



TECHNICAL REPORT

**Cyber Security (CYBER);
Quantum-Safe Cryptography (QSC);
Secure Implementation Guidance for
Key Encapsulation Mechanisms and
Digital Signature Schemes;
Part 1: General**

Reference

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Cyber Security (CYBER).

The present document is part 1 of a multi-part deliverable covering implementation guidance for quantum-safe key encapsulation mechanisms and digital signature schemes, as identified below:

Part 1: "General";

Part 2: "ML-KEM";

Part 3: "ML-DSA";

Part 4: "SLH-DSA".

Later parts of this multi-part deliverable will provide implementation guidance for specific algorithms, building on the general guidance provided in the present document.

Modal verbs terminology

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1 Scope

The present document provides developers with general guidance to aid the secure implementation of quantum-safe algorithms. This includes an overview of the interfaces and expected security properties of quantum-safe algorithms; some general good practice guidance for cryptographic implementations; some background on side-channel and fault attacks; and a brief discussion of testing and formal verification.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

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- [i.2] ETSI TR 104 239-2: "Cyber Security (CYBER); Quantum-Safe Cryptography (QSC); Secure Implementation Guidance for Key Encapsulation Mechanisms and Digital Signature Schemes; Part 2: ML-KEM".
- [i.3] ETSI TR 104 239-3: " Cyber Security (CYBER); Quantum-Safe Cryptography (QSC); Secure Implementation Guidance for Key Encapsulation Mechanisms and Digital Signature Schemes; Part 3: ML-DSA".
- [i.4] ETSI TR 104 239-4: " Cyber Security (CYBER); Quantum-Safe Cryptography (QSC); Secure Implementation Guidance for Key Encapsulation Mechanisms and Digital Signature Schemes; Part 4: SLH-DSA".
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