DigiByte Quantum Shield Network – Developer Guide

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1. Requirements

- Python 3.10+ - Optional: FastAPI and Uvicorn for the HTTP API

Install dependencies (example):

```
pip install fastapi uvicorn pydantic
```

2. Running the Engine Demo

From the repository root:

```
python dqsn_engine.py
```

You should see output comparing a “good” random signature and a “suspicious” low■entropy signature, with their risk scores, levels, and contributing factors.

3. Using the Engine as a Library

Example usage inside another Python project:

```
from dqsn_engine import analyze_signature

sig_bytes = get_signature_bytes_somehow()  result = analyze_signature(      sig_bytes, mempool_spike=0.6,      reorg_depth=2,      cross_chain_alerts=1,  )

print(result.risk_score, result.level, result.factors)
```

This pattern is suitable for DigiByte node plugins, Sentinel■AI modules, or monitoring agents.

4. Running the FastAPI Service

To expose a JSON API, run:

```
uvicorn dqsn_core:app --host 0.0.0.0 --port 8080 --reload
```

Then send a POST request to:

```
POST /dqsnet/analyze
```

with a body similar to:

```
{    "metrics": {      "entropy_bits_per_byte": 6.9,      "nonce_reuse_rate": 0.01,      "signature_repetition_rate": 0.02,      "mempool_utilization": 0.65,      "reorg_depth": 1,      "avg_block_interval_sec": 15.0,      "avg_tx_size_bytes": 650,      "taproot_adoption_rate": 0.12,      "window_seconds": 600    },    "source_chain": "DigiByte",    "window_label": "last_40_blocks"  }
```

The response will include risk_score, level, recommended_action, and internal components.

5. Packaging and Integration

- The engine can be packaged as a small Python library and later ported to C++ or Rust for direct embedding into DigiByte Core. - The FastAPI shim is optional; exchanges and custodians may integrate directly with the engine instead of running an HTTP service. - All code is MIT■licensed, so contributors may fork, modify, or embed the logic as long as copyright and license notices are preserved.