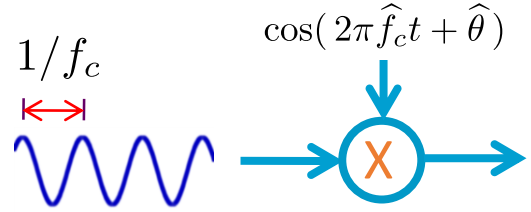
Enhanced Wireless Receiver

Enhanced Wireless Receiver for Poor Channel Quality and Interference

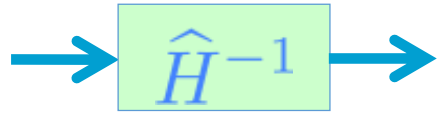
CHALLENGE AND BREAKTHROUGHS

- More energy is required to transmit to users suffering from poor channel quality and/or interference
- Two critical receiver functions, equalization and synchronization, perform poorly when signal quality is low and signal is not clearly differentiated from noise
- Key innovation is a redesigned receiver structure that operates better with lower signal quality
- Reduces both base station energy consumption and interference onto neighboring cells

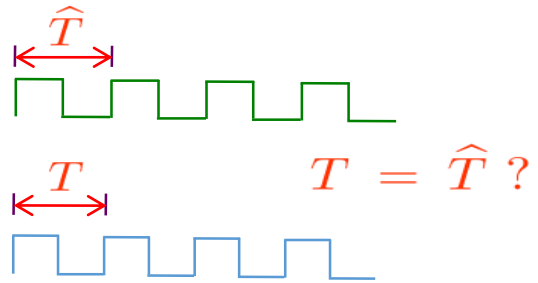
Carrier-Frequency & Phase Recovery



Channel Estimation/Equalization



Clock Recovery



A New Receiver Design Specifically for Users Requiring the Most Energy

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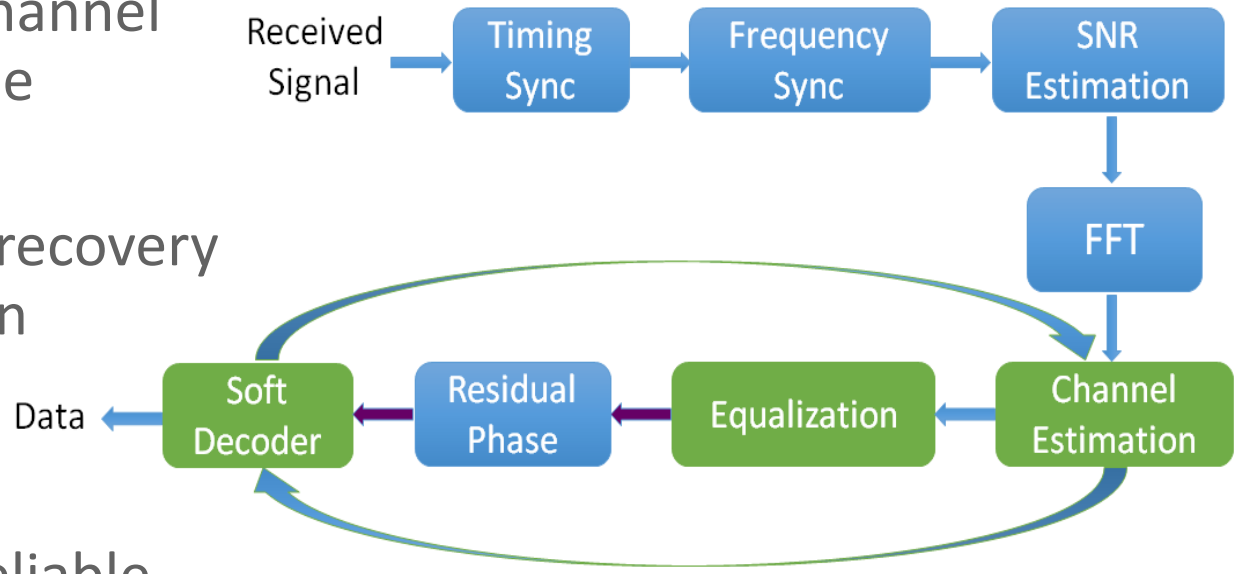
KEY ACCOMPLISHMENT AND RESULTS

- New receiver has an iterative decoder for channel estimation/equalization and a residual phase estimator
- Enables low SINR synchronization and data recovery and more reliable frequency synchronization
- Resulting in ~1dB performance gain over conventional receiver at lower SINRs
- Users with low signal quality have a more reliable mobile experience as well as higher data rates



New Receiver Design Provides ~9% of Energy Savings versus Conventional Receivers

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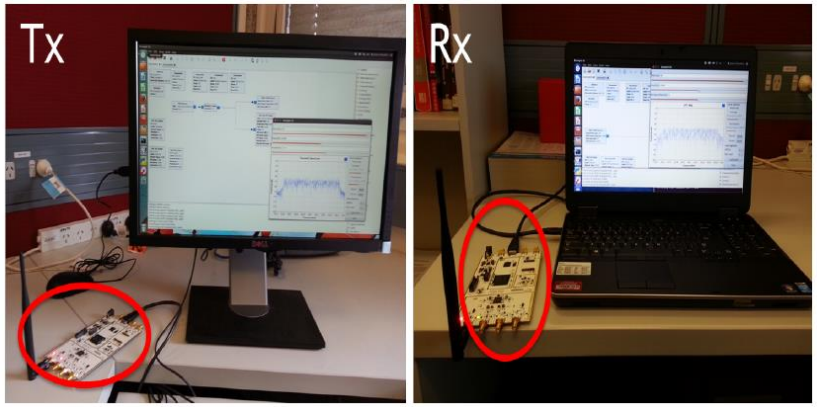
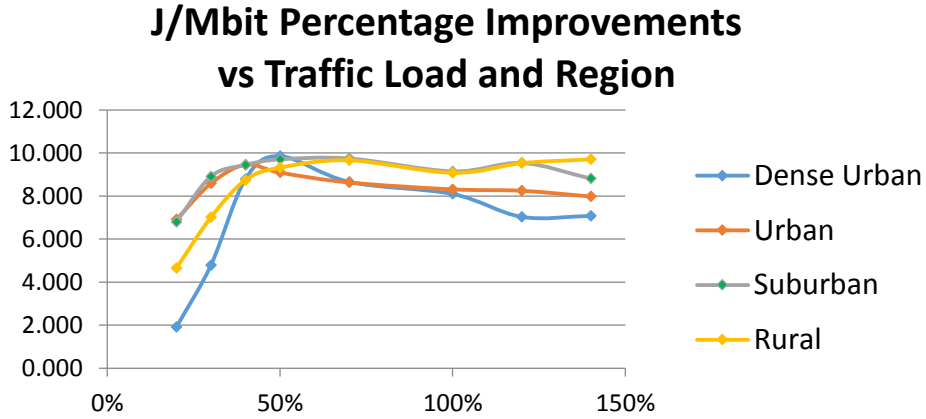
DEMO DESCRIPTION

- Two Universal Software Radio Peripheral (USRP) boards are connected to two laptops
- Data packets are sent wirelessly between the transmitter (Tx) and receiver (Rx)
- A low transmit power creates a low signal quality at the receiver to simulate a poor performing mobile user
- Receiver performance and energy impact estimated for different environments





USRP Boards Experimentally Validate the New Receiver Technology and Design