An End-to-End Research Platform for Public Safety Communications above 6 GHz

Thrust 4
End-to-End Network Simulation

CHANNEL MODELS
DYNAMICAL TRACES

LINK-TO-SYSTEM
MAPPING

Thrust 1
Channel Sounding

CHANNEL MODELS
DYNAMICAL TRACES

Thrust 3
Channel Emulation

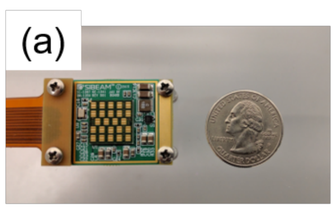
HW/SW
COMMONALITIES

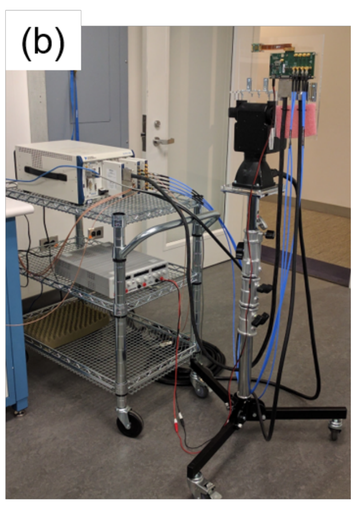
LINK LAYER
TESTING

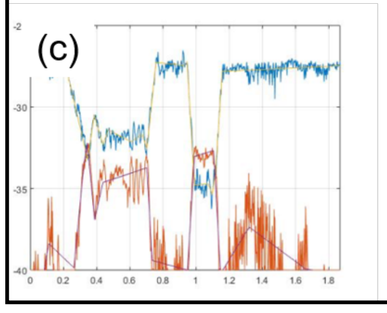
Thrust 2
Software Defined Radio

Thrust 1: Channel sounding for PSC links

GOAL: Measure dynamic directional channels in PSC scenarios.



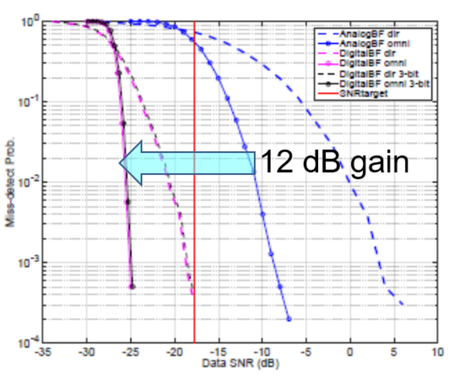


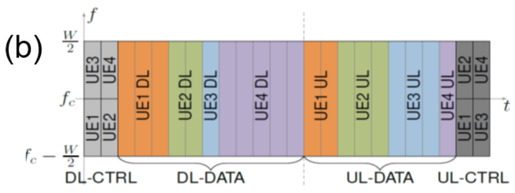


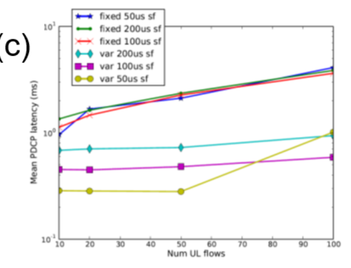
(a) 60 GHz SiBeam Phased Array with 12 steerable antenna elements and 45 degree steerable range.
(b) The phased array is mounted on steerable gimbal to simulate orientation motion.
(c) Preliminary spatially resolved dynamic measurements in a human blocking scenario.

Thrust 2: Software-defined Radio

GOAL: Prototyping new ultra-low latency MAC and sychronization algorithms likely to be used in the PSC links.



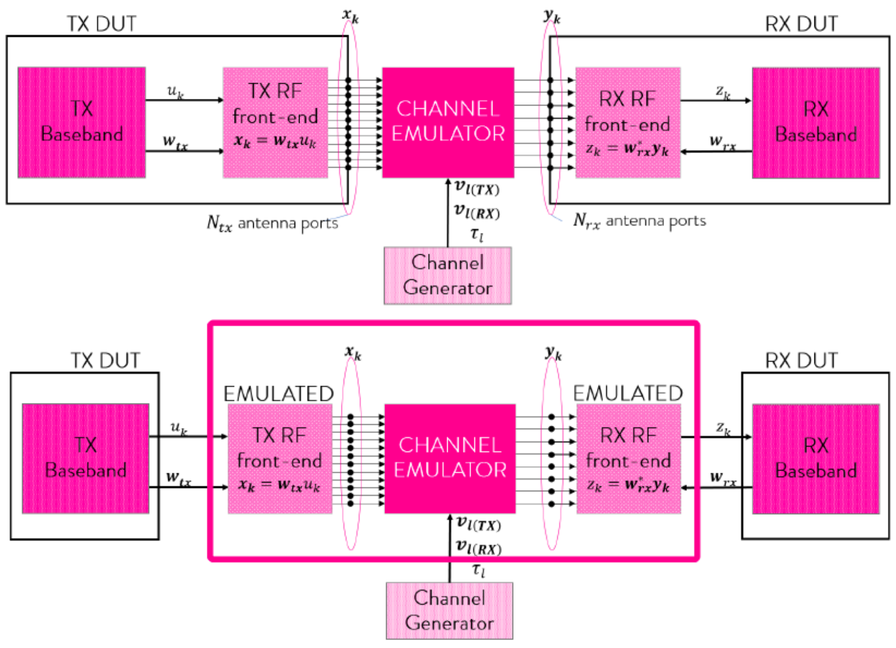




(a) Fast initial access and directional synchronization.
(b) Flexible frame structures.
(c) Ultra low latency.

Thrust 3: Channel emulation

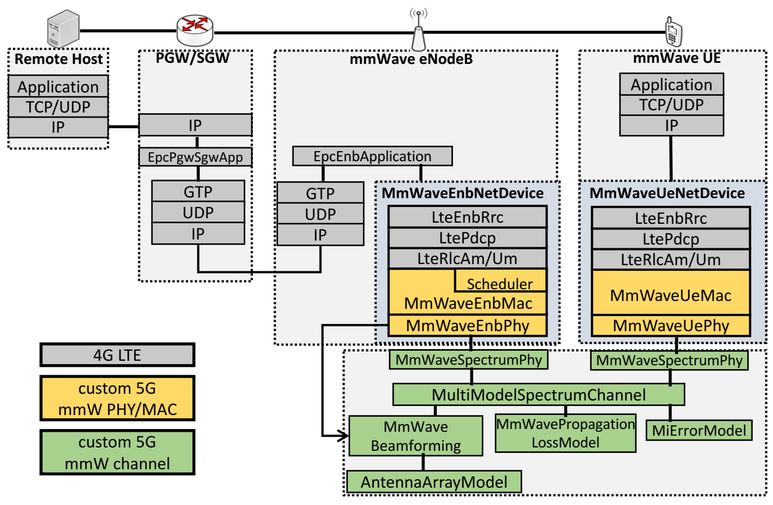
GOAL: Provide the first scalable real-time emulation of complex mmWave channels in PSC settings.



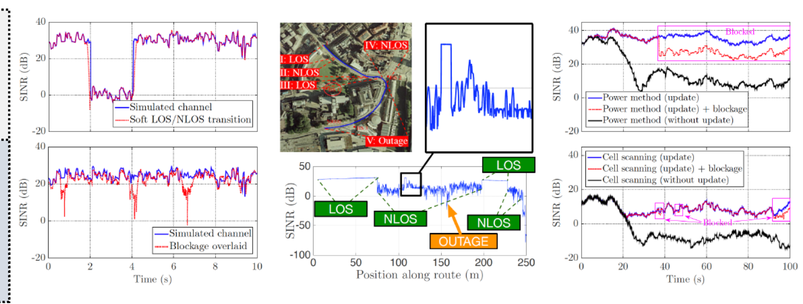
Top: Traditional emulation paradigm where the DUTs interface with the emulator over RF. This emulation paradigm is unsuitable for systems with a large number of antennas.
Bottom: Proposed emulation paradigm where the DUTs interface with the emulator in baseband enabling support of large numbers of elements.

Thrust 4: End-to-end network simulation

GOAL: Development and integration of PSC specific scenarios.



Class diagram for the end-to-end mmWave module.



Left: Statistical channel model overlaid with real blockage measurements.
Center: Real measurements overlaid with ray-tracing.
Right: 3GPP channel model and performance of different beamforming strategies.

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