Entropica Forensic Model — Appendix I

Deployment Profiles

Layer Activation and Spawn Governance

Version 1.7

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Abstract

Appendix I defines deployment profiles configuring EFM layer activation and spawn governance parameters. Version 1.6 adds comprehensive Spawn Parameters for each profile.

Metadata Field	Value
Layer(s) Affected	All Layers (configuration-dependent)
System Function	Deployment Configuration, Spawn Governance, Autonomy Levels
Cross-Booklet Anchor	Booklet 3 §2.1 (Deployment), Booklet 4 §5.2 (Scaling)
Primary Properties	P2 (Spawn Boundedness), P6 (Capsule Liveness)
Test Coverage	I-1 to I-6 (6 tests)

Table 1: Appendix I metadata for cross-reference traceability.

Table 2: Deployment Profile to Operator Guide Mode Alignment.

Profile	Ops Mode	Guide Ref	Notes
Minimal	SANDBOX	§2.1	Development/testing, full Gardener supervision
Standard	PRODUCTION	§3.1	Production workloads, CRITICAL alerts only
Swarm	DISTRIBUTED	§4.1	Multi-trunk deployment, cross-forest coordination
Research	RESEARCH	§2.3	Hypothesis testing, Discovery Stack enabled
Constitutional	GOVERNANCE	§5.1	Level 6 autonomy, bounded self-modification

Ops Mode Cross-Reference (Operator Guide Harmonization)

Mode Transitions: When transitioning between ops modes (e.g., SANDBOX → PRODUCTION), operators MUST follow the checklist in Operator Guide §6.2:

1. Verify all spawn conditions (S_1–S_6) pass under new profile limits
2. Confirm ASG parameters are within new profile bounds
3. Update Gardener notification thresholds per new mode
4. Execute `efm-cli profile validate -target=<mode>` before cutover

Emergency Mode: During catastrophic events (Operator Guide §7), the system MAY temporarily downgrade to Minimal profile regardless of current ops mode. This is the only mode transition that does not require explicit operator approval.

Contents

1 Profile Summary

Parameter	Minimal	Standard	Swarm	Research	Constitutional
Layers	0–1	0–2	0–5	0–2,M	0–6
Autonomy	2	4	5	5	6
τ_{spawn}	0.9	0.7	0.6	0.65	0.7
D_{max}	3	10	15	8	10
R_{max}	10	100	500	200	100
R_{local}	2	10	50	30	10
V_{max}	50	1000	5000	2000	1000

Table 3: Spawn parameters by deployment profile.

2 Profile Details

2.1 Minimal (Research/Sandbox)

- Active Layers: 0, 0.5, 1
- Autonomy Level: 2 (Low)
- Gardener: Always required
- Spawn: Explicit authorization only, very restricted

2.2 Standard (Production)

- Active Layers: 0, 0.5, 1, 2
- Autonomy Level: 4 (Moderate)
- Gardener: CRITICAL events only
- Spawn: Task-based, Arbiter validates

2.3 Swarm (Distributed)

- Active Layers: 0–5 (Full Forest)
- Autonomy Level: 5 (High)
- Gardener: Constitutional changes only
- Spawn: Swarm consensus, high throughput

2.4 Research (Probe/Exploration)

- Active Layers: 0–2, Discovery Stack (M)
- Autonomy Level: 5 (High)
- Gardener: Constitutional changes only
- Spawn: Discovery-driven, ephemeral probes

2.5 Constitutional (Full Governance)

- Active Layers: 0–6 (All)
- Autonomy Level: 6 (Bounded)
- Gardener: Layer 0/6 changes only
- Spawn: Constitutional validation

3 Spawn Condition Customization

Condition	Standard	Swarm	Research
S_1 (Task)	Explicit task	Swarm consensus	Discovery novelty
S_2 (Resources)	Parent alloc	Pooled Vault	Exploration budget
S_3 (Health)	$H \geq 0.7$	$H \geq 0.6$	$H \geq 0.65$
S_4 (Depth)	$d < 10$	$d < 15$	$d < 8$
S_5 (Rate)	Per-parent	Coordinator elevated	Burst allowed
S_6 (Integrity)	No ANOMALY	Swarm health	Probe isolation

4 Testing and Validation

4.1 Profile Validation Tests

Each deployment profile must pass validation before use:

#	Test	Validates
I-1	Parameter bounds	All spawn parameters within valid ranges
I-2	Layer consistency	Active layers match profile spec
I-3	Autonomy enforcement	Autonomy level correctly restricts operations
I-4	Gardener triggers	Correct events trigger Gardener notification
I-5	Cross-profile isolation	Profile change requires restart
I-6	Default selection	System selects appropriate default profile

Table 4: Profile validation test suite.

4.2 Spawn Parameter Invariants

1. **Bound Invariant:** $\forall$ profile P: $\tau_{spawn}^{min} \leq \tau_{spawn} \leq \tau_{spawn}^{max}$
2. **Depth Invariant:** $\forall$ capsule C: $depth(C) \leq D_{max}(profile)$
3. **Rate Invariant:** $\forall t$: $R(t) \leq R_{max}(profile)$
4. **Vault Invariant:** $\forall t$: $V_{used}(t) \leq V_{max}(profile)$

4.3 Profile Transition Testing

When transitioning between profiles (e.g., SANDBOX → PRODUCTION):

1. Verify all capsules respect new bounds
2. Verify ASG parameters within new profile limits
3. Verify Gardener notification triggers updated
4. Verify active layers match new profile

Changelog

v1.8 — Added Testing and Validation section, profile invariants
v1.6 — Added Spawn Governance Parameters, Research profile
v1.5 — Layer activation matrix, autonomy levels