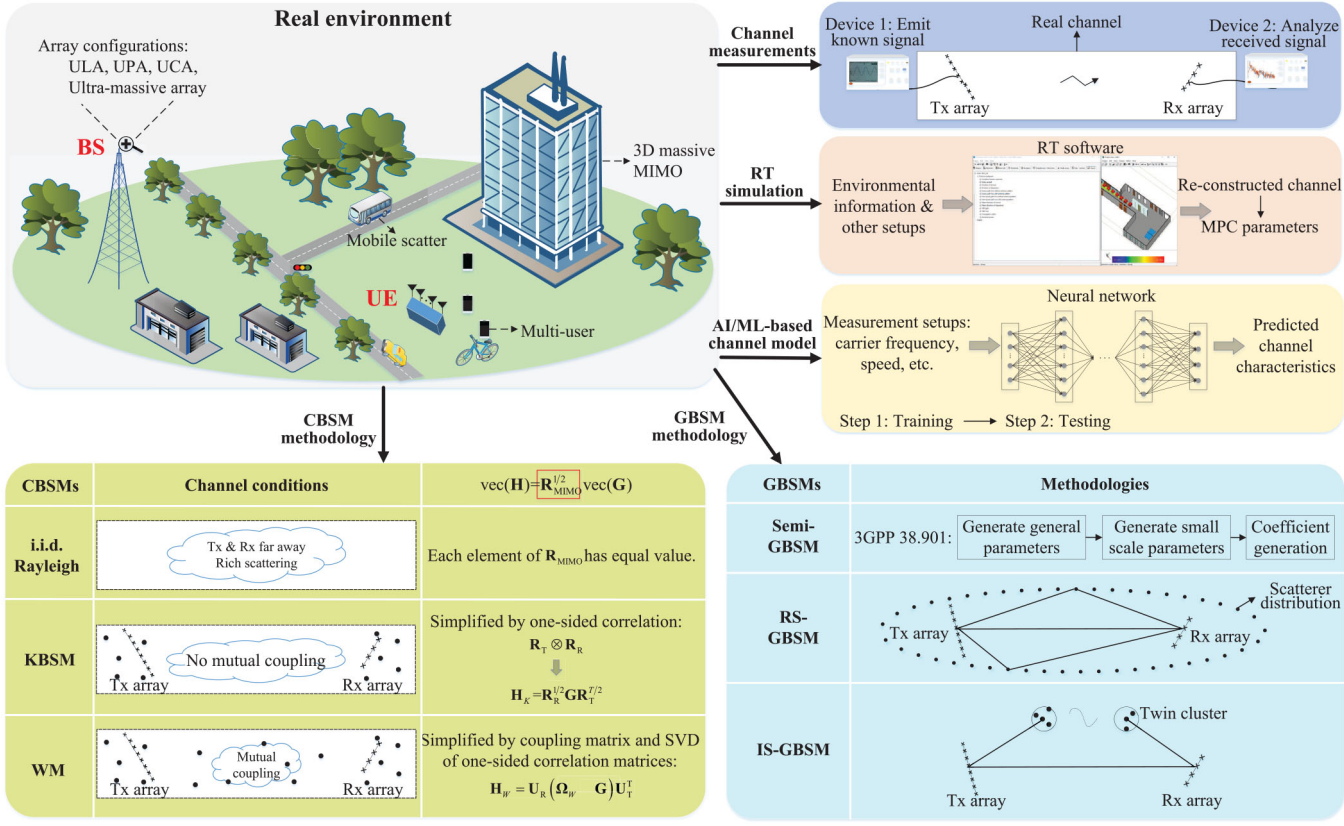
Real environment
Array configurations:
ULA, UPA, UCA,
Ultra-massive array
BS
3D massive MIMO
Mobile scatter
UE
Multi-user
Channel measurements
Device 1: Emit known signal
Real channel
Device 2: Analyze received signal
Tx array
Rx array
RT simulation
RT software
Environmental information & other setups
Re-constructed channel
MPC parameters
AI/ML-based channel model
Neural network
Measurement setups: carrier frequency, speed, etc.
Predicted channel characteristics
Step 1: Training
Step 2: Testing
CBSM methodology
GBSM methodology
CBSMs
Channel conditions
vec(H)=R_MIMO^1/2 vec(G)
i.i.d. Rayleigh
Tx & Rx far away
Rich scattering
Each element of R_MIMO has equal value.
KBSM
No mutual coupling
Tx array
Rx array
Simplified by one-sided correlation:
R_T ⊗ R_R
H_K = R_R^1/2 G R_T^T/2
WM
Mutual coupling
Tx array
Rx array
Simplified by coupling matrix and SVD of one-sided correlation matrices:
H_W = U_R (Ω_W ∘ G) U_T^T
GBSMs
Methodologies
Semi-GBSM
3GPP 38.901:
Generate general parameters
Generate small scale parameters
Coefficient generation
RS-GBSM
Scatterer distribution
Tx array
Rx array
IS-GBSM
Twin cluster
Tx array
Rx array