

Tackling Self Interference, Cross-Technology Interference and Channel Fading in WSN

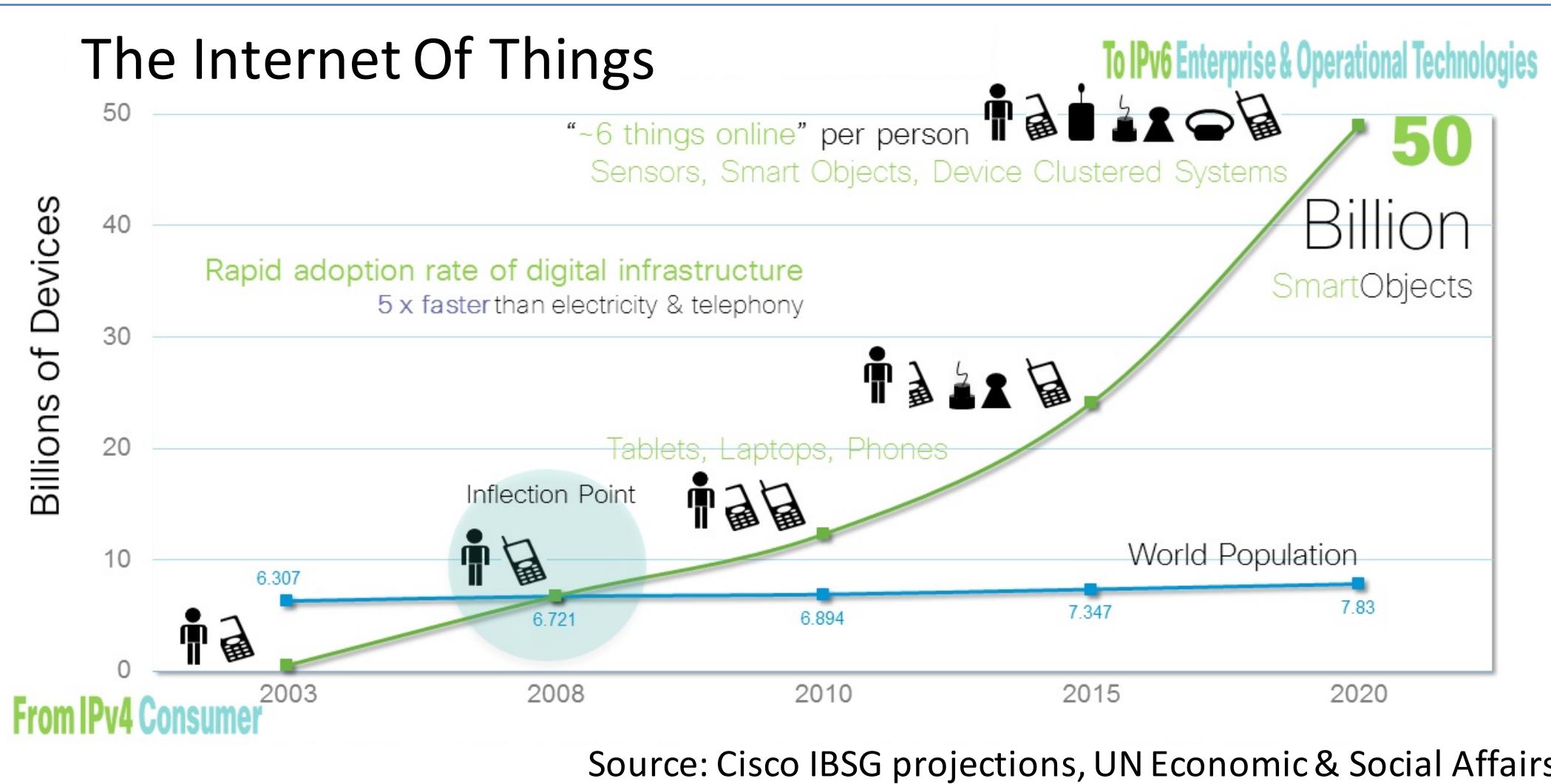
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Motivation

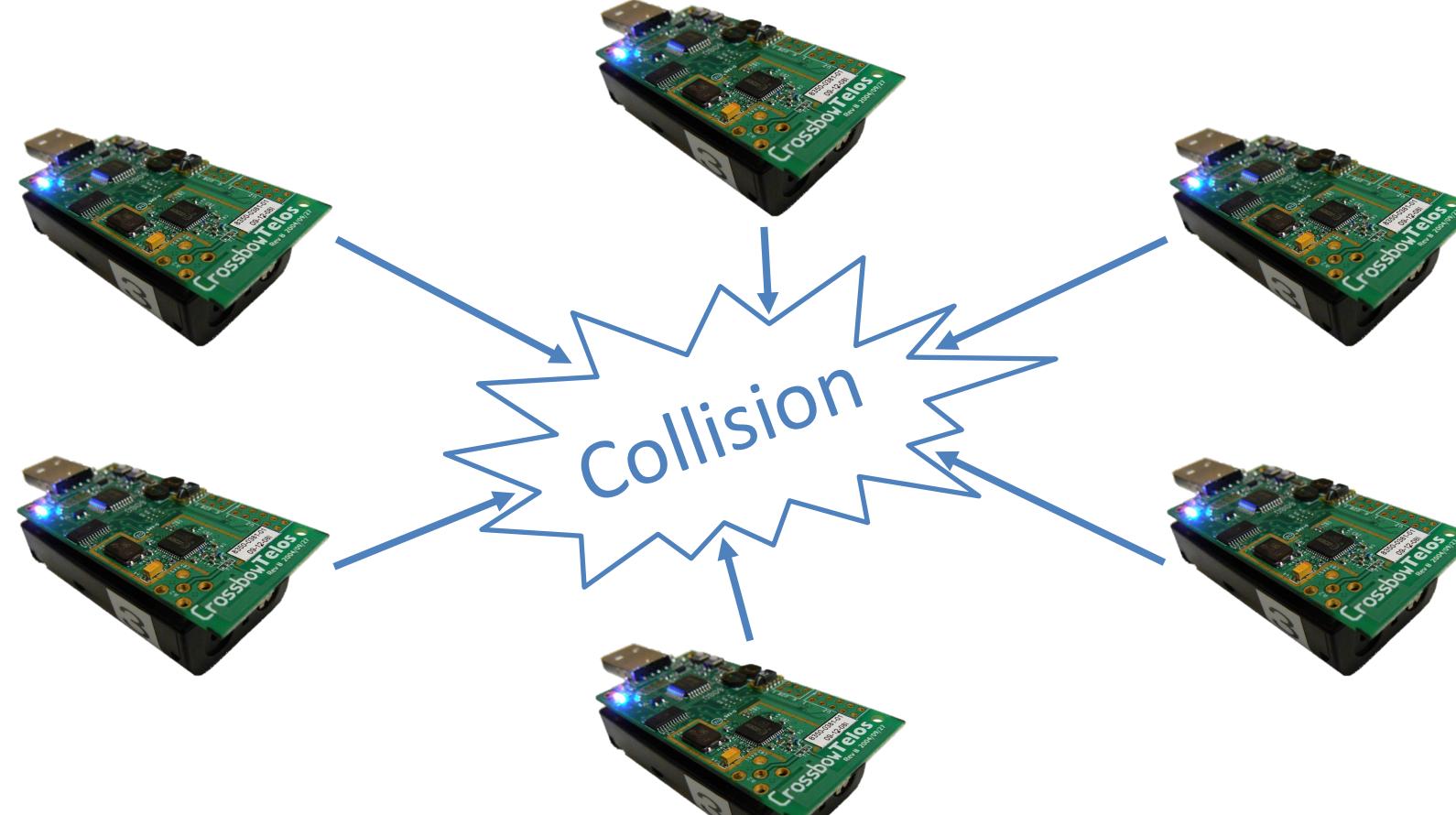
With a push towards “IoTification”, the world foresees a sharp rise in the number of devices having wireless networking capabilities



This leads to severe interference of the following two kinds

Self Interference

Same technology devices transmitting synchronously



Cross-Technology Interference

Different Technologies sharing the 2.4GHz ISM band



Scalable Data Dissemination

Synchronous Transmission

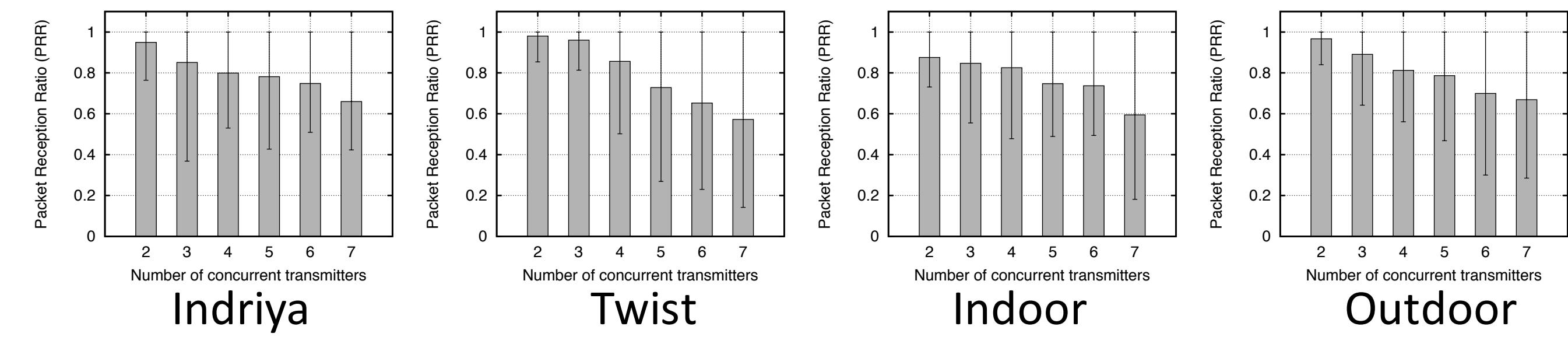
Multiple transmitters to send same data concurrently to multiple receivers.
Eliminates channel contention. Allows fast data dissemination.

- Glossy, LWB, Splash, Chaos, P³, etc.

Scalability Problem

Reliability drops for large number of concurrent transmitters.

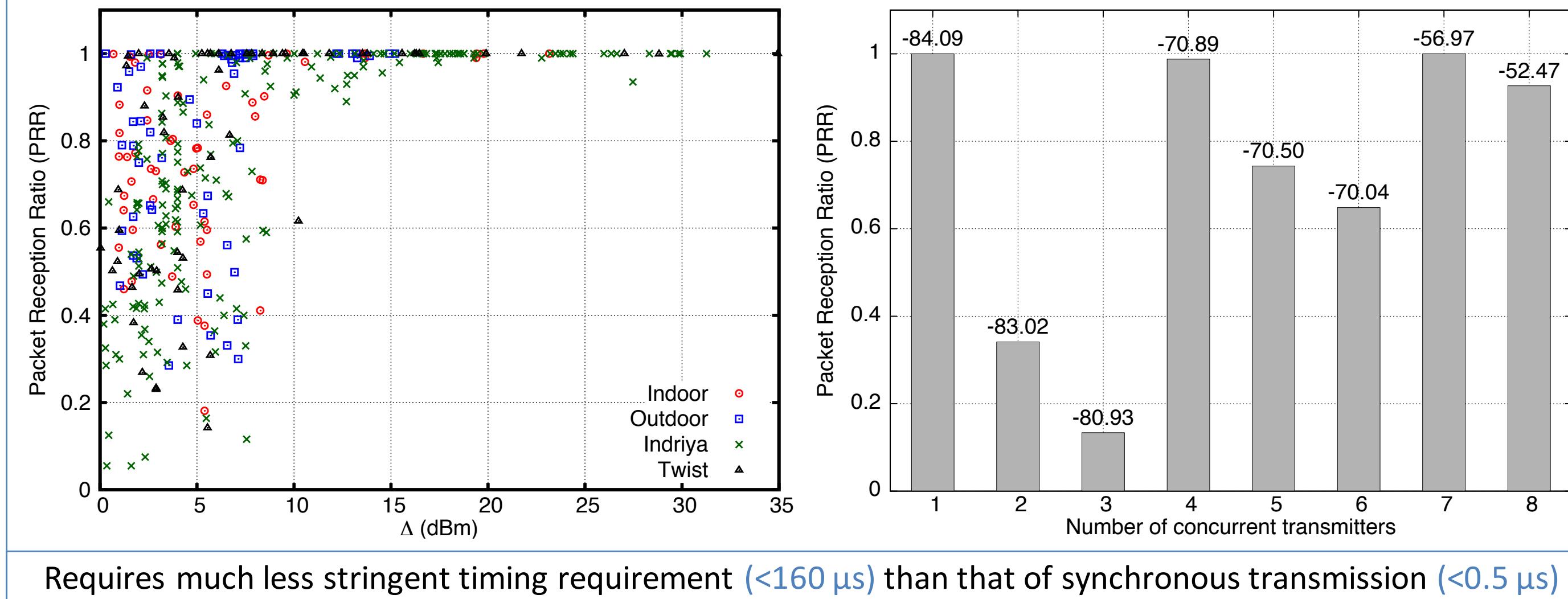
- Difficult to maintain precise synchronization (<0.5μs)
- Due to combination of software, hardware and signal propagation delays.



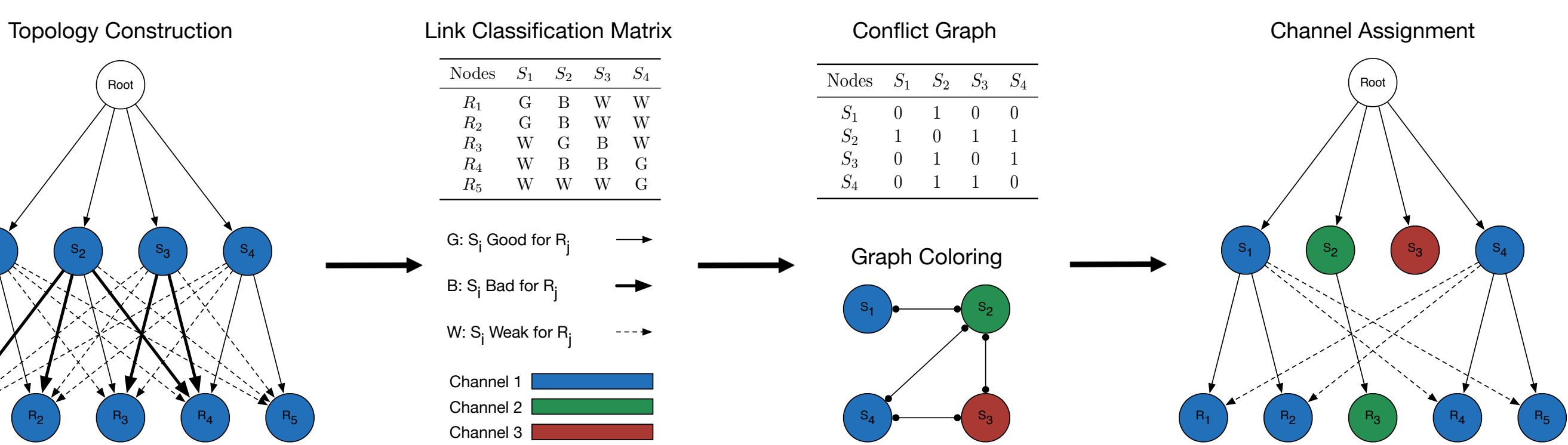
Approach

Exploit Capture Effect over Multi-Channels

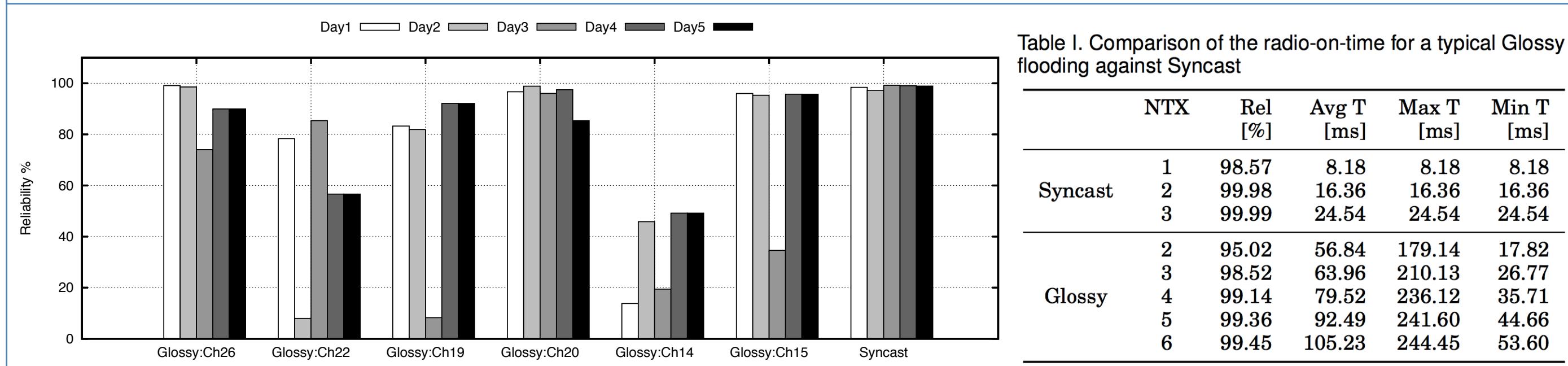
- Receiver can decode a packet in the presence of interfering signals if the signal from the sender is sufficiently stronger than that from the interferers



Design



Evaluation



Robust Data Collection in Dynamic Urban Environment

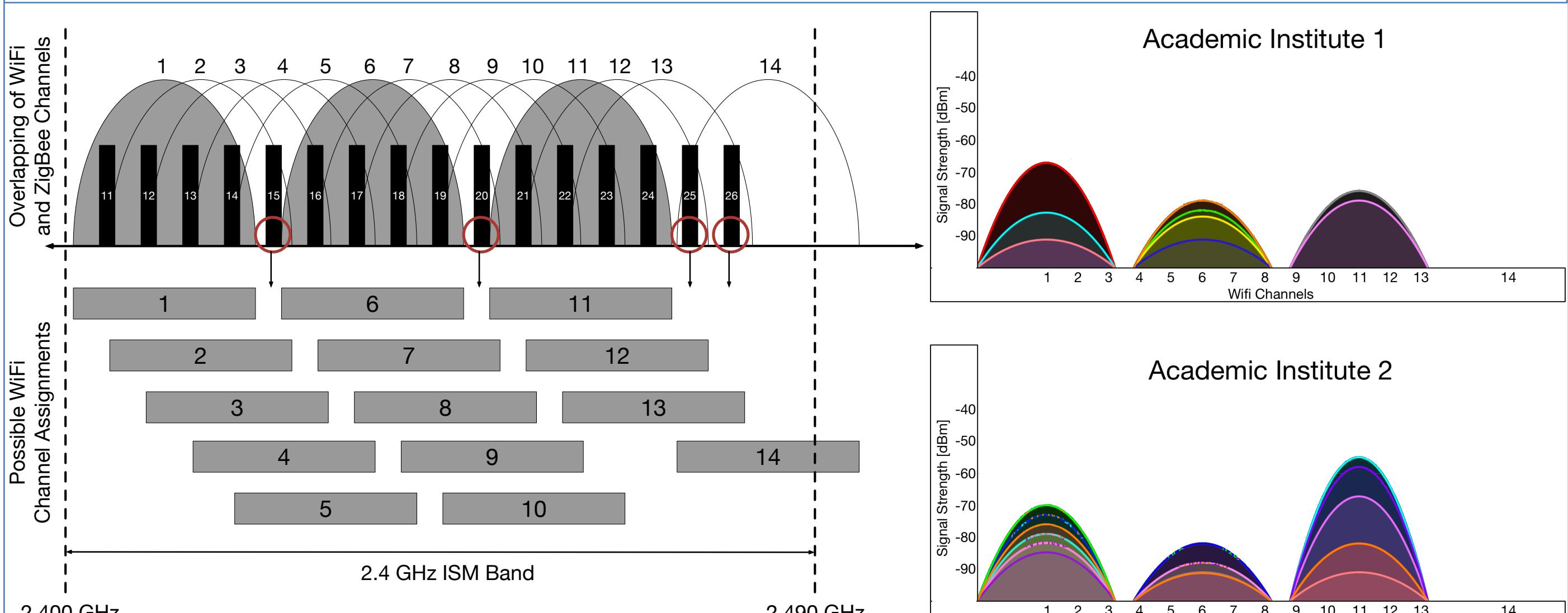
Cross-Technology Interference

2.4GHz ISM band is shared by a number of Wireless Technologies

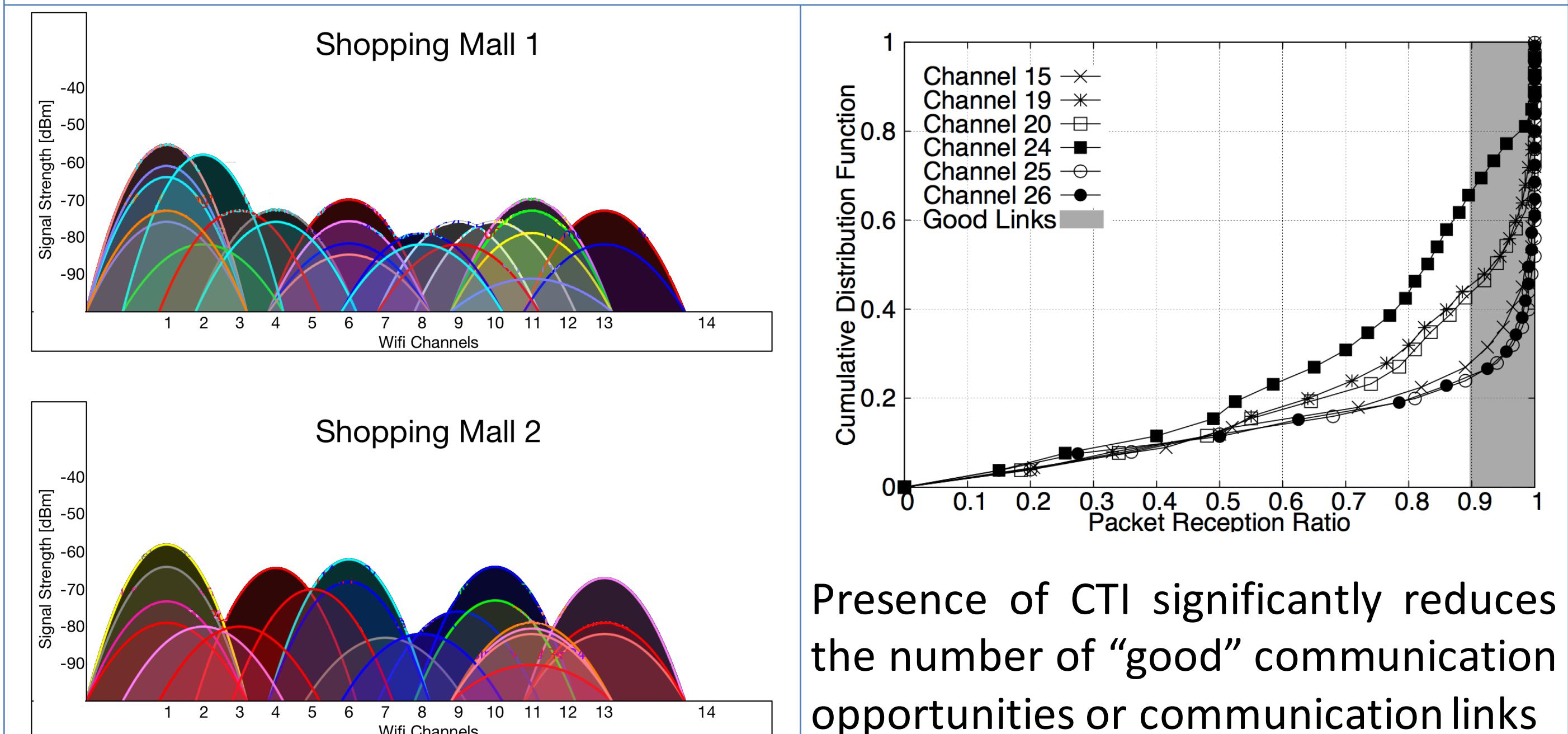


Availability of ZigBee Channels

Expectation



Reality in Urban Environments



Presence of CTI significantly reduces the number of “good” communication opportunities or communication links

Approach

For Robust Data Collection in Urban Environment

- No CTI-Free channel is be expected
- Channel Estimation in such environment is expensive
- Exploit Spatial and Channel Diversity to provide enough communication opportunities so that channel estimation becomes redundant

Acknowledgement

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