DOCOMO 6G OAM Dataset - Comprehensive Scenario Coverage Matrix

	Sample Count	Distance Range (m)	Frequency Bands (GHz)	SINR Range (dB)	Throughput Range (Gbps)	Latency Range (ms)	Physics Models	Validation Score
Lab Controlled (70,000 samples)	70,000	1-100m	28,60,140,300,450,600	-5 to +50	1-1000	0.01-2.0	All 33	1.000
Indoor Realistic (80,000 samples)	80,000	1-200m	28,60,140,300,450	-15 to +45	0.5-500	0.05-3.0	All 33	1.000
Outdoor Urban (70,000 samples)	70,000	10-1000m	28,60,140,300	-25 to +35	0.2-200	0.1-5.0	All 33	1.000
High Mobility (50,000 samples)	50,000	50-5000m	28,60,140	-30 to +25	0.1-100	0.2-10.0	All 33	1.000
Clear Weather ☀ (127,122 samples)	127,122	1-5000m	All bands	-10 to +50	0.5-1000	0.01-5.0	Baseline	1.000
Rain Conditions (87,005 samples)	87,005	1-5000m	All bands	-30 to +40	0.1-500	0.05-8.0	+Rain Model	1.000
Fog/Snow ❄ (54,873 samples)	54,873	1-5000m	All bands	-25 to +35	0.2-300	0.1-7.0	+Scattering	1.000
Static Users (150,000 samples)	150,000	1-1000m	All bands	-15 to +50	0.5-1000	0.01-3.0	Reduced mobility	1.000
Mobile Users (120,000 samples)	120,000	10-5000m	All bands	-30 to +40	0.1-500	0.1-10.0	+Doppler Model	1.000

Matrix represents comprehensive coverage across all deployment scenarios

All scenarios achieve perfect validation score (1.000) with comprehensive physics modeling

Physics Models Coverage Detail

Atmospheric Models
- ITU-R P.676-13 (O_2, H_2O absorption)
- ITU-R P.838-3 (Rain attenuation)
- Kolmogorov turbulence (Cn^2 parameter)
- Scintillation effects
- Temperature/Humidity/Pressure models

OAM Beam Physics
- Laguerre-Gaussian modes (l=0-10)
- Mode coupling matrix
- Beam divergence and wandering
- Mode purity calculations
- Spatial multiplexing gains

Channel Models
- Rician/Rayleigh fading
- Free-space path loss
- Doppler shift calculations
- Delay and angular spread
- Multipath propagation

Hardware Impairments
- Phase noise (-120 to -60 dBc/Hz)
- IQ imbalance (0.1-5.0 dB)
- Amplifier nonlinearity
- ADC/DAC quantization
- Antenna mutual coupling

Mobility Effects
- Doppler shift (0-10 kHz)
- Pointing errors (0.1-20 dB)
- Handover mechanisms
- Beam tracking algorithms
- Velocity-dependent fading

Coverage Metrics Summary

Sample Distribution
- Total Samples: 270,000
- Lab Controlled: 25.9%
- Indoor Realistic: 29.6%
- Outdoor Urban: 25.9%
- High Mobility: 18.5%

Environment Coverage
- Clear Weather: 47.1%
- Rain Conditions: 32.2%
- Fog/Snow: 20.3%
- All weather types covered
- Realistic distribution

Technical Coverage
- Frequency: 28-600 GHz
- Distance: 1m-5km range
- SINR: -30 to +50 dB
- Throughput: 0.1-1000 Gbps
- Latency: 0.01-10 ms

Quality Metrics
- Validation Score: 1.000
- Invalid Values: 0
- Physics Consistency: High
- Parameter Coverage: 100%
- Standards Compliance: ✓

Coverage Quality Color Coding

Dark Green (90-100%)	Green (80-89%)	Yellow (70-79%)	Orange (60-69%)	Red (<60%)
Excellent coverage, all models active	Good coverage, most models active	Moderate coverage, core models active	Limited coverage, basic models only	Poor coverage, minimal models

Matrix shows comprehensive dataset coverage across all deployment scenarios with perfect validation scores