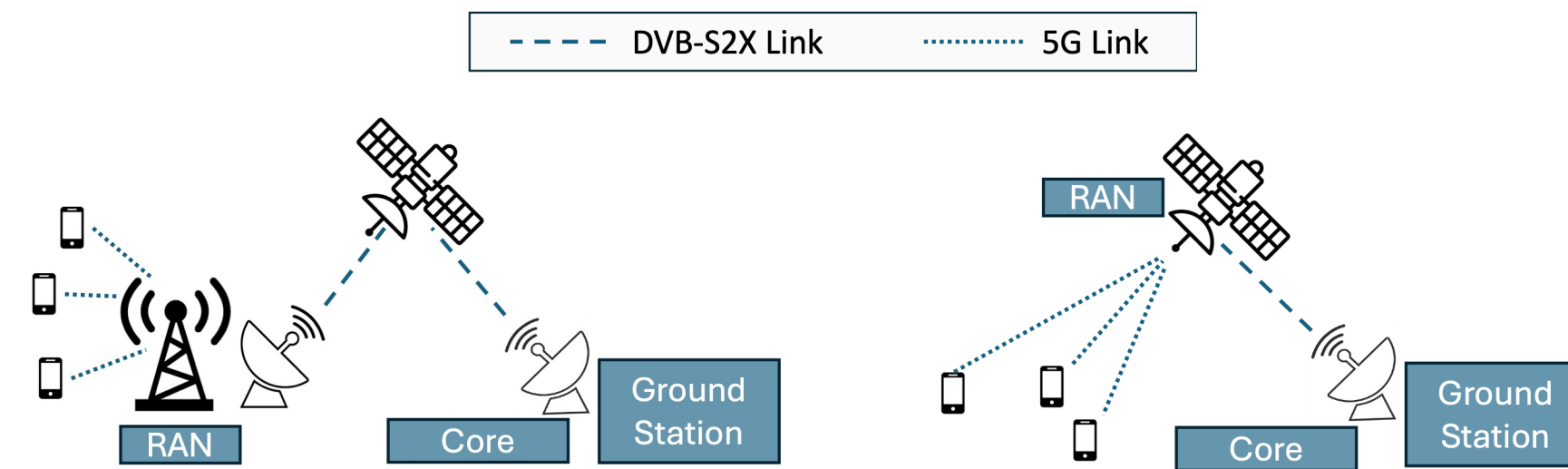
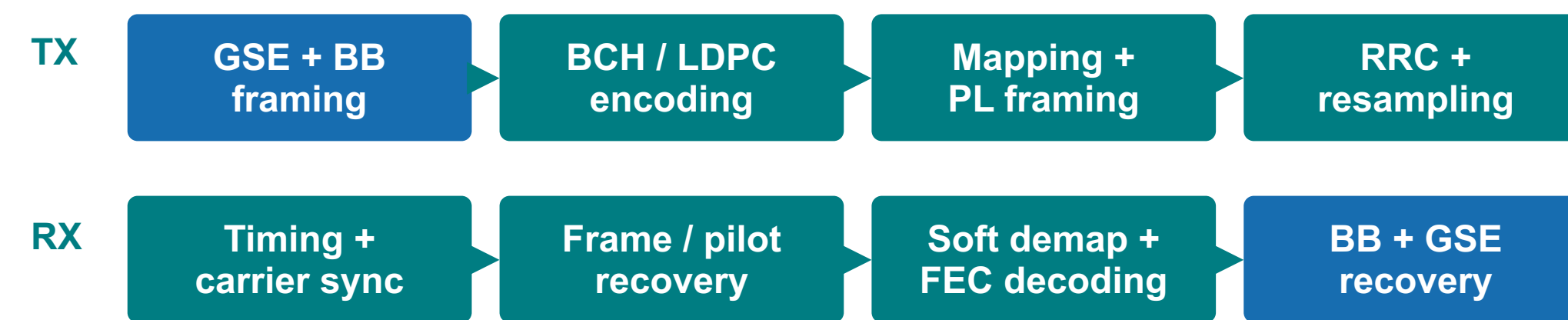


01 cuSat: GPU-Accelerated SATCOM

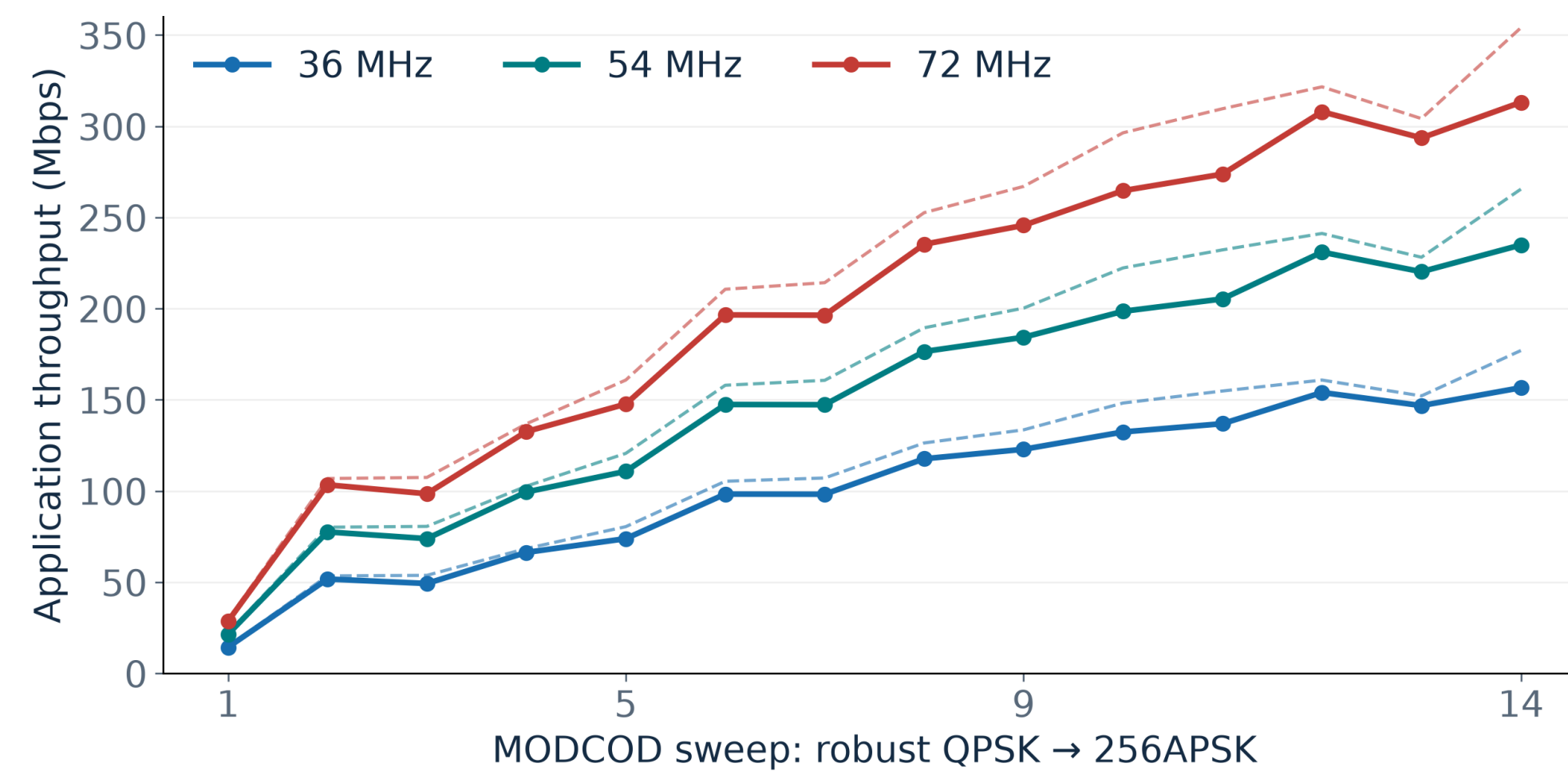
A GPU-based DVB-S2X modem [3]



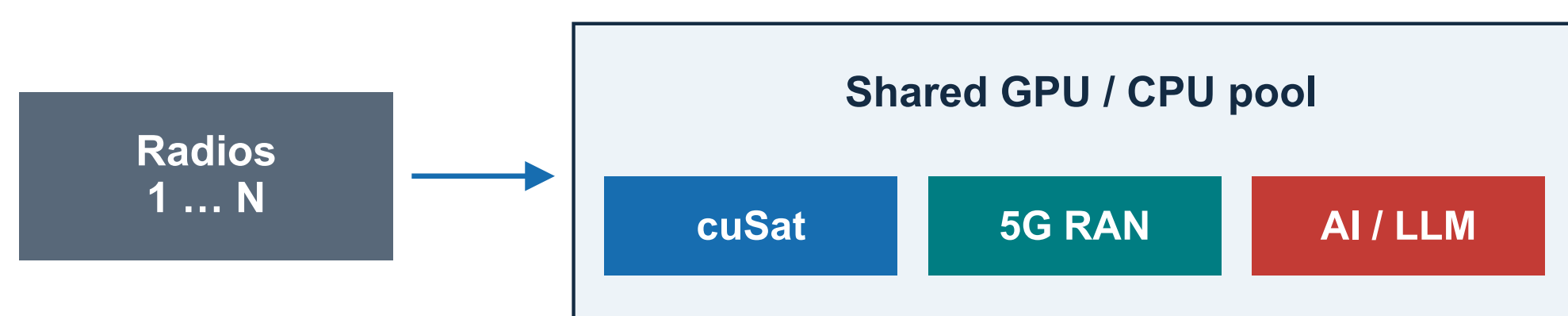
cuSat DVB-S2X processing pipeline



Real-time Throughput Across MODCODs



A DVB-S2X Platform With Shared Compute Capabilities



02 SATCOM Functional Splits

Where should SATCOM processing run?

3GPP Cellular Splits [1,2]

SPLIT 6 MAC / PHY



PHY on the radio side; lower fronthaul demand

SPLIT 7 Within PHY



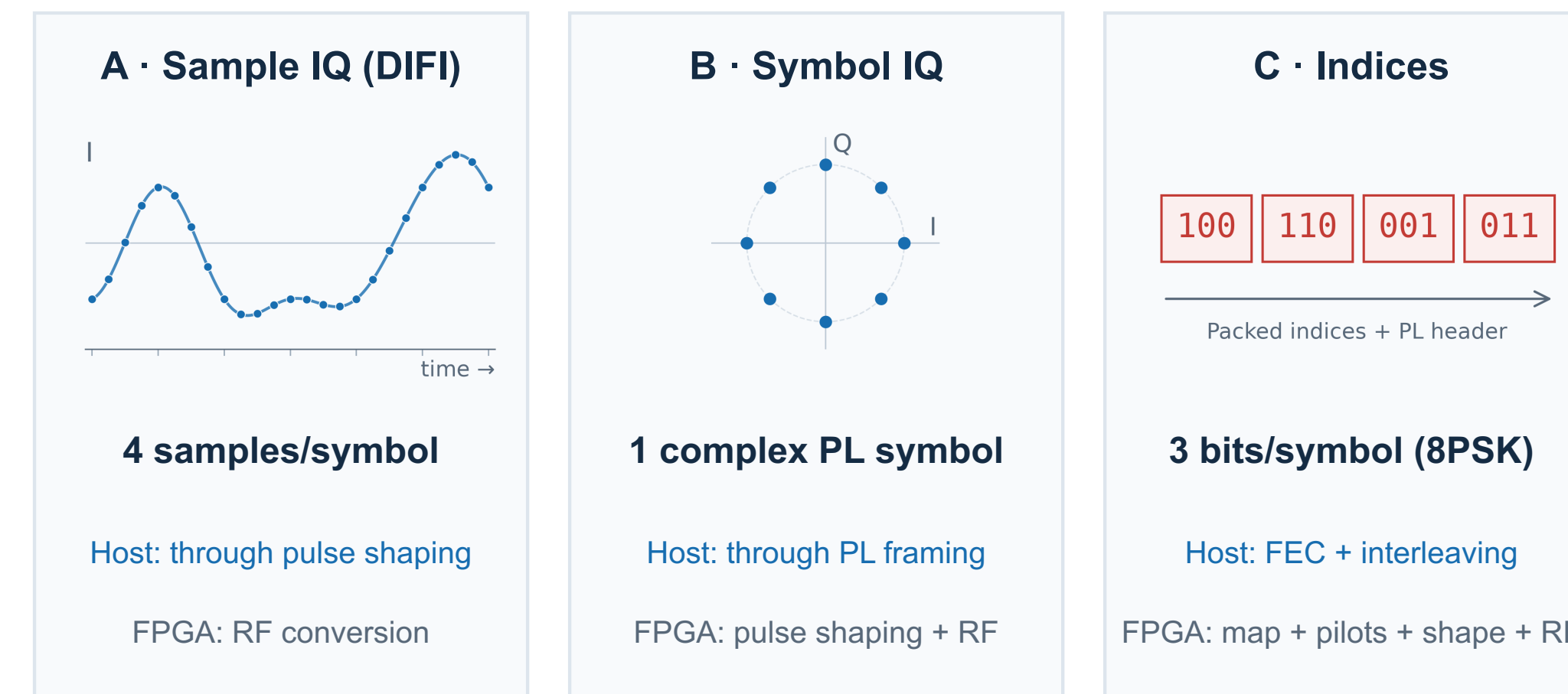
7.2x: frequency-domain IQ; selective resource transport

SPLIT 8 PHY / RF

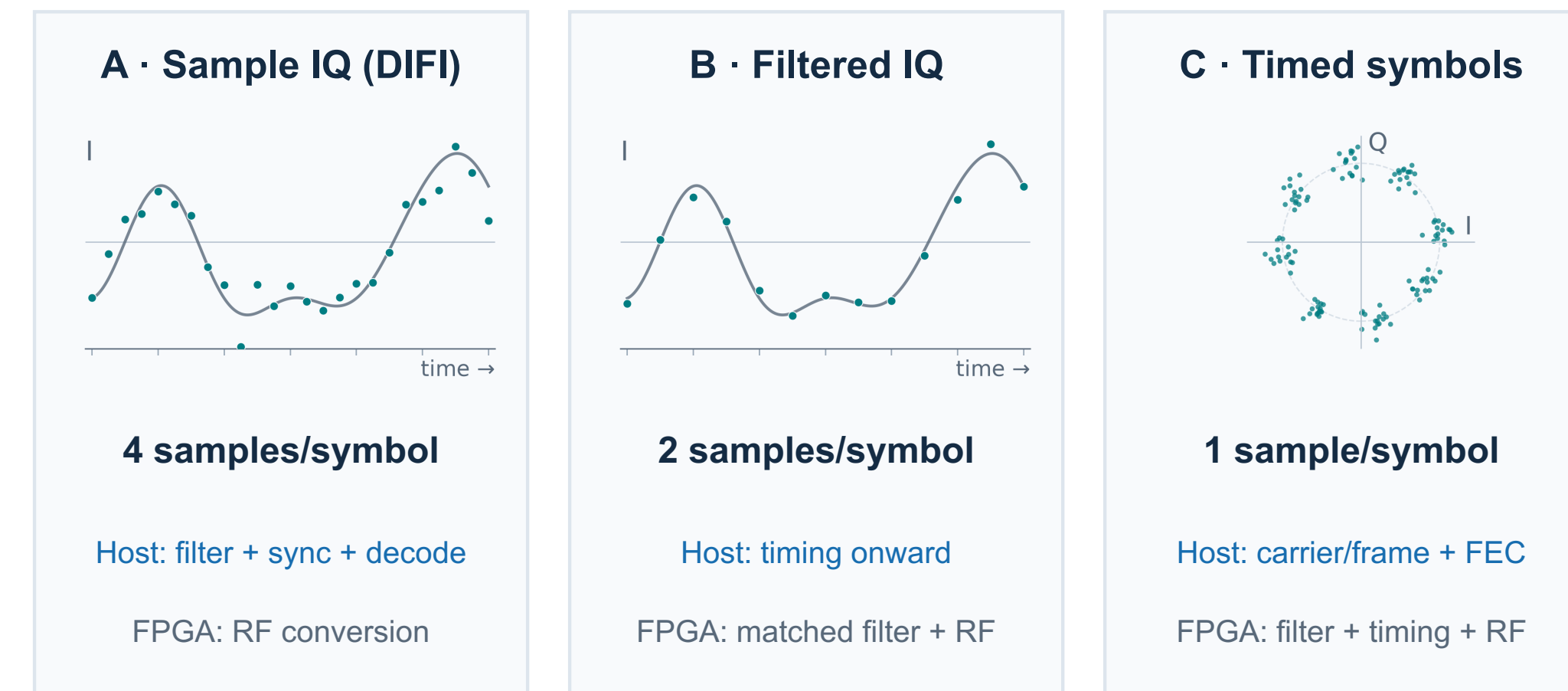


Time-domain IQ: centralized PHY, higher transport demand

SATCOM Split Options: TX

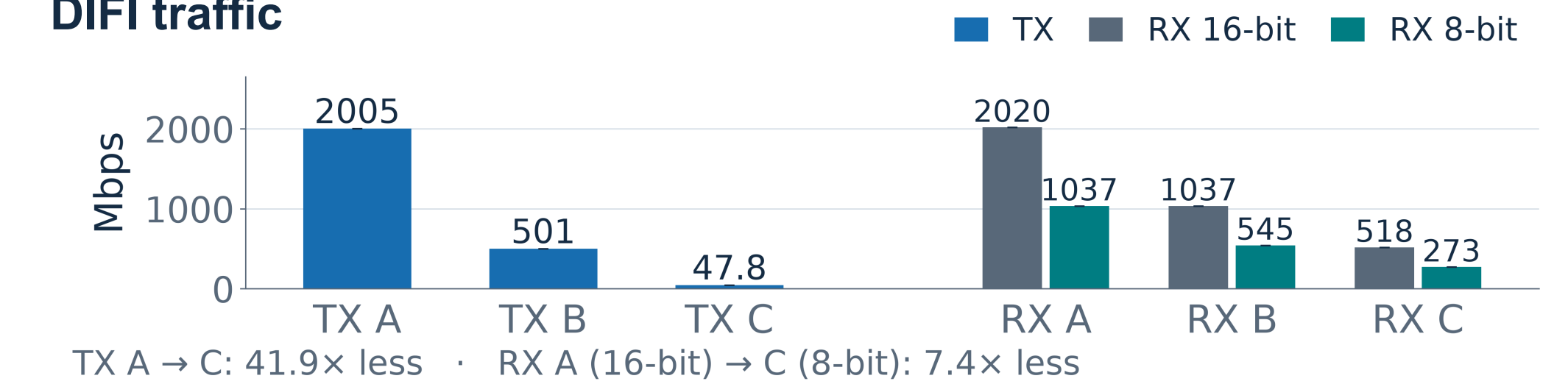


SATCOM Split Options: RX



03 Tradeoffs

DIFI traffic

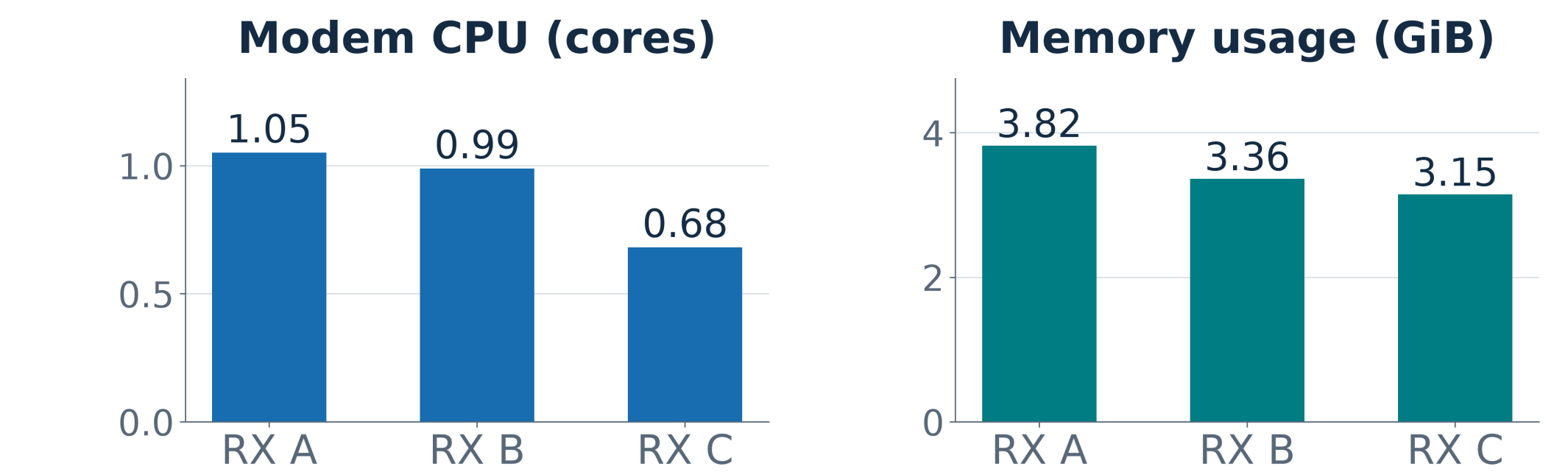


TX A → C: 41.9× less · RX A (16-bit) → C (8-bit): 7.4× less

ACM (~11 dB), 15.36 Msym/s.
DIFI headers included.

Host cost of RX placement

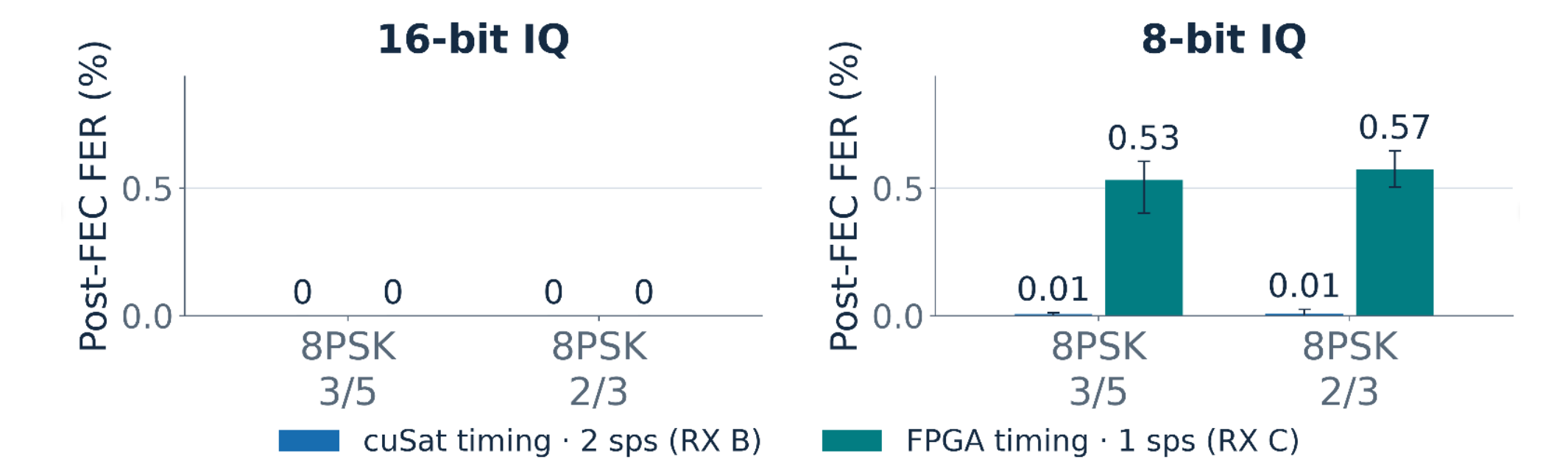
16-bit IQ · fixed 8PSK 2/3 · TX B unchanged



RX A → C: CPU -35% · memory -18%

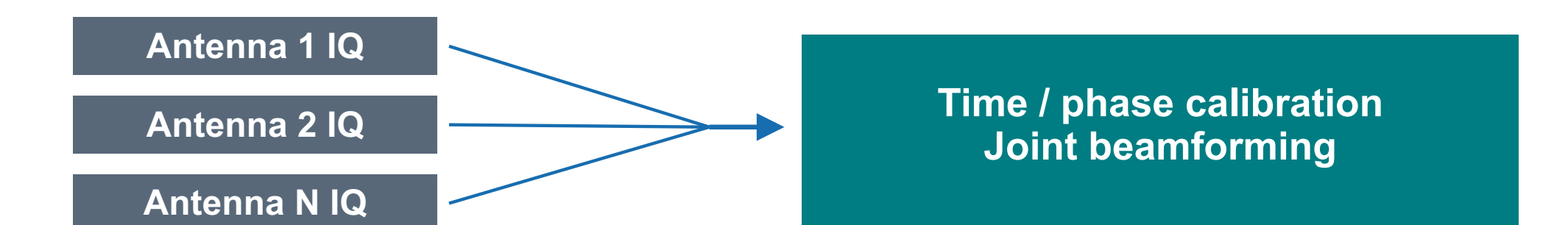
Timing-recovery tradeoff

Matched RF-noise settings, fixed MODCOD and IQ precision



8-bit RX B → C: 545 → 273 Mbps, higher FER

Future Work: Coherent Multi-Beam Processing



Centralize phase-coherent samples for joint beamforming.
Evaluate transport, compute and link-quality budgets.