**Quantum Resistant Cryptographic Solutions (QRCS)**  
**Post-Quantum Intellectual-Property Valuation Report**  
**Date:** 26 April 2025

*Confidential — Prepared for internal strategic planning and investor due-diligence.*

**1 Executive Summary**

QRCS controls a diversified, internally-developed portfolio of ten post-quantum security assets:

|  |  |
| --- | --- |
| **Layer** | **Assets** |
| **Core primitives** | QSC crypto library (MISRA-C) |
| **High-value key management** | HKDS (DUKPT successor) |
| **Secure ciphers / hashes** | RCS, CSX, SCB hash, QMAC |
| **Protocols & applications** | MPDC-I, AERN, PQS, QSMP, QSTP, SKDP |

* **HKDS** offers ≈ 7 × server-side performance vs. DUKPT, translating into mid-seven-figure annual OPEX savings for large processors.
* **MPDC** provides military-grade infrastructure security, suitable for state and critical infrastructure adoption.
* **PQS** could replace SSH component in fintech systems, including global banking asset transfer SWIFT.
* **AERN** anonymizing network system could be a fundamental component for next generation VPNs.
* **QSMP and QSTP** could be adopted into a wide range of fintech and communications applications
* **SKDP** in IoT systems and as a secondary authentication gate, encryption layer.
* All code is published on GitHub (github.com/QRCS-CORP) in MISRA-C style **under a private, non-commercial educational license**; commercial use requires a separate agreement.
* Every project is covered by a provisional patent; an HKDS utility patent is actively under examination.

These factors support a **2025 base-case equity valuation of USD 15 – 18 million**, with upside > USD 25 million as HKDS penetrates the global POS ecosystem.

**2 Market Opportunity**

* Analysts forecast quantum-safe cryptography spend to rise from **USD 518 M (2023) → USD 4.6 B (2030)** (≈ 38 % CAGR).
* **DUKPT ubiquity**: > 119 million POS terminals (2024). Any drop-in replacement inherits this installed base.
* Processors running 30 M card transactions/month can cut HSM/cloud costs by ~USD 40 k/year; at billion-Tx scale, savings exceed USD 1 M annually.

**3 HKDS & RCS — Strategic Positioning**

|  |  |  |
| --- | --- | --- |
| **Criteria** | **HKDS** | **RCS cipher** |
| Function | Tree-based key derivation (DUKPT replacement) | Wide-block AEAD (Rijndael-256 + Keccak) |
| Performance | ≈ 7 × faster server verification | Lightweight in embedded & cloud |
| Commercial fit | POS, ATM, HSM vendors | Secure channels in HKDS, MPDC-I, QSMP |
| Status | TRL-7 prototype; provisional + utility patent in process | TRL-9; deployed since 2015 |
| License | Private educational; commercial licence on request | Same |

**4 Comparable Transactions (2022-2025)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Stage (Year)** | **Capital / Deal** | **Relevance** |
| PQShield | Series B (2024) | USD 37 M | Lattice-based IP, chips & SDK |
| CryptoNext Security | Series A (2023) | EUR 11 M | PQC migration tool-chain |
| QuSecure | Series A+ (2025) | USD 28 M (total) | PQ VPN & orchestration |
| SandboxAQ → Cryptosense | Acquisition (2022) | ≈ USD 80-100 M\* | Crypto-analysis software |

\*Deal size estimated from venture filings.

**5 Valuation Methodology & Results**

**5.1 Method**

Triangulation across:

1. **Market comparables** (table §4).
2. **Cost-to-recreate** (~95 k engineer-hours @ CAD $95/hr + 30 % OH).
3. **Income**: 5-year license forecast (1 % PQC TAM capture by 2030).

**IP posture:** Source code is visible but restricted to educational use; all commercial deployments require a QRCS license. Every module has provisional patent cover; HKDS patent filing is active. This exclusivity strengthens valuation and raises the conservative floor.

**5.2 Asset values**

|  |  |
| --- | --- |
| **Asset** | **Valuation (USD M)** |
| HKDS | **3.5** |
| RCS/CSX ciphers | **1.2** |
| QSC library | 2.5 |
| MPDC-I | 1.5 |
| AERN | 1.2 |
| PQS | 0.75 |
| QSMP | 0.65 |
| QSTP | 0.60 |
| SKDP | 0.50 |
| SCB hash | 0.40 |
| QMAC | 0.35 |
| **Subtotal** | **12.20** |
| Synergy premium (+ 25 %) | 3.05 |
| **Total portfolio** | **≈ 15.25 M** |

**5.3 Equity valuation range**

|  |  |  |
| --- | --- | --- |
| **Scenario** | **Equity value (USD M)** | **Key assumptions** |
| **Conservative** | **11** | Limited HKDS pilots; IP royalties fund ops |
| **Base case** | **15 – 18** | HKDS pilots; seed/Series A |
| **Upside** | **25 +** | Top-10 processor adopts HKDS; certifications secured |

**6 Technical Team Assessment**

|  |  |  |
| --- | --- | --- |
| **Capability** | **Rating / 10** | **Evidence** |
| Applied cryptography & protocol design | **8.5** | HKDS, AERN & MPDC-I originals |
| Systems / network engineering | **8.0** | Full MISRA-C code-bases |
| Mathematical proof rigor | **7.5** | Formal sections drafted; some proofs incomplete |
| Secure SDLC | **7.0** | MISRA compliance, unit tests; CI needs expansion |
| Commercial productization | **6.0** | Limited GTM activity to date |

*The founder is top-decile among solo PQ developers; augment with certification & BD talent.*

**7 Risk Factors**

* Standards mis-alignment if HKDS diverges from future NIST guidance
* Single-founder bandwidth
* Patent prosecution & freedom-to-operate (FTO) still in progress
* Certification timelines (FIPS 140-3, PCI PTS)
* Adoption inertia among large processors

**8 Strategic Recommendations**

1. **File full patents** for AERN, MPDC-I, QSMP, QSTP, SKDP and PQS; maintain priority dates.
2. **Publish audited benchmarks** HKDS versus DUKPT (cost & latency).
3. **Secure a mid-tier processor pilot** to produce a quantified case study.
4. **Launch FIPS 140-3 validation** for QSC primitives; leverage existing lab ties.
5. **Evolve current educational license** into a two-tier scheme (free eval binary + paid commercial license) once the HKDS patent is allowed, to speed trials while preserving exclusivity.

**9 Conclusion**

HKDS’s measurable cost advantage over DUKPT and the existing IP portfolio elevate QRCS’s IP equity to a **base-case USD 15 – 18 million** today. With certifications complete and an anchor customer secured, the upside exceeds **USD 25 million**, positioning QRCS as an attractive acquisition target or Series A candidate in the fast-growing quantum-safe cybersecurity market.