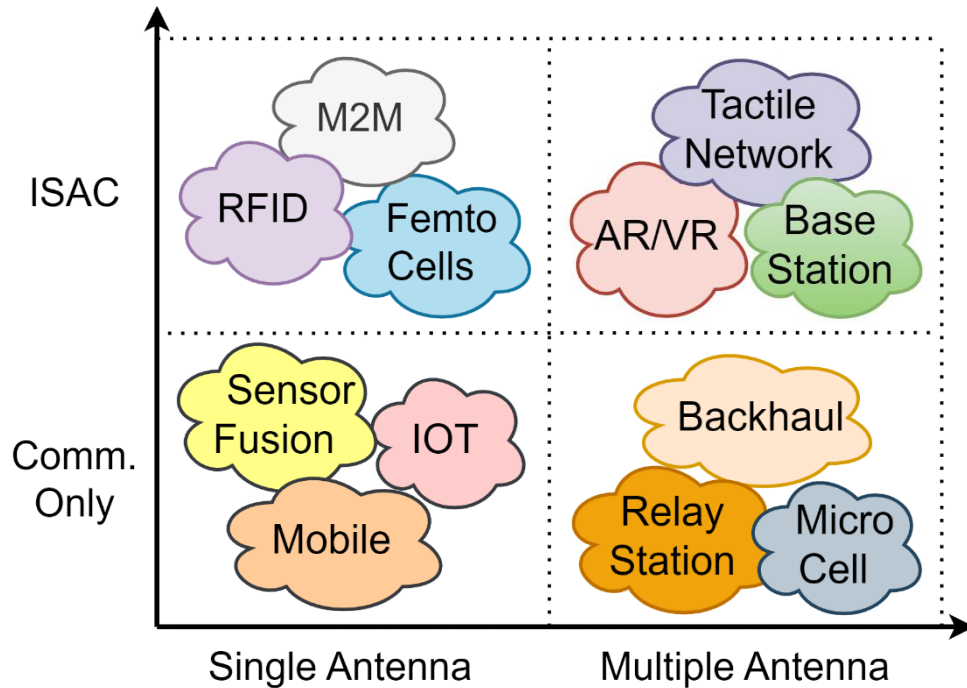
Workshop on Integrated Sensing and Communications

Traffic Forecast



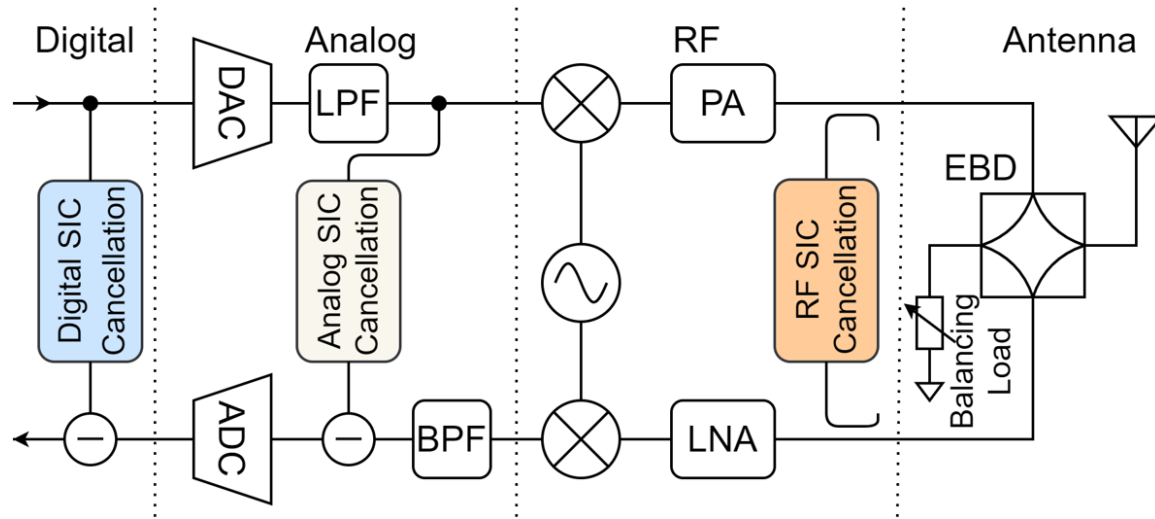
- End of 4G/LTE Era Ahead
- High Bandwidth Requirements
- More Complex Infrastructure
- More Complex Scenarios

Classification of Full Duplex



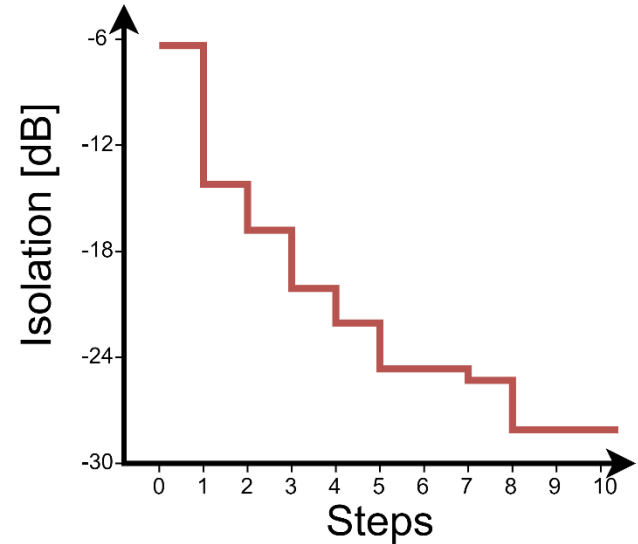
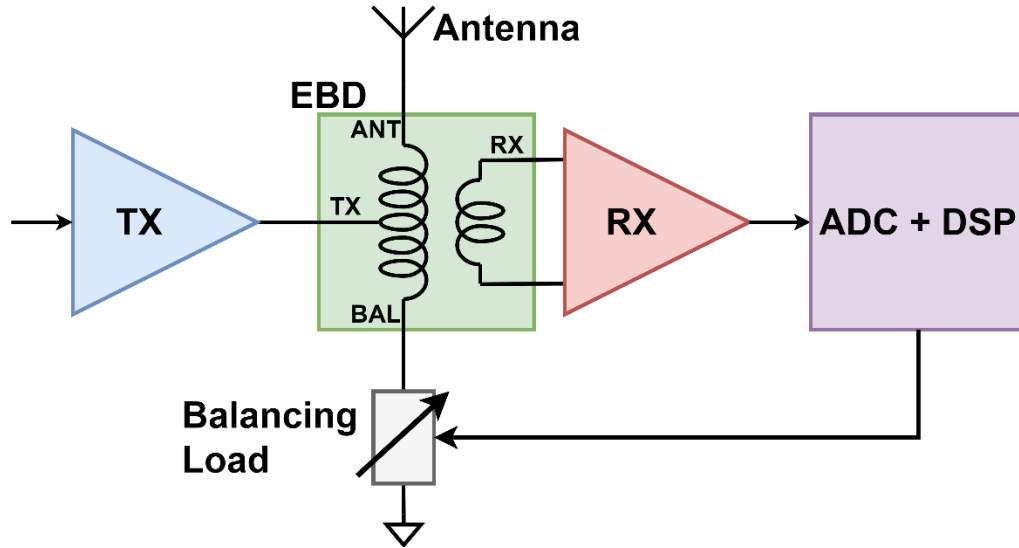
- Antenna Configuration
 - Single Antenna
 - Multiple Antennas
- Complexity
 - ISAC
 - Communication

Self-Interference Cancellation

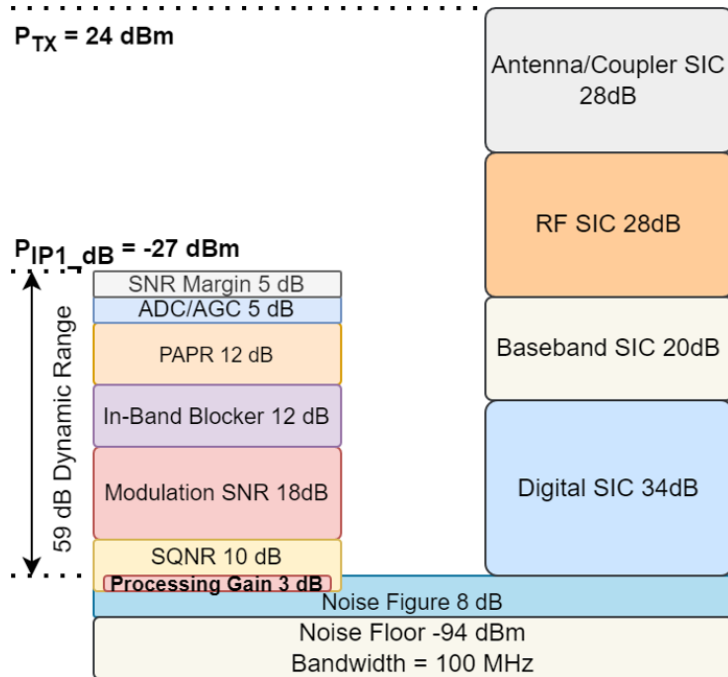


- Antenna Isolation
- single antenna
- RF/Analog
- frequency/time domain equalization
- Digital
- non-linear components

Electrically Balanced Duplexer



Signal-to-Noise Ratio Budget



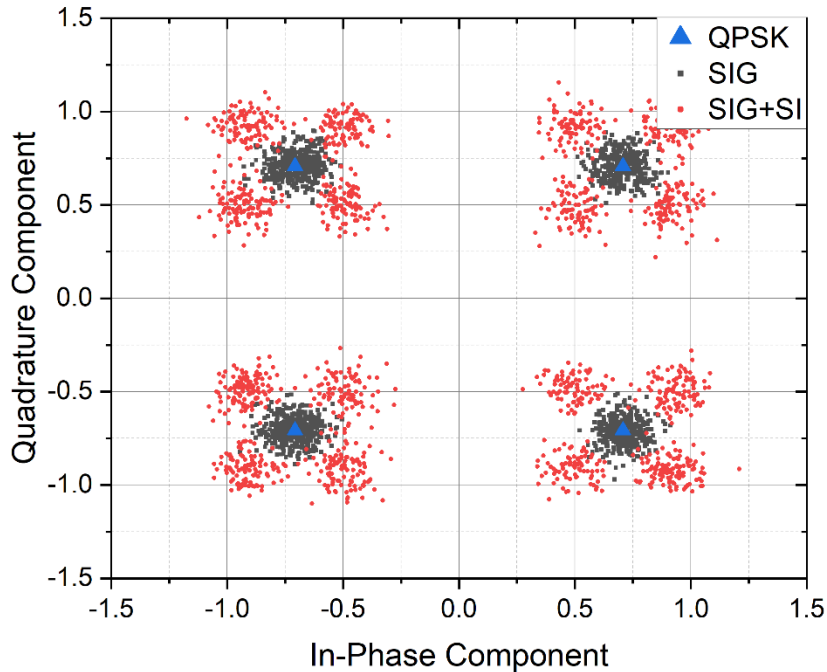
- Noise Floor: $k \cdot T \cdot BW$
- 3GPP Specs (38.104)
 - P_{TX} , In-band blocker
- Digital Communication
 - SQNR, Modulation SNR...
- Self-Interference-Cancellation
 - Wideband isolation needed
 - Limited wideband isolation

Figure of Merit

$$FOM = 10 * \lg\left(\{IS_{SIC} \cdot BW\} \cdot \{BW / f_c\} \cdot \sqrt{f_c}\right)$$

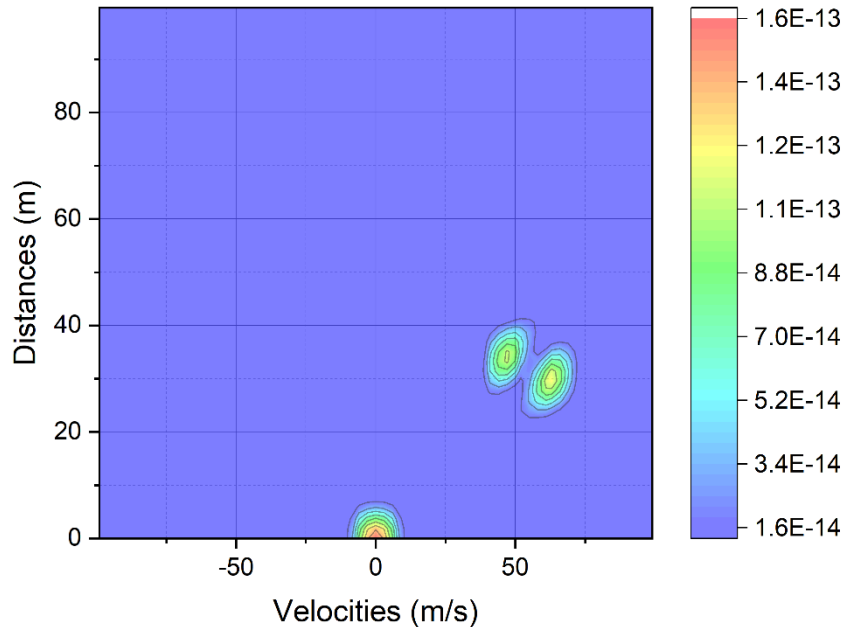
- Isolation Bandwidth
- Fractional Bandwidth
- Power Consumption

Full-Duplex Communication



- 802.11p OFDM Waveforms
 - SCS=78KHz
 - $N_{sc}=52$
- Interferer 5 dB Lower
- Superimposed Constellation

Full Duplex Sensing



- No Clutter
- Collocated Objects
- Sidelobes Suppressed
- 4 dB Higher SI at Periodogram Origin

SIC = Clutter Removal?

Summary

- ISAC Full-Duplex Part of 6G Era
- Full-Duplex Still NOT Standardized
- Wideband SIC as Full-Duplex Enabler
- Future 6G Wideband as SIC Facilitator