Figure 1:the DSS-Net Architecture & Physics-Informed Learning Framework

(a)Physics-based Channel Decomposition

Dynamic Paths (Surface Reflection)

Static Paths (Direct & Bottom Reflection)

Matrix H_S (Static)

Decomposition

$H = H_S + H_d$

Matrix H_d (Dynamic)

(b)Dual-Decoder U-Net with Attention

Shared Encoder

Static Decoder

Skip Connections

Noisy Matrix H

64 128 256 512 512 256 128 64

SE Attention

Channel Weights

Skip Connections

Shared Encoder

Dynamic Decoder

$\hat{H}_s$ Clean Static Component

Orthogonality Loss ($p \approx 0$)

$\hat{H}_d$ Clean Dynamic Component

(c)Physics-informed Supervision

Sparsity (e_1)

Temporal Smoothness

Reconstruction

Ground Truth H

U Σ V^T

u

Low-Rank (II-II.)

Gamma Variation