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M. Ounsworth
J. Gray
Entrust
M. Pala
OpenCA Labs
J. Klaussner
Bundesdruckerei GmbH
S. Fluhrer
Cisco Systems
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Composite ML-KEM for use in X.509 Public Key Infrastructure
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Abstract

This document defines combinations of ML-KEM [FIPS.203] in hybrid with traditional algorithms RSA-OAEP, ECDH, X25519, and X448. These combinations are tailored to meet security best practices and regulatory guidelines. Composite ML-KEM is applicable in any application that uses X.509 or PKIX data structures that accept ML-KEM, but where the operator wants extra protection against breaks or catastrophic bugs in ML-KEM.

About This Document

This note is to be removed before publishing as an RFC.

The latest revision of this draft can be found at https://lamps-wg.github.io/draft-composite-kem/draft-ietf-lamps-pq-composite-kem.html. Status information for this document may be found at https://datatracker.ietf.org/doc/draft-ietf-lamps-pq-composite-kem/.

Discussion of this document takes place on the LAMPS Working Group mailing list (mailto:spams@ietf.org), which is archived at https://datatracker.ietf.org/wg/lamps/about/. Subscribe at https://www.ietf.org/mailman/listinfo/spams/.

Source for this draft and an issue tracker can be found at https://github.com/lamps-wg/draft-composite-kem.

Status of This Memo

This Internet-Draft will expire on 18 December 2025.

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1. Changes in version -07

Interop-affecting changes:

* ML-KEM secret keys are now only seeds.

* Since all ML-KEM keys and ciphertexts are now fixed-length, dropped the length-tagged encoding.

* Added complete test vectors.

* Added ML-KEM1024 + RSA3072 combination.

* Added ML-KEM1024+ECDH-P521 combination.

* Updated prototype OIDs so these don’t conflict with the previous versions

* Removed the "Use in CMS" section so that we can get this document across the finish line, and defer CMS-related debates to a separate document.

Editorial changes:

* Since we are only using the first step of HKDF, which is HKDF-Extract() and not HKDF-Expand(), it was decided that it’s clearer to systematically rename this to "HMAC Combiner".

* Added an informative section on the difference between SHA3 and HMAC-SHA2 combiners, and the difference between HKDF(), HKDF-Extract(), and HMAC().

* Since the serialization is now non-DER, drastically reduced the ASN.1-based text.

* Changed HKDF-SHA384 to HKDF-SHA512. Since SHA-384 is a truncated version of SHA-512, and we are further truncating it to 256 bits, these are binary-compatible, might as well list the parent algorithm for clarity.

* Added a new section "KEM Combiner Examples" that show all the intermediate values of the KEM Combiner.

Still to do in a future version:

* Nothing. Authors believe this version to be complete.

2. Introduction

The advent of quantum computing poses a significant threat to current cryptographic systems. Traditional cryptographic key establishment algorithms such as RSA-OAEP, Diffie-Hellman and its elliptic curve variants are vulnerable to quantum attacks. During the transition to post-quantum cryptography (PQC), there is considerable uncertainty regarding the robustness of both existing and new cryptographic algorithms. While we can no longer fully trust traditional cryptography, we also cannot immediately place complete trust in post-quantum replacements until they have undergone extensive scrutiny and real-world testing to uncover and rectify both algorithmic weaknesses as well as implementation flaws across all the new implementations.

Unlike previous migrations between cryptographic algorithms, the decision of when to migrate and which algorithms to adopt is far from straightforward. For instance, the aggressive migration timelines may require deploying PQC algorithms before their implementations have been fully hardened or certified, and dual-algorithm data protection may be desirable over a longer time period to hedge against CVEs and other implementation flaws in the new implementations.

Cautious implementers may opt to combine cryptographic algorithms in such a way that an attacker would need to break all of them simultaneously to compromise the protected data. These mechanisms are referred to as Post-Quantum/Traditional (PQ/T) Hybrids [I-D.ietf-pquip-pqt-hybrid-terminology].

Certain jurisdictions are already recommending or mandating that PQC lattice schemes be used exclusively within a PQ/T hybrid framework. The use of a composite scheme provides a straightforward implementation of hybrid solutions compatible with (and advocated by) some governments and cybersecurity agencies [BSI2021], [ANSSI2024].

This specification defines a specific instantiation of the PQ/T Hybrid paradigm called "composite" where multiple cryptographic algorithms are combined to form a single key encapsulation mechanism (KEM) presenting a single public key and ciphertext such that it can be treated as a single atomic algorithm at the protocol level; a property referred to as "protocol backwards compatibility" since it can be applied to protocols that are not explicitly hybrid-aware. composite algorithms address algorithm strength uncertainty because the composite algorithm remains strong so long as one of its components remains strong. Concrete instantiations of composite ML-KEM algorithms are provided based on ML-KEM, RSA-OAEP and ECDH. Backwards compatibility in the sence of upgraded systems continuing to inter-operate with legacy systems is not directly covered in this specification, but is the subject of Section 11.2.

Composite ML-KEM is applicable in any PKIX-related application that would otherwise use ML-KEM.

2.1. Conventions and Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here. These words may also appear in this document in lower case as plain English words, absent their normative meanings.

This specification is consistent with all terminology from [I-D.ietf-pquip-pqt-hybrid-terminology]. In addition, the following terms are used in this specification:

ALGORITHM: The usage of the term "algorithm" within this specification generally refers to any function which has a registered Object Identifier (OID) for use within an ASN.1 AlgorithmIdentifier. This loosely, but not precisely, aligns with the definitions of "cryptographic algorithm" and "cryptographic scheme" given in [I-D.ietf-pquip-pqt-hybrid-terminology].

COMBINER: A combiner specifies how multiple shared secret keys are combined into a single shared secret key.

COMPONENT / PRIMITIVE: The words "component" or "primitive" are used interchangeably to refer to a cryptographic algorithm that is used internally within a composite algorithm. For example this could be an asymmetric algorithm such as "ML-KEM-768" or "RSA-OAEP", or a KDF such as "HMAC-SHA256".

DER: Distinguished Encoding Rules as defined in [X.690].

KEM: A key encapsulation mechanism as defined in Section 3.

PKI: Public Key Infrastructure, as defined in [RFC5280].

SHARED SECRET KEY: A value established between two communicating parties for use as cryptographic key material suitable for direct use by symmetric cryptographic algorithms. This specification is concerned with shared secrets established via public key cryptographic operations.

Notation: The algorithm descriptions use python-like syntax. The following symbols deserve special mention:

* || represents concatenation of two byte arrays.

* [:] represents byte array slicing.

* (a, b) represents a pair of values a and b. Typically this indicates that a function returns multiple values; the exact conveyance mechanism -- tuple, struct, output parameters, etc -- is left to the implementer.

* (a, _): represents a pair of values where one -- the second one in this case -- is ignored.

* Func<TYPE>(): represents a function that is parametrized by <TYPE> meaning that the function's implementation will have minor differences depending on the underlying TYPE. Typically this means that a function will need to look up different constants or use different underlying cryptographic primitives depending on which composite algorithm it is implementing.

2.2. Composite Design Philosophy

[I-D.ietf-pquip-pqt-hybrid-terminology] defines composites as:

> _Composite Cryptographic Element_: A cryptographic element that incorporates multiple component cryptographic elements of the same type in a multi-algorithm scheme.

Composite algorithms, as defined in this specification, follow this definition and should be regarded as a single key that performs a single cryptographic operation typical of a key establishment mechanism such as key generation, encapsulating, or decapsulating -- using its internal sequence of component keys as if they form a single key. This generally means that the complexity of combining algorithms can and should be handled by the cryptographic library or cryptographic module, and the single composite public key, private key, and ciphertext can be carried in existing fields in protocols such as PKCS#10 [RFC2986], CMP [RFC4210], X.509 [RFC5280], CMS [RFC5652], and the Trust Anchor Format [RFC5914]. In this way, composites achieve "protocol backwards-compatibility" in that they will drop cleanly into any protocol that accepts an analogous single-algorithm cryptographic scheme without requiring any modification of the protocol to handle multiple algorithms.

Discussion of the specific choices of algorithm pairings can be found in Section 7.2.

3. Overview of the Composite ML-KEM Scheme

Composite ML-KEM is a PQ/T hybrid Key Encapsulation Mechanism (KEM) which combines ML-KEM as specified in [FIPS.203] and [I-D.ietf-lamps-kyber-certificates] with one of RSA-OAEP defined in [RFC8017], the Elliptic Curve Diffie-Hellman key agreement schemes ECDH defined in section 5.7.1.2 of [SP.800-56Ar3], and X25519 / X448 defined in [RFC8410]. A KEM combiner function is used to combine the two component shared secret keyss into a single shared secret key.

Composite Key Encapsulation Mechanisms are defined as cryptographic primitives that consist of three algorithms. These definitions are borrowed from [RFC9180].

* KeyGen() -> (pk, sk): A probabilistic key generation algorithm, which generates a public key pk and a secret key sk. Some cryptographic modules may also expose a KeyGen(seed) -> (pk, sk), which generates pk and sk deterministically from a seed. This specification assumes a seed-based keygen for ML-KEM.

* Encap(pk) -> (ss, ct): A probabilistic encapsulation algorithm, which takes as input a public key pk and outputs a ciphertext ct and shared secret key ss. Note: this specification uses Encap() to conform to [RFC9180], but [FIPS.203] uses Encaps().

* Decap(sk, ct) -> ss: A decapsulation algorithm, which takes as input a secret key sk and ciphertext ct and outputs a shared secret ss, or in some cases a distinguished error value. Note: this specification uses Decap() to conform to [RFC9180], but [FIPS.203] uses Decaps().

The KEM interface defined above differs from both traditional key transport mechanism (for example for use with KeyTransRecipientInfo defined in [RFC5652]), and key agreement (for example for use with KeyAgreeRecipientInfo defined in [RFC5652]) and thus Composite ML-KEM

MUST be used with KEMRecipientInfo defined in [RFC9629], however full conventions for use of Composite ML-KEM within the Cryptographic Message Syntax will be included in a separate specification.

The KEM interface was chosen as the interface for a composite key establishment because it allows for arbitrary combinations of component algorithm types since both key transport and key agreement mechanisms can be promoted into KEMs as described in Section 3.1 and Section 3.2 below.

The following algorithms are defined for serializing and deserializing component values. These algorithms are inspired by similar algorithms in [RFC9180].

* SerializePublicKey(mlkemPK, tradPK) -> bytes: Produce a byte string encoding of the component public keys.

* DeserializePublicKey(bytes) -> (mlkemPK, tradPK): Parse a byte string to recover the component public keys.

* SerializeCiphertext(mlkemCT, tradCT) -> bytes: Produce a byte string encoding of the component ciphertexts.

* DeserializeCiphertext(bytes) -> (mlkemCT, tradCT): Parse a byte string to recover the component ciphertexts.

* SerializePrivateKey(mlkemSeed, tradSK) -> bytes: Produce a byte string encoding of the component private keys.

* DeserializePrivateKey(bytes) -> (mlkemSeed, tradSK): Parse a byte string to recover the component private keys.

Full definitions of serialization and deserialization algorithms can be found in Section 5.

3.1. Promotion of RSA-OAEP into a KEM

The RSA Optimal Asymmetric Encryption Padding (OAEP), as defined in section 7.1 of [RFC8017] is a public key encryption algorithm used to transport key material from a sender to a receiver. A "key transport" type algorithm has the following API:

* Encrypt(pk, ss) -> ct: Take an existing shared secret key ss and encrypt it for pk.

* Decrypt(sk, ct) -> ss: Decrypt the ciphertext ct to recover ss.

Note the difference between the API of RSA.Encrypt(pk, ss) -> ct and KEM.Encap(pk) -> (ss, ct) presented above. For this reason, RSA-OAEP cannot be directly combined with ML-KEM. Fortunately, a key transport mechanism such as RSA-OAEP can be easily promoted into a KEM by having the sender generate a random 256 bit shared secret key and encrypt it.

```
RSAOAEPKEM.Encap(pkR):
  shared_secret = SecureRandom(ss_len)
  enc = RSAES-OAEP-ENCRYPT(pkR, shared_secret)

  return shared_secret, enc
```

Acceptable public key encodings for pkR are described in Section 5.

Note that the OAEP label L is left to its default value, which is the empty string as per [RFC8017]. The shared secret key output by the overall Composite ML-KEM already binds a composite domain separator, so there is no need to also use the component domain separators.

The value of ss_len as well as concrete values for all the RSA-OAEP parameters used within this specification can be found in Section 7.3.

Decap(sk, ct) -> ss is accomplished by direct use of OAEP Decrypt.

```
RSAOAEPKEM.Decap(skR, enc):
  shared_secret = RSAES-OAEP-DECRYPT(skR, enc)

  return shared_secret
```

A quick note on the choice of RSA-OAEP as the supported RSA encryption primitive. RSA-KEM [RFC5990] is cryptographically robust and is more straightforward to work with, but it has fairly limited adoption and therefore is of limited value as a PQ migration mechanism. Also, while RSA-PKCS#1v1.5 [RFC8017] is still widely used, it is hard to make secure and no longer FIPS-approved as of the end of 2023 [SP800-131Ar2], so it is of limited forwards value. This leaves RSA-OAEP [RFC8017] as the remaining choice. See Section 7.2 for further discussion of algorithm choices.

Note that, at least at the time of writing, the algorithm RSAOAEPKEM is not defined as a standalone algorithm within PKIX standards and it does not have an assigned algorithm OID, so it cannot be used directly with CMS KEMRecipientInfo [RFC9629]; it is merely a building block for the composite algorithm.

3.2. Promotion of ECDH into a KEM

The elliptic curve Diffie-Hellman algorithm identified by the OID id-ecDH as defined in [RFC5480] and [SEC1] is a key agreement algorithm requiring both parties to contribute an asymmetric keypair to the derivation of the shared secret key. A "key agreement" type algorithm has the following API:

* DH(skX, pkY) -> ss: Each party combines their secret key skX with the other party’s public key pkY.

Note the difference between the API of DH(skX, pkY) -> ss and KEM.Encap(pk) -> (ss, ct) presented above. For this reason, a Diffie-Hellman key exchange cannot be directly combined with ML-KEM. Fortunately, a Diffie-Hellman key agreement can be easily promoted into a KEM Encap(pk) -> (ss, ct) by having the sender generate an ephemeral keypair for themself and sending their public key as the ciphertext ct. Composite ML-KEM uses a simplified version of the DHKEM definition from [RFC9180]:

```
DHKEM.Encap(pkR):
  (skE, pkE) = GenerateKeyPair()
  ss = DH(skE, pkR)
  ct = SerializePublicKey(pkE)

  return ss, ct
```

Decap(sk, ct) -> ss is accomplished in the analogous way.

```
DHKEM.Decap(skR, ct):
  pkE = DeserializePublicKey(ct)
  ss = DH(skR, pkE)

  return ss
```

This construction applies for all variants of elliptic curve Diffie-Hellman used in this specification: ECDH, X25519, and X448.

For ECDH, DH() yields the value Z as described in section 5.7.1.2 of [SP.800-56Ar3]. Acceptable public key encodings for enc and pkE are described in Section 5.

For X25519 and X448, DH() yields the value K as described in section 6 of [RFC7748]. Acceptable public key encodings for enc and pkE are described in Section 5.

The promotion of DH to a KEM is similar to the DHKEM functions in [RFC9180], but it is simplified in the following ways:

1. Notation has been aligned to the notation used in this specification.

2. Since a domain separator is included explicitly in the Composite ML-KEM combiner, there is no need to perform the labeled steps of ExtractAndExpand().

3. Since the ciphertext and receiver’s public key are included explicitly in the Composite ML-KEM combiner, there is no need to construct the kem_context object.

Note that here, SerializePublicKey() and DeserializePublicKey() refer to the underlying encoding of the DH primitive, and not to the composite serialization functions defined in Section 5. Acceptable serializations for the underlying DH primitives are described in Section 5.

Note that, at least at the time of writing, the algorithm DHKEM is not defined as a standalone algorithm within PKIX standards and it does not have an assigned algorithm OID, so it cannot be used directly with CMS KEMRecipientInfo [RFC9629]; it is merely a building block for the composite algorithm.

4. Composite ML-KEM Functions

This section describes the composite ML-KEM functions needed to instantiate the public API of a Key Encapsulation Mechanism as defined in Section 3.

4.1. Key Generation

In order to maintain security properties of the composite, applications that use composite keys MUST always perform fresh key generations of both component keys and MUST NOT reuse existing key material. See Section 10.3 for a discussion.

To generate a new keypair for composite schemes, the KeyGen() -> (pk, sk) function is used. The KeyGen() function calls the two key generation functions of the component algorithms independently. Multi-process or multi-threaded applications might choose to execute the key generation functions in parallel for better key generation performance.

The following describes how to instantiate a KeyGen() function for a given composite algorithm represented by <OID>.

```
Composite-ML-KEM<OID>.KeyGen() -> (pk, sk)

Explicit Inputs:
     None

Implicit Inputs mapped from <OID>:

  ML-KEM     The underlying ML-KEM algorithm and
             parameter set, for example, could be "ML-KEM-768".

  Trad       The underlying traditional algorithm and
             parameter, for example "RSA-OAEP"
             or "X25519".

Output:
  (pk, sk)  The composite keypair.

Key Generation Process:

  1. Generate component keys

    mlkemSeed = Random(64)
    (mlkemPK, _) = ML-KEM.KeyGen(mlkemSeed)
    (tradPK, tradSK) = Trad.KeyGen()

  2. Check for component key gen failure
    if NOT (mlkemPK, mlkemSK) or NOT (tradPK, tradSK):
      output "Key generation error"

  3. Output the composite public and private keys

    pk = SerializePublicKey(mlkemPK, tradPK)
    sk = SerializePrivateKey(mlkemSK, tradSK)
    return (pk, sk)
```

Figure 1: Composite-ML-KEM<OID>.KeyGen() -> (pk, sk)

In order to ensure fresh keys, the key generation functions MUST be executed for both component algorithms. Compliant parties MUST NOT use, import or export component keys that are used in other contexts, combinations, or by themselves as keys for standalone algorithm use. For more details on the security considerations around key reuse, see section Section 10.3.

Note that in step 2 above, both component key generation processes are invoked, and no indication is given about which one failed. This SHOULD be done in a timing-invariant way to prevent side-channel attackers from learning which component algorithm failed.

Variations in the keygen process above and decapsulation processes below to accommodate particular private key storage mechanisms or alternate interfaces to the underlying cryptographic modules are considered to be conformant to this specification so long as they produce the same output and error handling. For example, component private keys stored in separate software or hardware modules where it is not possible to do a joint simultaneous keygen would be considered compliant so long as both keys are freshly generated. It is also possible that the underlying cryptographic module does not expose a ML-KEM.KeyGen(seed) that accepts an externally-generated seed, and instead an alternate keygen interface must be used. Note however that cryptographic modules that do not support seed-based ML-KEM key generation will be incapable of importing or exporting composite keys in the standard format since the private key serialization routines defined in Section 5.2 only support ML-KEM keys as seeds.

4.2. Encapsulation

The Encap(pk) of a Composite ML-KEM algorithm is designed to behave exactly the same as ML-KEM.Encaps(ek) defined in Algorithm 20 in Section 7.2 of [FIPS.203]. Specifically, Composite-ML-KEM.Encap(pk) produces a 256-bit shared secret key that can be used directly with any symmetric-key cryptographic algorithm. In this way, Composite ML-KEM can be used as a direct drop-in replacement anywhere that ML-KEM is used.

The following describes how to instantiate a Encap(pk) function for a given composite algorithm represented by <OID>.

```
Composite-ML-KEM<OID>.Encap(pk) -> (ss, ct)

Explicit Inputs:

  pk      Composite public key consisting of encryption public keys
          for each component.

Implicit inputs mapped from <OID>:

  ML-KEM  The underlying ML-KEM algorithm and
          parameter set, for example "ML-KEM-768".

  Trad    The underlying ML-KEM algorithm and
          parameter set, for example "RSA-OAEP"
          or "X25519".

  KDF     The KDF specified for the given Composite ML-KEM algorithm.
          See algorithm specifications below.
```

Domain Domain separator value for binding the ciphertext to the Composite OID. See section on Domain Separators below.

Output:

ss The shared secret key, a 256-bit key suitable for use with symmetric cryptographic algorithms.

ct The ciphertext, a byte string.

Encap Process:

1. Separate the public keys.

```
(mlkemPK, tradPK) = DeserializePublicKey(pk)
```

2. Perform the respective component Encap operations according to their algorithm specifications.

```
(mlkemCT, mlkemSS) = ML-KEM.Encaps(mlkemPK)
(tradCT, tradSS) = TradKEM.Encap(tradPK)
```

3. If either ML-KEM.Encaps() or TradKEM.Encap() return an error, then this process must return an error.

```
if NOT (mlkemCT, mlkemSS) or NOT (tradCT, tradSS):
  output "Encapsulation error"
```

4. Encode the ciphertext

```
ct = SerializeCiphertext(mlkemCT, tradCT)
```

5. Combine the KEM secrets and additional context to yield the composite shared secret key.

```
ss = KemCombiner<KDF>(mlkemSS, tradSS, tradCT, tradPK, Domain)
```

6. Output composite shared secret key and ciphertext.

```
return (ss, ct)
```

Figure 2: Composite-ML-KEM<OID>.Encap(pk) -> (ss, ct)

Depending on the security needs of the application, it MAY be advantageous to perform steps 2, 3, and 5 in a timing-invariant way to prevent side-channel attackers from learning which component algorithm failed and from learning any of the inputs or output of the KEM combiner.

The specific values for KDF are defined per Composite ML-KEM algorithm in Table 2 and the specific values for Domain are defined per Composite ML-KEM algorithm in Section 7.

4.3. Decapsulation

The Decap(sk, ct) -> ss of a Composite ML-KEM algorithm is designed to behave exactly the same as ML-KEM.Decaps(dk, c) defined in Algorithm 21 in Section 7.3 of [FIPS.203]. Specifically, Composite-ML-KEM.Decap(sk, ct) produces a 256-bit shared secret key that can be used directly with any symmetric-key cryptographic algorithm. In this way, Composite ML-KEM can be used as a direct drop-in replacement anywhere that ML-KEM is used.

The following describes how to instantiate a Decap(sk, ct) function for a given composite algorithm represented by <OID>.

```
Composite-ML-KEM<OID>.Decap(sk, ct) -> ss

Explicit inputs

  sk      Composite private key consisting of decryption private keys
          for each component.

  ct      The ciphertext, a byte string.

Implicit inputs mapped from <OID>:

  ML-KEM  The underlying ML-KEM algorithm and
          parameter set, for example, could be "ML-KEM-768".

  Trad    The underlying traditional algorithm and
          parameter set, for example "RSA-OAEP"
          or "X25519".

  KDF     The KDF specified for the given Composite ML-KEM algorithm.
          See algorithm specifications below.

  Domain  Domain separator value for binding the ciphertext to the
          Composite ML-KEM OID. See section on Domain Separators below.

Output:

  ss      The shared secret key, a 256-bit key suitable for use with
          symmetric cryptographic algorithms.

Decap Process:
```

1. Separate the private keys and ciphertexts

```
(mlkemSK, tradSK) = DeserializePrivateKey(sk)
(mlkemCT, tradCT) = DeserializeCiphertext(ct)
```

2. Perform the respective component Encap operations according to their algorithm specifications.

```
mlkemSS = MLKEM.Decaps(mlkemSK, mlkemCT)
tradSS  = TradKEM.Decap(tradSK, tradCT)
```

3. If either ML-KEM.Decaps() or TradKEM.Decap() return an error, then this process must return an error.

```
if NOT mlkemSS or NOT tradSS:
  output "Encapsulation error"
```

4. Combine the KEM secrets and additional context to yield the composite shared secret key.

```
ss = KemCombiner<KDF>(mlkemSS, tradSS, tradCT, tradPK, Domain)
```

5. Output composite shared secret key.

```
return ss
```

Figure 3: Composite-ML-KEM<OID>.Decap(sk, ct) -> ss

Steps 2, 3, and 4 SHOULD be performed in a timing-invariant way to prevent side-channel attackers from learning which component algorithm failed and from learning any of the inputs or output of the KEM combiner.

It is possible to use component private keys stored in separate software or hardware keystores. Variations in the process to accommodate particular private key storage mechanisms are considered to be conformant to this specification so long as it produces the same output and error handling as the process sketched above.

In order to properly achieve its security properties, the KEM combiner requires that all inputs are fixed-length. Since each Composite ML-KEM algorithm fully specifies its component algorithms, including key sizes, all inputs should be fixed-length in non-error scenarios except for minor variations introduced by encoding. However some implementations may choose to perform additional checking to handle certain error conditions. In particular, the KEM combiner step should not be performed if either of the component decapsulations returned an error condition indicating malformed inputs. For timing-invariance reasons, it is RECOMMENDED to perform both decapsulation operations and check for errors afterwards to prevent an attacker from using a timing channel to tell which component failed decapsulation. Also, RSA-based composites MUST ensure that the modulus size (i.e. the size of tradCT and tradPK) matches that specified for the given Composite ML-KEM algorithm in Table 2; depending on the cryptographic library used, this check may be done by the library or may require an explicit check as part of the Composite-ML-KEM.Decap() routine. Implementers should keep in mind that some instances of tradCT and tradPK will be DER-encoded which could introduce minor length variations such as dropping leading zeroes; since these variations are not attacker-controlled they are considered benign.

4.4. KEM Combiner Function

As noted in the Encapsulation and Decapsulation procedures above, the KEM combiner is parameterized by the choice of underlying KDF. This specification provides two combiner constructions, one with SHA3 and one with HMAC-SHA2.

The following describes how to instantiate a KemCombiner() function for a given key derivation function represented by <KDF>.

```
KemCombiner<KDF>(mlkemSS, tradSS, tradCT, tradPK, Domain) -> ss

Explicit inputs:

  The list of input values to be combined.

Implicit inputs:

  KDF      The KDF specified for the given Composite ML-KEM algorithm.
           In particular, for the KEM combiner it only matters
           whether this is a SHA3 function, which can be used
           as a KDF directly, or a SHA2 function which requires
           an HMAC construction.

Output:

  ss      The shared secret key, a 256-bit key suitable for use with
          symmetric cryptographic algorithms.


Process:

  if KDF is "SHA3-256":
    ss = SHA3-256(mlkemSS || tradSS || tradCT || tradPK || Domain)

  else if KDF is "HMAC-{Hash}":

    ss = HMAC-{Hash}(key={0}, text=mlkemSS || tradSS || tradCT
                                         || tradPK || Domain)
    ss = truncate(ss, 256)
        # Where "{0}" is the string of HashLen zeros according to
        # section 2.2 of [RFC5869].

        # Where "{Hash} is the underlying hash function used
        # for the given composite algorithm.

        # Since Composite ML-KEM always outputs a 256-bit shared
        # secret key, the output is always truncated to 256 bits,
        # regardless of underlying hash function.

  return ss
```

Figure 4: KemCombiner<KDF>(mlkemSS, tradSS, tradCT, tradPK, Domain) -> ss

Implementation note: The HMAC-based combiner here is exactly the "HKDF-Extract" step from [RFC5869] with an empty salt. Implementations with access to "HKDF-Extract", without the "HKDF-

Expand" step, MAY use this interchangeably with the HMAC-based construction presented above. Note that a full invocation of HKDF with both HKDF-Extract and HKDF-Expand, even with the correct output length and empty info param is not equivalent to the HMAC construction above since HKDF-Expand will always perform at least one extra iteration of HMAC.

5. Serialization

This section presents routines for serializing and deserializing composite public keys, private keys, and ciphertext values to bytes via simple concatenation of the underlying encodings of the component algorithms. The functions defined in this section are considered internal implementation detail and are referenced from within the public API definitions in Section 4.

Deserialization is possible because ML-KEM has fixed-length public keys, private keys (seeds), and ciphertext values as shown in the following table.

Algorithm	Public Key	Private Key	Ciphertext
ML-KEM-768	1184	64	1088
ML-KEM-1024	1568	64	1568

Table 1: ML-KEM Key and Ciphertext Sizes

For all serialization routines below, when these values are required to be carried in an ASN.1 structure, they are wrapped as described in Section 6.1.

While ML-KEM has a single fixed-size representation for each of public key, private key, and ciphertext, the traditional component might allow multiple valid encodings; for example an elliptic curve public key, and therefore also ciphertext, might be validly encoded as either compressed or uncompressed [SEC1], or an RSA private key could be encoded in Chinese Remainder Theorem form [RFC8017]. In order to obtain interoperability, composite algorithms MUST use the following encodings of the underlying components:

* *ML-KEM*: MUST be encoded as specified in [FIPS.203], using a 64-byte seed as the private key.

* *RSA*: MUST be encoded with the (n,e) public key representation as specified in A.1.1 of [RFC8017] and the private key representation as specified in A.1.2 of [RFC8017].

* *ECDH*: public key MUST be encoded as an ECPoint as specified in section 2.2 of [RFC5480], with both compressed and uncompressed keys supported. For maximum interoperability, it is RECOMMENEDED to use uncompressed points.

* *X25519 and X448*: MUST be encoded as per section 5 of [RFC7748].

Even with fixed encodings for the traditional component, there may be slight differences in size of the encoded value due to, for example, encoding rules that drop leading zeroes. See Appendix A for further discussion of encoded size of each composite algorithm.

The deserialization routines described below do not check for well-formedness of the cryptographic material they are recovering. It is assumed that underlying cryptographic primitives will catch malformed values and raise an appropriate error.

5.1. SerializePublicKey and DeserializePublicKey

The serialization routine for keys simply concatenates the public keys of the component algorithms, as defined below:

```
Composite-ML-KEM.SerializePublicKey(mlkemPK, tradPK) -> bytes

Explicit inputs:

  mlkemPK The ML-KEM public key, which is bytes.

  tradPK  The traditional public key in the appropriate
          encoding for the underlying component algorithm.

Implicit inputs:

  None

Output:

  bytes   The encoded composite public key.


Serialization Process:

  1. Combine and output the encoded public key

     output mlkemPK || tradPK
```

Figure 5: Composite-ML-KEM.SerializePublicKey(mlkemPK, tradPK) -> bytes

Deserialization reverses this process. Each component key is deserialized according to their respective specification as shown in Appendix B.

The following describes how to instantiate a DeserializePublicKey(bytes) function for a given composite algorithm represented by <OID>.

```
Composite-ML-KEM<OID>.DeserializePublicKey(bytes) -> (mlkemPK, tradPK)

Explicit inputs:

  bytes   An encoded composite public key.

Implicit inputs mapped from <OID>:

  ML-KEM   The underlying ML-KEM algorithm and
           parameter, for example, could be "ML-KEM-768".

Output:

  mlkemPK  The ML-KEM public key, which is bytes.

  tradPK   The traditional public key in the appropriate
           encoding for the underlying component algorithm.


Deserialization Process:

  1. Parse each constituent encoded public key.
       The length of the mlkemPK is known based on the size of
       the ML-KEM component key length specified by the Object ID.

     switch ML-KEM do
        case ML-KEM-768:
          mlkemPK = bytes[:1184]
          tradPK  = bytes[1184:]
        case ML-KEM-1024:
          mlkemPK = bytes[:1568]
          tradPK  = bytes[1568:]

     Note that while ML-KEM has fixed-length keys, RSA and ECDH
     may not, depending on encoding, so rigorous length-checking
     of the overall composite key is not always possible.

  2. Output the component public keys

     output (mlkemPK, tradPK)
```

Figure 6: Composite-ML-KEM<OID>.DeserializePublicKey(bytes) -> (mlkemPK, tradPK)

5.2. SerializePrivateKey and DeserializePrivateKey

The serialization routine for keys simply concatenates the private keys of the component algorithms, as defined below:

```
Composite-ML-KEM.SerializePrivateKey(mlkemSeed, tradSK) -> bytes

Explicit inputs:

  mlkemSeed  The ML-KEM private key, which is the bytes of the seed.

  tradSK     The traditional private key in the appropriate
             encoding for the underlying component algorithm.

Implicit inputs:

  None

Output:

  bytes   The encoded composite private key.

Serialization Process:

  1. Combine and output the encoded private key.

     output mlkemSeed || tradSK
```

Figure 7: Composite-ML-KEM.SerializePrivateKey(mlkemSeed, tradSK) -> bytes

Deserialization reverses this process. Each component key is deserialized according to their respective specification as shown in Appendix B.

The following describes how to instantiate a DeserializePrivateKey(bytes) function. Since ML-KEM private keys are 64 bytes for all parameter sets, this function does not need to be parametrized.

```
Composite-ML-KEM.DeserializePrivateKey(bytes) -> (mlkemSeed, tradSK)

Explicit inputs:

  bytes   An encoded composite private key.

Implicit inputs:

  That an ML-KEM private key is 64 bytes for all parameter sets.

Output:

  mlkemSeed  The ML-KEM private key, which is the bytes of the seed.

  tradSK    The traditional private key in the appropriate
             encoding for the underlying component algorithm.


Deserialization Process:

  1. Parse each constituent encoded key.
     The length of an ML-KEM private key is always a 64 byte seed
     for all parameter sets.

     mlkemSeed = bytes[:64]
     tradSK  = bytes[64:]

     Note that while ML-KEM has fixed-length keys, RSA and ECDH
     may not, depending on encoding, so rigorous length-checking
     of the overall composite key is not always possible.

  2. Output the component private keys

     output (mlkemSeed, tradSK)
```

Figure 8: Composite-ML-KEM.DeserializeKey(bytes) -> (mlkemSeed, tradSK)

5.3. SerializeCiphertext and DeserializeCiphertext

The serialization routine for the composite ciphertext value simply concatenates the fixed-length ML-KEM ciphertext with the ciphertext from the traditional algorithm, as defined below:

```
Composite-ML-KEM.SerializeCiphertext(mlkemCT, tradCT) -> bytes

Explicit inputs:

  mlkemCT  The ML-KEM ciphertext, which is bytes.

  tradCT   The traditional ciphertext in the appropriate
           encoding for the underlying component algorithm.

Implicit inputs:

  None

Output:

  bytes   The encoded composite ciphertext value.


Serialization Process:

  1. Combine and output the encoded composite ciphertext

     output mlkemCT || tradCT
```

Figure 9: Composite-ML-KEM.SerializeCiphertext(mlkemCT, tradCT) -> bytes

Deserialization reverses this process. Each component ciphertext is deserialized according to their respective specification as shown in Appendix B.

The following describes how to instantiate a DeserializeCiphertext(bytes) function for a given composite algorithm represented by <OID>.

```
Composite-ML-KEM<OID>.DeserializeCiphertext(bytes)
                                            -> (mldkemCT, tradCT)

Explicit inputs:

  bytes   An encoded composite ciphertext value.

Implicit inputs mapped from <OID>:

  ML-KEM   The underlying ML-KEM algorithm and
           parameter, for example, could be "ML-KEM-768".

Output:

  mlkemCT  The ML-KEM ciphertext, which is bytes.

  tradCT   The traditional ciphertext in the appropriate
           encoding for the underlying component algorithm.


Deserialization Process:

  1. Parse each constituent encoded ciphertext.
     The length of the mlkemCT is known based on the size of
     the ML-KEM component ciphertext length specified by the Object ID.

     switch ML-KEM do
        case ML-KEM-768:
          mlkemCT = bytes[:1088]
          tradCT  = bytes[1088:]
        case ML-KEM-1024:
          mlkemCT= bytes[:1568]
          tradCT  = bytes[1568:]

     Note that while ML-KEM has fixed-length ciphertexts, RSA and ECDH
     may not, depending on encoding, so rigorous length-checking is
     not always possible here.

  2. Output the component ciphertext values

     output (mlkemCT, tradCT)
```

Figure 10: Composite-ML-KEM<OID>.DeserializeCiphertext(bytes) -> (mldkemCT, tradCT)

6. Use within X.509 and PKIX

The following sections provide processing logic and the necessary ASN.1 modules necessary to use composite ML-KEM within X.509 and PKIX protocols. Use within the Cryptographic Message Syntax (CMS) will be covered in a separate specification.

While composite ML-KEM keys and ciphertext values MAY be used raw, the following sections provide conventions for using them within X.509 and other PKIX protocols such that Composite ML-KEM can be used as a drop-in replacement for KEM algorithms in PKCS#10 [RFC2986], CMP [RFC4210], X.509 [RFC5280], and related protocols.

6.1. Encoding to DER

The serialization routines presented in Section 5 produce raw binary values. When these values are required to be carried within a DER-encoded message format such as an X.509's subjectPublicKey BIT STRING [RFC5280] or a CMS KEMRecipientInfo.kemct OCTET STRING [RFC9629], then the composite value MUST be wrapped into a DER BIT STRING or OCTET STRING in the obvious ways.

When a BIT STRING is required, the octets of the composite data value SHALL be used as the bits of the bit string, with the most significant bit of the first octet becoming the first bit, and so on, ending with the least significant bit of the last octet becoming the last bit of the bit string.

When an OCTET STRING is required, the DER encoding of the composite data value SHALL be used directly.

6.2. Key Usage Bits

When any Composite ML-KEM Object Identifier appears within the SubjectPublicKeyInfo.AlgorithmIdentifier field of an X.509 certificate [RFC5280], the key usage certificate extension MUST only contain:

keyEncipherment

Composite ML-KEM keys MUST NOT be used in a "dual usage" mode because even if the traditional component key supports both signing and encryption, the post-quantum algorithms do not and therefore the overall composite algorithm does not. Implementations MUST NOT use one component of the composite for the purposes of digital signature and the other component for the purposes of encryption or key establishment.

6.3. ASN.1 Definitions

Composite ML-KEM uses a substantially non-ASN.1 based encoding, as specified in Section 5. However, as as composite algorithms will be used within ASN.1-based X.509 and PKIX protocols, some conventions for ASN.1 wrapping are necessary.

The following ASN.1 Information Object Classes are defined to allow for compact definitions of each composite algorithm, leading to a smaller overall ASN.1 module.

```
pk-CompositeKEM {OBJECT IDENTIFIER:id}
  PUBLIC-KEY ::= {
    IDENTIFIER id
    KEY BIT STRING
    PARAMS ARE absent
    CERT-KEY-USAGE { keyEncipherment }
  }

kema-CompositeKEM {
  OBJECT IDENTIFIER:id,
    PUBLIC-KEY:publicKeyType }
    KEM-ALGORITHM ::= {
         IDENTIFIER id
         VALUE OCTET STRING
         PARAMS ARE absent
         PUBLIC-KEYS { publicKeyType }
         SMIME-CAPS { IDENTIFIED BY id }
        }
```

Figure 11: ASN.1 Object Information Classes for Composite ML-KEM

As an example, the public key and KEM algorithm types associated with id-MLKEM768-ECDH-P256-HMAC-SHA256 are defined as:

```
pk-MLKEM768-ECDH-P256-HMAC-SHA256 PUBLIC-KEY ::=
  pk-CompositeKEM {
    id-MLKEM768-ECDH-P256-HMAC-SHA256 }

kema-MLKEM768-ECDH-P256-HMAC-SHA256 KEM-ALGORITHM ::=
    kema-CompositeKEM{
      id-MLKEM768-ECDH-P256-HMAC-SHA256,
      pk-MLKEM768-ECDH-P256-HMAC-SHA256 }
```

The full set of key types defined by this specification can be found in the ASN.1 Module in Section 8.

Use cases that require an interoperable encoding for composite private keys will often need to place a composite private key inside a OneAsymmetricKey structure defined in [RFC5958], such as when private keys are carried in PKCS #12 [RFC7292], CMP [RFC4210] or CRMF [RFC4211]. The definition of OneAsymmetricKey is copied here for convenience:

```
 OneAsymmetricKey ::= SEQUENCE {
       version                   Version,
       privateKeyAlgorithm       PrivateKeyAlgorithmIdentifier,
       privateKey                PrivateKey,
       attributes            [0] Attributes OPTIONAL,
       ...,
       [[2: publicKey        [1] PublicKey OPTIONAL ]],
       ...
     }

  ...
  PrivateKey ::= OCTET STRING
                        -- Content varies based on type of key.  The
                        -- algorithm identifier dictates the format of
                        -- the key.
```

Figure 12: OneAsymmetricKey as defined in [RFC5958]

When a composite private key is conveyed inside a OneAsymmetricKey structure (version 1 of which is also known as PrivateKeyInfo) [RFC5958], the privateKeyAlgorithm field SHALL be set to the corresponding composite algorithm identifier defined according to Section 7 and its parameters field MUST be absent. The privateKey field SHALL contain the OCTET STRING representation of the serialized composite private key as per Section 5.2. The publicKey field remains OPTIONAL. If the publicKey field is present, it MUST be a composite public key as per Section 5.1.

Some applications might need to reconstruct the SubjectPublicKeyInfo or OneAsymmetricKey objects corresponding to each component key individually, for example if this is required for invoking the underlying primitive. Section 7 provides the necessary mapping between composite and their component algorithms for doing this reconstruction.

Component keys of a composite private key MUST NOT be used in any other type of key or as a standalone key. For more details on the security considerations around key reuse, see Section 10.3.

7. Algorithm Identifiers

This table summarizes the OID and the component algorithms for each Composite ML-KEM algorithm.

EDNOTE: these are prototyping OIDs to be replaced by IANA.

<CompKEM> is equal to 2.16.840.1.114027.80.5.2

Composite ML-KEM Algorithm	OID	ML-KEM	Trad	KDF
id-MLKEM768-RSA2048-HMAC-SHA256	<CompKEM>.50	ML-KEM-768	RSA-OAEP 2048	HMAC-SHA256
id-MLKEM768-RSA3072-HMAC-SHA256	<CompKEM>.51	ML-KEM-768	RSA-OAEP 3072	HMAC-SHA256
id-MLKEM768-RSA4096-HMAC-SHA256	<CompKEM>.52	ML-KEM-768	RSA-OAEP 4096	HMAC-SHA256
id-MLKEM768-X25519-SHA3-256	<CompKEM>.53	ML-KEM-768	X25519	SHA3-256
id-MLKEM768-ECDH-P256-HMAC-SHA256	<CompKEM>.54	ML-KEM-768	ECDH with secp256r1	HMAC-SHA256
id-MLKEM768-ECDH-P384-HMAC-SHA256	<CompKEM>.55	ML-KEM-768	ECDH with secp384r1	HMAC-SHA256
id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256	<CompKEM>.56	ML-KEM-768	ECDH with brainpoolp256r1	HMAC-SHA256
id-MLKEM1024-RSA3072-HMAC-SHA512	<CompKEM>.61	ML-KEM-1024	RSA-OAEP 3072	HMAC-SHA512
id-MLKEM1024-ECDH-P384-HMAC-SHA512	<CompKEM>.57	ML-KEM-1024	ECDH with secp384r1	HMAC-SHA512

id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512	<CompKEM>.58	ML-KEM-1024	ECDH with brainpoolP384r1	HMAC-SHA512
id-MLKEM1024-X448-SHA3-256	<CompKEM>.59	ML-KEM-1024	X448	SHA3-256
id-MLKEM1024-ECDH-P521-HMAC-SHA512	<CompKEM>.60	ML-KEM-1024	ECDH with secp521r1	HMAC-SHA512

Table 2: Composite ML-KEM algorithm combinations

In alignment with ML-KEM [FIPS.203], Composite KEM algorithms output a 256-bit shared secret key at all security levels, truncating is necessary as described in Section 4.4.

The KDFs were chosen to roughly match the security level of the stronger component. In the case of X25519 and X448 SHA3-256 is used to match the construction in [X-Wing].

Full specifications for the referenced component algorithms can be found in Appendix B.

As the number of algorithms can be daunting to implementers, see Section 11.3 for a discussion of choosing a subset to support.

7.1. Domain Separator Values

The KEM combiner used in this specification requires a domain separator Domain input. The following table shows the HEX-encoded domain separator for each Composite ML-KEM AlgorithmID; to use it, the value MUST be HEX-decoded and used in binary form. The domain separator is simply the DER encoding of the composite algorithm OID.

Each Composite ML-KEM algorithm has a unique domain separator value which is used in constructing the KEM combiner in (Section 4.4). This helps protect against a different algorithm arriving at the same shared secret key even if all inputs are the same; for example id-MLKEM768-X25519-SHA3-256 and X-Wing [X-Wing] have identical component algorithms and KEM combiners but since they have different security properties, they use different domain separators in order to make them incompatible by design.

The domain separator is simply the DER encoding of the OID. The following table shows the HEX-encoded domain separator value for each Composite ML-KEM algorithm.

Composite KEM Algorithm	Domain Separator (in Hex encoding)
id-MLKEM768-RSA2048-HMAC-SHA256	060B6086480186FA6B50050232
id-MLKEM768-RSA3072-HMAC-SHA256	060B6086480186FA6B50050233
id-MLKEM768-RSA4096-HMAC-SHA256	060B6086480186FA6B50050234
id-MLKEM768-X25519-SHA3-256	060B6086480186FA6B50050235
id-MLKEM768-ECDH-P256-HMAC-SHA256	060B6086480186FA6B50050236
id-MLKEM768-ECDH-P384-HMAC-SHA256	060B6086480186FA6B50050237
id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256	060B6086480186FA6B50050238
id-MLKEM1024-RSA3072-HMAC-SHA512	060B6086480186FA6B5005023D
id-MLKEM1024-ECDH-P384-HMAC-SHA512	060B6086480186FA6B50050239
id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512	060B6086480186FA6B5005023A
id-MLKEM1024-X448-SHA3-256	060B6086480186FA6B5005023B
id-MLKEM1024-ECDH-P521-HMAC-SHA512	060B6086480186FA6B5005023C

Table 3: Composite ML-KEM fixedInfo Domain Separators

EDNOTE: these domain separators are based on the prototyping OIDs assigned on the Entrust arc. We will need to ask for IANA early allocation of these OIDs so that we can re-compute the domain separators over the final OIDs.

7.2. Rationale for choices

In generating the list of composite algorithms, the idea was to provide composite algorithms at various security levels with varying performance charactaristics.

The main design consideration in choosing pairings is to prioritize providing pairings of each ML-KEM security level with commonly-deployed traditional algorithms. This supports the design goal of using composites as a stepping stone to efficiently deploy post-quantum on top of existing hardened and certified traditional algorithm implementations. This was prioritized rather than attempting to exactly match the security level of the post-quantum and traditional components -- which in general is difficult to do since there is no academic consensus on how to compare the "bits of security" against classical attackers and "qubits of security" against quantum attackers.

SHA2 is prioritized over SHA3 in order to facilitate implementations that do not have easy access to SHA3 outside of the ML-KEM module. However SHA3 is used with X25519 and X448 SHA3-256 to match the construction in [X-Wing]. This also provides a slight efficiency gain for the X25519 and X448 based composites since a single invocation of SHA3 is known to behave as a dual-PRF, and thus is sufficient for use as a KDF, see Section 10.2, compared with an HMAC-SHA2 construction.

While it may seem odd to use 256-bit outputs at all security levels, this aligns with ML-KEM [FIPS.203] which produces a 256-bit shared secret key at all security levels. All hash functions used have >= 256 bits of (2nd) pre-image resistance, which is the required property for a KDF to provide 128 bits of security, as allowed in Table 3 of [SP.800-57pt1r5]. Composite algorithms at higher security levels use a larger hash function in order to preserve internal collision resistance of the hash function at a comparable strength to the underlying component algorithms up to the point where truncation to a 256-bit output is performed.

7.3. RSA-OAEP Parameters

Use of RSA-OAEP [RFC8017] requires additional parameters to be specified.

The RSA component keys MUST be generated at the specified 2048-bit, 3072-bit, 4096-bit key sizes respectively (up to small differences such as dropping leading zeros); intermediate sizes are not acceptable.

As with the other Composite ML-KEM algorithms, AlgorithmIdentifier parameters MUST be absent. The RSA-OAEP primitive SHALL be instantiated with the following hard-coded parameters which are the same for the 2048, 3072 and 4096 bit security levels since the objective is to carry and output a 256-bit shared secret key at all security levels.

RSAES-OAEP-params	Value
hashAlgorithm	id-sha256
MaskGenAlgorithm.algorithm	id-mgf1
maskGenAlgorithm.parameters	id-sha256
pSourceAlgorithm	pSpecifiedEmpty
ss_len	256 bits

Table 4: RSA-OAEP Parameters

Full specifications for the referenced algorithms can be found in Appendix B.

Note: The mask length, according to [RFC8017], is k - hLen - 1, where k is the size of the RSA modulus. Since the choice of hash function and the RSA key size is fixed for each composite algorithm, implementations could choose to pre-compute and hard-code the mask length.

8. ASN.1 Module

<CODE STARTS>

```
Composite-MLKEM-2025
      { iso(1) identified-organization(3) dod(6) internet(1)
        security(5) mechanisms(5) pkix(7) id-mod(0)
        id-mod-composite-mlkem-2025(TBDMOD) }

DEFINITIONS IMPLICIT TAGS ::= BEGIN

EXPORTS ALL;

IMPORTS

PUBLIC-KEY, AlgorithmIdentifier{}, SMIME-CAPS
```

```
     FROM AlgorithmInformation-2009  -- RFC 5912 [X509ASN1]
         { iso(1) identified-organization(3) dod(6) internet(1)
           security(5) mechanisms(5) pkix(7) id-mod(0)
           id-mod-algorithmInformation-02(58) }

   KEM-ALGORITHM
     FROM KEMAlgorithmInformation-2023
         { iso(1) identified-organization(3) dod(6) internet(1)
           security(5) mechanisms(5) pkix(7) id-mod(0)
           id-mod-kemAlgorithmInformation-2023(109) }
   ;


   --
   -- Object Identifiers
   --

   --
   -- Information Object Classes
   --

   pk-CompositeKEM {OBJECT IDENTIFIER:id}
     PUBLIC-KEY ::= {
       IDENTIFIER id
       KEY BIT STRING
       PARAMS ARE absent
       CERT-KEY-USAGE { keyEncipherment }
     }

   kema-CompositeKEM {
     OBJECT IDENTIFIER:id,
       PUBLIC-KEY:publicKeyType }
       KEM-ALGORITHM ::= {
            IDENTIFIER id
            VALUE OCTET STRING
            PARAMS ARE absent
            PUBLIC-KEYS { publicKeyType }
            SMIME-CAPS { IDENTIFIED BY id }
           }



   --
   -- Composite KEM Algorithms
   --


   -- TODO: OID to be replaced by IANA
```

```
   id-MLKEM768-RSA2048-HMAC-SHA256 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 50 }

   pk-MLKEM768-RSA2048-HMAC-SHA256 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM768-RSA2048-HMAC-SHA256 }

   kema-MLKEM768-RSA2048-HMAC-SHA256 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM768-RSA2048-HMAC-SHA256,
         pk-MLKEM768-RSA2048-HMAC-SHA256 }



   -- TODO: OID to be replaced by IANA
   id-MLKEM768-RSA3072-HMAC-SHA256 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 51 }

   pk-MLKEM768-RSA3072-HMAC-SHA256 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM768-RSA3072-HMAC-SHA256 }

   kema-MLKEM768-RSA3072-HMAC-SHA256 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM768-RSA3072-HMAC-SHA256,
         pk-MLKEM768-RSA3072-HMAC-SHA256 }



   -- TODO: OID to be replaced by IANA
   id-MLKEM768-RSA4096-HMAC-SHA256 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 52 }

   pk-MLKEM768-RSA4096-HMAC-SHA256 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM768-RSA4096-HMAC-SHA256 }

   kema-MLKEM768-RSA4096-HMAC-SHA256 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM768-RSA4096-HMAC-SHA256,
         pk-MLKEM768-RSA4096-HMAC-SHA256 }



   -- TODO: OID to be replaced by IANA
```

```
   id-MLKEM768-X25519-SHA3-256 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 53 }

   pk-MLKEM768-X25519-SHA3-256 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM768-X25519-SHA3-256 }

   kema-MLKEM768-X25519-SHA3-256 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM768-X25519-SHA3-256,
         pk-MLKEM768-X25519-SHA3-256 }


   -- TODO: OID to be replaced by IANA
   id-MLKEM768-ECDH-P256-HMAC-SHA256 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 54 }

   pk-MLKEM768-ECDH-P256-HMAC-SHA256 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM768-ECDH-P256-HMAC-SHA256 }

   kema-MLKEM768-ECDH-P256-HMAC-SHA256 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM768-ECDH-P256-HMAC-SHA256,
         pk-MLKEM768-ECDH-P256-HMAC-SHA256 }



   -- TODO: OID to be replaced by IANA
   id-MLKEM768-ECDH-P384-HMAC-SHA256 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 55 }

   pk-MLKEM768-ECDH-P384-HMAC-SHA256 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM768-ECDH-P384-HMAC-SHA256 }

   kema-MLKEM768-ECDH-P384-HMAC-SHA256 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM768-ECDH-P384-HMAC-SHA256,
         pk-MLKEM768-ECDH-P384-HMAC-SHA256 }



   -- TODO: OID to be replaced by IANA
   id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256 OBJECT IDENTIFIER ::= {
```

```
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 56 }

   pk-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256 }

   kema-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256,
         pk-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256 }


   -- TODO: OID to be replaced by IANA
   id-MLKEM1024-RSA3072-HMAC-SHA512 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 61 }

   pk-MLKEM1024-RSA3072-HMAC-SHA512 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM1024-RSA3072-HMAC-SHA512 }

   kema-MLKEM1024-RSA3072-HMAC-SHA512 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM1024-RSA3072-HMAC-SHA512,
         pk-MLKEM1024-RSA3072-HMAC-SHA512 }


   -- TODO: OID to be replaced by IANA
   id-MLKEM1024-ECDH-P384-HMAC-SHA512 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 57 }

   pk-MLKEM1024-ECDH-P384-HMAC-SHA512 PUBLIC-KEY ::=
     pk-CompositeKEM {
       id-MLKEM1024-ECDH-P384-HMAC-SHA512 }

   kema-MLKEM1024-ECDH-P384-HMAC-SHA512 KEM-ALGORITHM ::=
       kema-CompositeKEM{
         id-MLKEM1024-ECDH-P384-HMAC-SHA512,
         pk-MLKEM1024-ECDH-P384-HMAC-SHA512 }


   -- TODO: OID to be replaced by IANA
   id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512 OBJECT IDENTIFIER ::= {
     joint-iso-itu-t(2) country(16) us(840) organization(1)
     entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 58 }
```

```
pk-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512 PUBLIC-KEY ::=
  pk-CompositeKEM{
    id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512 }

kema-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512 KEM-ALGORITHM ::=
    kema-CompositeKEM{
      id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512,
      pk-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512 }


-- TODO: OID to be replaced by IANA
id-MLKEM1024-X448-SHA3-256 OBJECT IDENTIFIER ::= {
  joint-iso-itu-t(2) country(16) us(840) organization(1)
  entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 59 }

pk-MLKEM1024-X448-SHA3-256 PUBLIC-KEY ::=
  pk-CompositeKEM {
    id-MLKEM1024-X448-SHA3-256 }

kema-MLKEM1024-X448 KEM-ALGORITHM ::=
    kema-CompositeKEM{
      id-MLKEM1024-X448-SHA3-256,
      pk-MLKEM1024-X448-SHA3-256 }


-- TODO: OID to be replaced by IANA
id-MLKEM1024-ECDH-P521-HMAC-SHA512 OBJECT IDENTIFIER ::= {
  joint-iso-itu-t(2) country(16) us(840) organization(1)
  entrust(114027) algorithm(80) explicitcomposite(5) kem(2) 60 }

pk-MLKEM1024-ECDH-P521-HMAC-SHA512 PUBLIC-KEY ::=
  pk-CompositeKEM {
    id-MLKEM1024-ECDH-P521-HMAC-SHA512 }

kema-MLKEM1024-ECDH-P521-HMAC-SHA512 KEM-ALGORITHM ::=
    kema-CompositeKEM{
      id-MLKEM1024-ECDH-P521-HMAC-SHA512,
      pk-MLKEM1024-ECDH-P521-HMAC-SHA512 }

END

<CODE ENDS>
```

9. IANA Considerations

9.1. Object Identifier Allocations

EDNOTE to IANA: OIDs will need to be replaced in both the ASN.1 module and in Table 2.

9.1.1. Module Registration

The following is to be regisetered in "SMI Security for PKIX Module Identifier":

* Decimal: IANA Assigned - *Replace TBDMOD*

* Description: Composite-KEM-2023 - id-mod-composite-kems

* References: This Document

9.1.2. Object Identifier Registrations

The following is to be registered in "SMI Security for PKIX Algorithms":

* id-MLKEM768-RSA2048-HMAC-SHA256

  - Decimal: IANA Assigned

  - Description: id-MLKEM768-RSA2048-HMAC-SHA256

  - References: This Document

* id-MLKEM768-RSA3072-HMAC-SHA256

  - Decimal: IANA Assigned

  - Description: id-MLKEM768-RSA3072-HMAC-SHA256

  - References: This Document

* id-MLKEM768-RSA4096-HMAC-SHA256

  - Decimal: IANA Assigned

  - Description: id-MLKEM768-RSA4096-HMAC-SHA256

  - References: This Document

* id-MLKEM768-ECDH-P256-HMAC-SHA256

  - Decimal: IANA Assigned

   - Description: id-MLKEM768-ECDH-P256-HMAC-SHA256

   - References: This Document

* id-MLKEM768-ECDH-P384-HMAC-SHA256

   - Decimal: IANA Assigned

   - Description: id-MLKEM768-ECDH-P384-HMAC-SHA256

   - References: This Document

* id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256

   - Decimal: IANA Assigned

   - Description: id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256

   - References: This Document

* id-MLKEM768-X25519-SHA3-256

   - Decimal: IANA Assigned

   - Description: id-MLKEM768-X25519-SHA3-256

   - References: This Document

* id-MLKEM1024-RSA3072-HMAC-SHA512

   - Decimal: IANA Assigned

   - Description: id-MLKEM1024-RSA3072-HMAC-SHA512

   - References: This Document

* id-MLKEM1024-ECDH-P384-HMAC-SHA512

   - Decimal: IANA Assigned

   - Description: id-MLKEM1024-ECDH-P384-HMAC-SHA512

   - References: This Document

* id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512

   - Decimal: IANA Assigned

   - Description: id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512

   - References: This Document

* id-MLKEM1024-X448-SHA3-256

   - Decimal: IANA Assigned

   - Description: id-MLKEM1024-X448-SHA3-256

   - References: This Document

* id-MLKEM1024-ECDH-P521-HMAC-SHA512

   - Decimal: IANA Assigned

   - Description: id-MLKEM1024-ECDH-P521-HMAC-SHA512

   - References: This Document

10. Security Considerations

10.1. Why Hybrids?

In broad terms, a PQ/T Hybrid can be used either to provide dual-algorithm security or to provide migration flexibility. Let's quickly explore both.

Dual-algorithm security. The general idea is that the data is protected by two algorithms such that an attacker would need to break both in order to compromise the data. As with most of cryptography, this property is easy to state in general terms, but becomes more complicated when expressed in formalisms. The following sections go into more detail here.

Migration flexibility. Some PQ/T hybrids exist to provide a sort of "OR" mode where the application can choose to use one algorithm or the other or both. The intention is that the PQ/T hybrid mechanism builds in backwards compatibility to allow legacy and upgraded applications to co-exist and communicate. The composite algorithms presented in this specification do not provide this since they operate in a strict "AND" mode. They do, however, provide codebase migration flexibility. Consider that an organization has today a mature, validated, certified, hardened implementation of RSA or ECC; composites allow them to add an ML-KEM implementation which immediately starts providing benefits against harvest-now-decrypt-later attacks even if that ML-KEM implementation is still an experimental, non-validated, non-certified, non-hardened implementation. More details of obtaining FIPS certification of a composite algorithm can be found in Section 11.1.

10.2. KEM Combiner

The KEM combiner from Section 4.4 is reproduced here for reference.

```
KDF(mlkemSS || tradSS || tradCT || tradPK || Domain)
```

Figure 13: KEM combiner construction

The primary security property of the KEM combiner is that it preserves IND-CCA2 of the overall Composite ML-KEM so long as at least one component is IND-CCA2 [X-Wing] [GHP18]. Additionally, we also need to consider the case where one of the component algorithms is completely broken; that the private key is known to an attacker, or worse that the public key, private key, and ciphertext are manipulated by the attacker. In this case, we rely on the construction of the KEM combiner to ensure that the value of the other shared secret key cannot be leaked or the combined shared secret key predicted via manipulation of the broken algorithm.

Each registered Composite ML-KEM algorithm specifies the choice of KDF and Domain -- see Section 7 and Section 7.1. Given that each Composite ML-KEM algorithm fully specifies the component algorithms, including for example the size of the RSA modulus, all inputs to the KEM combiner are fixed-size and thus do not require length-prefixing.

* mlkemSS is always 32 bytes.

* tradSS in the case of DH this is derived by the decapsulator and therefore the length is not controlled by the attacker, however in the case of RSA-OAEP this value is directly chosen by the sender and both the length and content could be freely chosen by an attacker.

* tradCT is either an elliptic curve public key or an RSA-OAEP ciphertext which is required to have its length checked by step 1b of RSAES-OAEP-DECRYPT in [RFC8017].

* tradPK is the public key of the traditional component (elliptic curve or RSA) and therefore fixed-length.

* Domain is a fixed value specified in this document.

10.2.1. IND-CCA Security of the hybrid scheme

Informally, a Composite ML-KEM algorithm is secure if the combiner (HMAC-SHA2 or SHA3) is secure, and either ML-KEM is secure or the traditional component (RSA-OAEP, ECDH, X25519 or X448) is secure.

The security of ML-KEM and DH hybrids is covered in [X-Wing] and requires that the first KEM component (ML-KEM in this construction) is IND-CCA and second ciphertext preimage resistant (C2PRI) and that the second traditional component is IND-CCA. This design choice improves performance by not including the large ML-KEM public key and ciphertext, but means that an implementation error in the ML-KEM component that affects the ciphertext check step of the FO transform could result in the overall composite no longer achieving IND-CCA2 security. Note that ciphertext collisions exist in the traditional component by the composite design choice to support any underlying encoding of the traditional component, such as compressed vs uncompressed EC points as the DH KEM ciphertext. This solution remains IND-CCA due to binding the tradPK and tradCT in the KEM combiner.

The QSF framework presented in [X-Wing] is extended to cover RSA-OAEP as the traditional algorithm in place of DH by noting that RSA-OAEP is also IND-CCA secure [RFC8017].

Note that X-Wing uses SHA3 as the combiner KDF whereas Composite ML-KEM uses either SHA3 or HMAC-SHA2 which are interchangeable in the X-Wing proof since both behave as random oracles under multiple concatenated inputs.

The composite combiner cannot be assumed to be secure when used with different KEMs and a more cautious approach would bind the public key and ciphertext of the first KEM as well.

10.2.2. Second pre-image resistance of component KEMs

The notion of a "ciphertext second pre-image resistant KEM" is defined in [X-Wing] as being the property that it is computationally difficult to find two different ciphertexts c != c’ that will decapsulate to the same shared secret key under the same public key. For the purposes of a hybrid KEM combiner, this property means that given two composite ciphertexts (c1, c2) and (c1’, c2’), we must obtain a unique overall shared secret key so long as either c1 != c1’ or c2 != c2’ -- i.e. the overall Composite ML-KEM is ciphertext second pre-image resistant, and therefore secure so long as one of the component KEMs is secure.

In [X-Wing] it is proven that ML-KEM is a second pre-image resistant KEM and therefore the ML-KEM ciphertext can safely be omitted from the KEM combiner. Note that this makes a fundamental assumption on ML-KEM remaining ciphertext second pre-image resistant, and therefore this formulation of KEM combiner does not fully protect against implementation errors in the ML-KEM component -- particularly around the ciphertext check step of the Fujisaki-Okamoto transform -- which could trivially lead to second ciphertext pre-image attacks that break the IND-CCA2 security of the ML-KEM component and of the overall Composite ML-KEM. This could be more fully mitigated by binding the ML-KEM ciphertext in the combiner, but a design decision was made to settle for protection against algorithmic attacks and not implementation attacks against ML-KEM in order to increase performance.

However, since neither RSA-OAEP nor DH guarantee second pre-image resistance at all, even in a correct implementation, these ciphertexts are bound to the key derivation in order to guarantee that c != c’ will yield a unique ciphertext, and thus restoring second pre-image resistance to the overall Composite ML-KEM.

10.2.3. SHA3 vs HMAC-SHA2

In order to achieve the desired security property that the Composite ML-KEM is IND-CCA2 whenever at least one of the component KEMs is, the KDF used in the KEM combiner needs to possess collision and second pre-image resistance with respect to each of its inputs independently; a property sometimes called "dual-PRF" [Aviram22]. Collision and second-pre-image resistance protects against compromise of one component algorithm from resulting in the ability to construct multiple different ciphertexts which result in the same shared secret key. Pre-image resistance protects against compromise of one component algorithm being used to attack and learn the value of the other shared secret key.

SHA3 is known to have all of the necessary dual-PRF properties [X-Wing], but SHA2 does not and therefore all SHA2-based constructions MUST use SHA2 within an HMAC construction such as HKDF-Extract upon which the composite HMAC combiner is based [GHP18].

10.2.4. Generifying this construction

It should be clear that the security analysis of the presented KEM combiner construction relies heavily on the specific choices of component algorithms and combiner KDF, and this combiner construction SHOULD NOT by applied to any other combination of ciphers without performing the appropriate security analysis.

10.3. Key Reuse

While conformance with this specification requires that both components of a composite key MUST be freshly generated, the designers are aware that some implementers may be forced to break this rule due to operational constraints. This section documents the implications of doing so.

When using single-algorithm cryptography, the best practice is to always generate fresh keying material for each purpose, for example when renewing a certificate, or obtaining both a TLS and S/MIME certificate for the same device. However, in practice key reuse in such scenarios is not always catastrophic to security and therefore often tolerated. However this reasoning does not hold in the PQ/T hybrid setting.

Within the broader context of PQ/T hybrids, we need to consider new attack surfaces that arise due to the hybrid constructions and did not exist in single-algorithm contexts. One of these is key reuse where the component keys within a hybrid are also used by themselves within a single-algorithm context. For example, it might be tempting for an operator to take already-deployed RSA keys and add an ML-KEM key to them to form a hybrid. Within a hybrid signature context this leads to a class of attacks referred to as "stripping attacks" where one component signature can be extracted and presented as a single-algorithm signature. Hybrid KEMs using a concatenation-style KEM combiner, as is done in this specification, do not have the analogous attack surface because even if an attacker is able to extract and decrypt one of the component ciphertexts, this will yield a different shared secret key than the overall shared secret key derived from the composite, so any subsequent symmetric cryptographic operations will fail.

In addition, there is a further implication to key reuse regarding certificate revocation. Upon receiving a new certificate enrolment request, many certification authorities will check if the requested public key has been previously revoked due to key compromise. Often a CA will perform this check by using the public key hash. Therefore, if one, or even both, components of a composite have been previously revoked, the CA may only check the hash of the combined composite key and not find the revocations. Therefore, because the possibility of key reuse exists even though forbidden in this specification, CAs performing revocation checks on a composite key SHOULD also check both component keys independently to verify that the component keys have not been revoked.

10.4. Decapsulation failure

Provided all inputs are well-formed, the key establishment procedure of ML-KEM will never explicitly fail. Specifically, the ML-KEM.Encaps() and ML-KEM.Decaps() algorithms from [FIPS.203] will always output a value with the same data type as a shared secret key, and will never output an error or failure symbol. However, it is possible (though extremely unlikely) that the process will fail in the sense that ML-KEM.Encaps() and ML-KEM.Decaps() will produce different outputs, even though both of them are behaving honestly and no adversarial interference is present. This is due to the lattice arithmetic for decapsulation with the secret key having hit an unrecoverable degenerate case that could not have been predicted by the encapsulator without knowledge of the secret key. In this case, the sender and recipient clearly did not succeed in producing a shared secret key. This event is called a decapsulation failure. Estimates for the decapsulation failure probability (or rate) for each of the ML-KEM parameter sets are provided in Table 1 of [FIPS.203] and reproduced here in Table 5.

Parameter set	Decapsulation failure rate
ML-KEM-512	2^(-139)
ML-KEM-768	2^(-164)
ML-KEM-1024	2^(-174)

Table 5: ML-KEM decapsulation failure rates

In the case of ML-KEM decapsulation failure, Composite ML-KEM MUST preserve the same behaviour and return a well-formed output shared secret key.

10.5. Policy for Deprecated and Acceptable Algorithms

Traditionally, a public key or certificate contains a single cryptographic algorithm. If and when an algorithm becomes deprecated (for example, RSA-512, or SHA1), the path to deprecating it through policy and removing it from operational environments is, at least is principle, straightforward.

In the composite model this is less obvious since a PQ/T hybrid is expected to still be considered valid after the traditional component is deprecated for individual use. As such, a single composite public key or certificate may contain a mixture of deprecated and non-deprecated algorithms. In general this should be manageable through policy by removing OIDs for the standalone component algorithms while still allowing OIDs for composite algorithms. However, complications may arise when the composite implementation needs to invoke the cryptographic module for a deprecated component algorithm. In particular, this could lead to complex Cryptographic Bills of Materials that show implementations of deprecated algorithms still present and being used.

11. Implementation Considerations

11.1. FIPS Certification

The following sections give guidance to implementers wishing to FIPS-certify a composite implementation.

This guidance is not authoritative and has not been endorsed by NIST.

Implementers seeking FIPS certification of a composite KEM algorithm where only one of the component algorithms has been FIPS-validated or FIPS-approved should credit the FIPS-validated component algorithm with full security strength, the non-FIPS-validated component algorithm with zero security, and the overall composite should be considered at least as strong and thus FIPS-approved.

The composite algorithm has been designed to treat the underlying primitives as "black-box implementations" and not impose any additional requirements on them that could require an existing implementation of an underlying primitive to run in a mode different from the one under which it was certified. For example, the KeyGen defined in Section 4.1 invokes ML-KEM.KeyGen(seed) which might not be available in a cryptographic module running in FIPS-mode, but Section 4.1 is only a suggested implementation and the composite KeyGen MAY be implemented using a different available interface for ML-KEM.KeyGen.

The authors wish to note that composite algorithms provide a design pattern to provide utility in future situations that require care to remain FIPS-compliant, such as future cryptographic migrations as well as bridging across jurisdictions with non-intersecting cryptographic requirements.

The following sections go into further detail on specific issues that relate to FIPS certification.

11.1.1. Combiner Function

For reference, the KEM combiner used in Composite ML-KEM is:

ss = KDF(mlkemSS || tradSS || tradCT || tradPK || Domain)

where KDF is either SHA3 or HMAC-SHA2.

NIST SP 800-227 [SP-800-227ipd], which at the time of writing is in its initial public draft period, allows hybrid key combiners of the following form:

K ← KDM(S1 ‖ S2 ‖ ‖ St , OtherInput) (14)

Composite ML-KEM maps cleanly into this since it places the two shared secret keys mlkemSS || tradSS at the beginning of the KDF input such that all other inputs tradCT || tradPK || Domain can be considered part of OtherInput for the purposes of FIPS certification.

For the detailed steps of the Key Derivation Mechanism KDM, [SP-800-227ipd] refers to [SP.800-56Cr2].

Compliance of the Composite ML-KEM variants is achieved in the following way:

The Composite ML-KEM algorithms using HMAC-SHA2 can be certified under [SP.800-56Cr2] One-Step Key Derivation Option 2: H(x) = HMAC-hash(salt, x) where salt is the empty (0 octet) string, which will internally be mapped to the zero vector 0x00..00 of the correct input size for the underlying hash function. This satisfies the requirement in [SP.800-56Cr2]:

> "in the absence of an agreed-upon alternative the default_salt shall be an all-zero byte string whose bit length equals that specified as the bit length of an input block for the hash function, hash"

The Composite ML-KEM algorithms using SHA3 can be certified under [SP.800-56Cr2] One-Step Key Derivation Option 1: H(x) = hash(x).

[SP.800-56Cr2] section 4 "One-Step Key Derivation" requires a counter which begins at the 4-byte value 0x00000001. However, the counter is allowed to be omitted when the hash function is executed only once, as specified on page 159 of the FIPS 140-3 Implementation Guidance [FIPS-140-3-IG].

11.1.2. Order of KDF inputs with Non-Approved Algorithms

[SP-800-227ipd] adds an important stipulation that was not present in earlier NIST specifications:

> This publication approves the use of the key combiner (14) for any t > 1, so long as at least one shared secret (i.e., S_j for some j) is a shared secret generated from the key- establishment methods of SP 800-56A or SP 800-56B, or an approved KEM.

This means that although Composite ML-KEM always places the shared secret key from ML-KEM in the first slot, a Composite ML-KEM can be FIPS certified so long as either component is FIPS certified. This is important for several reasons. First, in the early stages of PQC migration, composites allow for a non-FIPS certified ML-KEM implementation to be added to a module that already has a FIPS certified traditional component, and the resulting composite can be FIPS certified. Second, when eventually RSA and Elliptic Curve are no longer FIPS-allowed, the composite can retain its FIPS certified status on the strength of the ML-KEM component. Third, while this is outside the scope of this specification, the general composite construction could be used to create FIPS certified algorithms that contain a component algorithm from a different jurisdiction. Third, a composite where both components are FIPS-certified could allow an implementer to patch one component algorithm while awaiting re-certification while continuing to use the overall composite in FIPS mode.

At the time of writing, [SP-800-227ipd] is in its public draft period and not yet in force. A Composite ML-KEM implementation using a FIPS-certified traditional component and a non-FIPS certified ML-KEM is not believed to be certifiable under [SP.800-56Cr2] since this requires the shared secret key from the certified algorithm to be in the first slot.

11.2. Backwards Compatibility

The term "backwards compatibility" is used here to mean that existing systems as they are deployed today can interoperate with the upgraded systems of the future. This draft explicitly does not provide backwards compatibility, only upgraded systems will understand the OIDs defined in this specification.

These migration and interoperability concerns need to be thought about in the context of various types of protocols that make use of X.509 and PKIX with relation to key establishment and content encryption, from online negotiated protocols such as TLS 1.3 [RFC8446] and IKEv2 [RFC7296], to non-negotiated asynchronous protocols such as S/MIME signed email [RFC8551], as well as myriad other standardized and proprietary protocols and applications that leverage CMS [RFC5652] encrypted structures.

11.3. Profiling down the number of options

One daunting aspect of this specification is the number of composite algorithm combinations. Each option has been specified because there is a community that has a direct application for it; typically because the traditional component is already deployed in a change-managed environment, or because that specific traditional component is required for regulatory reasons.

However, this large number of combinations leads either to fracturing of the ecosystem into non-interoperable sub-groups when different communities choose non-overlapping subsets to support, or on the other hand it leads to spreading development resources too thin when trying to support all options.

This specification does not list any particular composite algorithm as mandatory-to-implement, however organizations that operate within specific application domains are encouraged to define profiles that select a small number of composites appropriate for that application domain. For applications that do not have any regulatory requirements or legacy implementations to consider, it is RECOMMENDED to focus implementation effort on:

id-MLKEM768-X25519-SHA3-256
id-MLKEM768-ECDH-P256-HMAC-SHA256

In applications that only allow NIST PQC Level 5, it is RECOMMENDED to focus implementation effort on:

id-MLKEM1024-ECDH-P384-HMAC-SHA512

11.4. Decapsulation Requires the Public Key

ML-KEM always requires the public key in order to perform various steps of the Fujisaki-Okamoto decapsulation [FIPS.203], and for this reason the private key encoding specified in FIPS 203 includes the public key. Moreover, the KEM combiner as specified in Section 4.4 requires the public key of the traditional component in order to achieve the public-key binding property and ciphertext collision resistance as described in Section 10.2.

The mechanism by which an application transmits the public keys is out of scope of this specification, but it MAY be accomplished by placing a serialized composite public key into the optional OneAsymmetricKey.publicKey field of the private key object.

Implementers who choose to use a different private key encoding than the one specified in this document MUST consider how to provide the component public keys to the decapsulate routine. While some implementations might contain routines to computationally derive the public key from the private key, it is not guaranteed that all implementations will support this.

12. References

12.1. Normative References

[FIPS.180-4]
National Institute of Standards and Technology (NIST), "FIPS Publication 180-4: Secure Hash Standard", August 2015, <https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.180-4.pdf>.

[FIPS.202] National Institute of Standards and Technology (NIST), "SHA-3 Standard: Permutation-Based Hash and Extendable-Output Functions", August 2015, <https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.202.pdf>.

[FIPS.203] National Institute of Standards and Technology (NIST), "Module-Lattice-based Key-Encapsulation Mechanism Standard", August 2024, <https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.203.pdf>.

[FIPS.204] National Institute of Standards and Technology (NIST), "Module-Lattice-Based Digital Signature Standard", August 2024, <https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.204.pdf>.

[RFC2104] Krawczyk, H., Bellare, M., and R. Canetti, "HMAC: Keyed-Hashing for Message Authentication", RFC 2104, DOI 10.17487/RFC2104, February 1997, <https://www.rfc-editor.org/info/rfc2104>.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC5280] Cooper, D., Santesson, S., Farrell, S., Boeyen, S., Housley, R., and W. Polk, "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile", RFC 5280, DOI 10.17487/RFC5280, May 2008, <https://www.rfc-editor.org/info/rfc5280>.

[RFC5480] Turner, S., Brown, D., Yiu, K., Housley, R., and T. Polk, "Elliptic Curve Cryptography Subject Public Key Information", RFC 5480, DOI 10.17487/RFC5480, March 2009, <https://www.rfc-editor.org/info/rfc5480>.

[RFC5652] Housley, R., "Cryptographic Message Syntax (CMS)", STD 70, RFC 5652, DOI 10.17487/RFC5652, September 2009, <https://www.rfc-editor.org/info/rfc5652>.

[RFC5869] Krawczyk, H. and P. Eronen, "HMAC-based Extract-and-Expand Key Derivation Function (HKDF)", RFC 5869, DOI 10.17487/RFC5869, May 2010, <https://www.rfc-editor.org/info/rfc5869>.

[RFC5958] Turner, S., "Asymmetric Key Packages", RFC 5958, DOI 10.17487/RFC5958, August 2010, <https://www.rfc-editor.org/info/rfc5958>.

[RFC6234] Eastlake 3rd, D. and T. Hansen, "US Secure Hash Algorithms (SHA and SHA-based HMAC and HKDF)", RFC 6234, DOI 10.17487/RFC6234, May 2011, <https://www.rfc-editor.org/info/rfc6234>.

[RFC7748] Langley, A., Hamburg, M., and S. Turner, "Elliptic Curves for Security", RFC 7748, DOI 10.17487/RFC7748, January 2016, <https://www.rfc-editor.org/info/rfc7748>.

[RFC8017] Moriarty, K., Ed., Kaliski, B., Jonsson, J., and A. Rusch, "PKCS #1: RSA Cryptography Specifications Version 2.2", RFC 8017, DOI 10.17487/RFC8017, November 2016, <https://www.rfc-editor.org/info/rfc8017>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

[RFC8410] Josefsson, S. and J. Schaad, "Algorithm Identifiers for Ed25519, Ed448, X25519, and X448 for Use in the Internet X.509 Public Key Infrastructure", RFC 8410, DOI 10.17487/RFC8410, August 2018, <https://www.rfc-editor.org/info/rfc8410>.

[RFC8411] Schaad, J. and R. Andrews, "IANA Registration for the Cryptographic Algorithm Object Identifier Range", RFC 8411, DOI 10.17487/RFC8411, August 2018, <https://www.rfc-editor.org/info/rfc8411>.

[RFC9629] Housley, R., Gray, J., and T. Okubo, "Using Key Encapsulation Mechanism (KEM) Algorithms in the Cryptographic Message Syntax (CMS)", RFC 9629, DOI 10.17487/RFC9629, August 2024, <https://www.rfc-editor.org/info/rfc9629>.

[SEC1] Certicom Research, "SEC 1: Elliptic Curve Cryptography", May 2009, <https://www.secg.org/sec1-v2.pdf>.

[SEC2] Certicom Research, "SEC 2: Recommended Elliptic Curve Domain Parameters", January 2010, <https://www.secg.org/sec2-v2.pdf>.

[SP.800-185] National Institute of Standards and Technology (NIST), "SHA-3 Derived Functions: cSHAKE, KMAC, TupleHash, and ParallelHash", December 2016, <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-185.pdf>.

[SP.800-56Ar3] National Institute of Standards and Technology (NIST), "Recommendation for Pair-Wise Key-Establishment Schemes Using Discrete Logarithm Cryptography", April 2018, <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-56Ar3.pdf>.

[SP.800-56Cr2] National Institute of Standards and Technology (NIST), "Recommendation for Key-Derivation Methods in Key-Establishment Schemes", August 2020, <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-56Cr2.pdf>.

[SP.800-57pt1r5] National Institute of Standards and Technology (NIST), "Recommendation for Key Management: Part 1 General", May

2020,
<https://nvlpubs.nist.gov/nistpubs/SpecialPublications/
NIST.SP.800-57pt1r5.pdf>.

[X.690] ITU-T, "Information technology - ASN.1 encoding Rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)", ISO/IEC 8825-1:2015, November 2015.

12.2. Informative References

[ANSSI2024]
French Cybersecurity Agency (ANSSI), Federal Office for Information Security (BSI), Netherlands National Communications Security Agency (NLNCSA), and Swedish National Communications Security Authority, Swedish Armed Forces, "Position Paper on Quantum Key Distribution", n.d., <https://cyber.gouv.fr/sites/default/files/document/
Quantum_Key_Distribution_Position_Paper.pdf>.

[Aviram22] Aviram, N., Dowling, B., Komargodski, I., Paterson, K. G., Ronen, E., and E. Yogev, "Practical (Post-Quantum) Key Combiners from One-Wayness and Applications to TLS", n.d., <https://eprint.iacr.org/2022/065>.

[BSI2021] Federal Office for Information Security (BSI), "Quantum-safe cryptography - fundamentals, current developments and recommendations", October 2021,
<https://www.bsi.bund.de/SharedDocs/Downloads/EN/BSI/
Publications/Brochure/quantum-safe-cryptography.pdf>.

[CNSA2.0] National Security Agency, "Commercial National Security Algorithm Suite 2.0", n.d.,
<https://media.defense.gov/2022/Sep/07/2003071834/-1/-1/0/
CSA_CNSA_2.0_ALGORITHMS_.PDF>.

[ETSI.TS.103.744]
ETSI, "ETSI TS 103 744 V1.2.1 CYBER-QSC; Quantum-safe Hybrid Key Establishment", March 2025,
<https://www.etsi.org/deliver/
etsi_ts/103700_103799/103744/01.02.01_60/
ts_103744v010201p.pdf>.

[FIPS-140-3-IG]
National Institute of Standards and Technology (NIST), "Implementation Guidance for FIPS 140-3 and the Cryptographic Module Validation Program", July 2024, <https://csrc.nist.gov/csrc/media/Projects/cryptographic-module-validation-program/documents/fips%20140-3/FIPS%20140-3%20IG.pdf>.

[GHP18] Giacon, F., Heuer, F., and B. Poettering, "KEM Combiners", 2018, <https://eprint.iacr.org/2018/024>.

[I-D.ietf-lamps-kyber-certificates]
Turner, S., Kampanakis, P., Massimo, J., and B. Westerbaan, "Internet X.509 Public Key Infrastructure - Algorithm Identifiers for the Module-Lattice-Based Key-Encapsulation Mechanism (ML-KEM)", Work in Progress, Internet-Draft, draft-ietf-lamps-kyber-certificates-10, 16 April 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-lamps-kyber-certificates-10>.

[I-D.ietf-pquip-pqt-hybrid-terminology]
D, F., P, M., and B. Hale, "Terminology for Post-Quantum Traditional Hybrid Schemes", Work in Progress, Internet-Draft, draft-ietf-pquip-pqt-hybrid-terminology-06, 10 January 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-pquip-pqt-hybrid-terminology-06>.

[RFC2986] Nystrom, M. and B. Kaliski, "PKCS #10: Certification Request Syntax Specification Version 1.7", RFC 2986, DOI 10.17487/RFC2986, November 2000, <https://www.rfc-editor.org/info/rfc2986>.

[RFC4210] Adams, C., Farrell, S., Kause, T., and T. Mononen, "Internet X.509 Public Key Infrastructure Certificate Management Protocol (CMP)", RFC 4210, DOI 10.17487/RFC4210, September 2005, <https://www.rfc-editor.org/info/rfc4210>.

[RFC4211] Schaad, J., "Internet X.509 Public Key Infrastructure Certificate Request Message Format (CRMF)", RFC 4211, DOI 10.17487/RFC4211, September 2005, <https://www.rfc-editor.org/info/rfc4211>.

[RFC5639] Lochter, M. and J. Merkle, "Elliptic Curve Cryptography (ECC) Brainpool Standard Curves and Curve Generation", RFC 5639, DOI 10.17487/RFC5639, March 2010, <https://www.rfc-editor.org/info/rfc5639>.

[RFC5914] Housley, R., Ashmore, S., and C. Wallace, "Trust Anchor Format", RFC 5914, DOI 10.17487/RFC5914, June 2010, <https://www.rfc-editor.org/info/rfc5914>.

[RFC5990] Randall, J., Kaliski, B., Brainard, J., and S. Turner, "Use of the RSA-KEM Key Transport Algorithm in the Cryptographic Message Syntax (CMS)", RFC 5990, DOI 10.17487/RFC5990, September 2010, <https://www.rfc-editor.org/info/rfc5990>.

[RFC6090] McGrew, D., Igoe, K., and M. Salter, "Fundamental Elliptic Curve Cryptography Algorithms", RFC 6090, DOI 10.17487/RFC6090, February 2011, <https://www.rfc-editor.org/info/rfc6090>.

[RFC7292] Moriarty, K., Ed., Nystrom, M., Parkinson, S., Rusch, A., and M. Scott, "PKCS #12: Personal Information Exchange Syntax v1.1", RFC 7292, DOI 10.17487/RFC7292, July 2014, <https://www.rfc-editor.org/info/rfc7292>.

[RFC7296] Kaufman, C., Hoffman, P., Nir, Y., Eronen, P., and T. Kivinen, "Internet Key Exchange Protocol Version 2 (IKEv2)", STD 79, RFC 7296, DOI 10.17487/RFC7296, October 2014, <https://www.rfc-editor.org/info/rfc7296>.

[RFC8446] Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.3", RFC 8446, DOI 10.17487/RFC8446, August 2018, <https://www.rfc-editor.org/info/rfc8446>.

[RFC8551] Schaad, J., Ramsdell, B., and S. Turner, "Secure/Multipurpose Internet Mail Extensions (S/MIME) Version 4.0 Message Specification", RFC 8551, DOI 10.17487/RFC8551, April 2019, <https://www.rfc-editor.org/info/rfc8551>.

[RFC9180] Barnes, R., Bhargavan, K., Lipp, B., and C. Wood, "Hybrid Public Key Encryption", RFC 9180, DOI 10.17487/RFC9180, February 2022, <https://www.rfc-editor.org/info/rfc9180>.

[SP-800-227ipd]
Alagic, G., Barker, E., Chen, L., Moody, D., Robinson, A., Silberg, H., Waller, N., and National Institute of Standards and Technology (NIST), "Recommendations for Key-Encapsulation Mechanisms (Initial Public Draft)", n.d., <https://csrc.nist.gov/pubs/sp/800/227/ipd>.

[SP800-131Ar2]
Barker, E., Roginksy, A., and National Institute of Standards and Technology (NIST), "Transitioning the Use of

Cryptographic Algorithms and Key Lengths", n.d., <https://nvlpubs.nist.gov/nistpubs/specialpublications/nist.sp.800-131ar2.pdf>.

[X-Wing] Barbosa, M., Connolly, D., Duarte, J., Kaiser, A., Schwabe, P., Varner, K., and B. Westerbaan, "X-Wing The Hybrid KEM You’ ve Been Looking For", 9 January 2024, <https://eprint.iacr.org/2024/039.pdf>.

Appendix A. Approximate Key and Ciphertext Sizes

The sizes listed below are approximate: these values are measured from the test vectors, however, several factors could cause fluctuations in the size of the traditional component. For example, this could be due to:

* Compressed vs uncompressed EC point.

* The RSA public key (n, e) allows e to vary is size between 3 and n - 1 [RFC8017].

* When the underlying RSA or EC value is itself DER-encoded, integer values could occaisionally be shorter than expected due to leading zeros being dropped from the encoding.

By contrast, ML-KEM values are always fixed size, so composite values can always be correctly de-serialized based on the size of the ML-KEM component.

Implementations MUST NOT perform strict length checking based on the values in this table except for ML-KEM + X25519 or X448; since these algorithms produce fixed-size outputs, the values in the table below for these variants MAY be treated as constants.

Non-hybrid ML-KEM is included for reference.

Algorithm	Public key	Private key	Ciphertext	SS
id-alg-ml-kem-768	1184	64	1088	32
id-alg-ml-kem-1024	1568	64	1568	32
id-MLKEM768-RSA2048-HMAC-SHA256	1454	1282	1344	32
id-MLKEM768-RSA3072-HMAC-SHA256	1582	1856	1472	32
id-MLKEM768-RSA4096-HMAC-SHA256	1710	2437	1600	32
id-MLKEM768-X25519-SHA3-256	1216	96	1120	32
id-MLKEM768-ECDH-P256-HMAC-SHA256	1249	202	1153	32
id-MLKEM768-ECDH-P384-HMAC-SHA256	1281	249	1185	32
id-MLKEM768-ECDH-brainpoolP256r1-HMAC-SHA256	1249	203	1153	32
id-MLKEM1024-RSA3072-HMAC-SHA512	1966	1857	1952	32
id-MLKEM1024-ECDH-P384-HMAC-SHA512	1665	249	1665	32
id-MLKEM1024-ECDH-brainpoolP384r1-HMAC-SHA512	1665	253	1665	32
id-MLKEM1024-X448-SHA3-256	1624	120	1624	32
id-MLKEM1024-ECDH-P521-HMAC-SHA512	1701	305	1701	32

Table 6: Approximate size values of composite ML-KEM

Appendix B. Component Algorithm Reference

This section provides references to the full specification of the algorithms used in the composite constructions.

Component KEM Algorithm ID	OID	Specification
id-ML-KEM-768	2.16.840.1.101.3.4.4.2	[FIPS.203]
id-ML-KEM-1024	2.16.840.1.101.3.4.4.3	[FIPS.203]
id-X25519	1.3.101.110	[RFC7748], [RFC8410]
id-X448	1.3.101.111	[RFC7748], [RFC8410]
id-ecDH	1.3.132.1.12	[RFC5480], [SEC1]
id-RSAES-OAEP	1.2.840.113549.1.1.7	[RFC8017]

Table 7: Component Encryption Algorithms used in Composite Constructions

Elliptic CurveID	OID	Specification
secp256r1	1.2.840.10045.3.1.7	[RFC6090], [SEC2]
secp384r1	1.3.132.0.34	[RFC6090], [SEC2]
secp521r1	1.3.132.0.35	[RFC6090], [SEC2]
brainpoolP256r1	1.3.36.3.3.2.8.1.1.7	[RFC5639]
brainpoolP384r1	1.3.36.3.3.2.8.1.1.11	[RFC5639]

Table 8: Elliptic Curves used in Composite Constructions

HashID	OID	Specification
id-sha256	2.16.840.1.101.3.4.2.1	[RFC6234]
id-sha512	2.16.840.1.101.3.4.2.3	[RFC6234]
id-sha3-256	2.16.840.1.101.3.4.2.8	[FIPS.202]

Table 9: Hash algorithms used in Composite Constructions

Appendix C. Fixed Component Algorithm Identifiers

The following sections list explicitly the DER encoded AlgorithmIdentifier that MUST be used when reconstructing SubjectPublicKeyInfo objects for each component algorithm type, which may be required for example if cryptographic library requires the public key in this form in order to process each component algorithm. The public key BIT STRING should be taken directly from the respective component of the Composite ML-KEM public key.

ML-KEM-768

ASN.1:

```
algorithm AlgorithmIdentifier ::= {
  algorithm id-alg-ml-kem-768   -- (2.16.840.1.101.3.4.4.2)
  }
```

DER:

```
30 0B 06 07 60 86 48 01 65 03 04 04 02
```

ML-KEM-1024

ASN.1:

ASN.1:

```
algorithm AlgorithmIdentifier ::= {
  algorithm id-alg-ml-kem-1024   -- (2.16.840.1.101.3.4.4.3)
  }
```

DER:

```
30 0B 06 07 60 86 48 01 65 03 04 04 03
```

RSA-OAEP - all sizes

```
 ASN.1:
   algorithm AlgorithmIdentifier ::= {
     algorithm id-RSAES-OAEP,   -- (1.2.840.113549.1.1.7)
     parameters RSAES-OAEP-params {
          hashFunc      [0] id-sha256,  -- (2.16.840.1.101.3.4.2.1)
          maskGenFunc   [1] mgf1SHA256Identifier,
          pSourceFunc   [2] pSpecifiedEmpty  }
     }


 where
       mgf1SHA256Identifier  AlgorithmIdentifier  ::=  {
                             algorithm id-mgf1,  -- (1.2.840.113549.1.1.8)
                             parameters sha256Identifier }


       sha256Identifier  AlgorithmIdentifier  ::=  { id-sha256, NULL }

 DER:
  30 4D 06 09 2A 86 48 86 F7 0D 01 01 07 30 40 A0 0F 30 0D 06 09 60 86
  48 01 65 03 04 02 01 05 00 A1 1C 30 1A 06 09 2A 86 48 86 F7 0D 01 01
  08 30 0D 06 09 60 86 48 01 65 03 04 02 01 05 00 A2 0F 30 0D 06 09 2A
  86 48 86 F7 0D 01 01 09 04 00
```

ECDH NIST-P-256

```
   ASN.1:
     algorithm AlgorithmIdentifier ::= {
       algorithm id-ecPublicKey   -- (1.2.840.10045.2.1)
       parameters ANY ::= {
         AlgorithmIdentifier ::= {
           algorithm secp256r1    -- (1.2.840.10045.3.1.7)
           }
         }
       }

   DER:
     30 13 06 07 2A 86 48 CE 3D 02 01 06 08 2A 86 48 CE 3D 03 01 07
```

ECDH NIST-P-384

```
ASN.1:
  algorithm AlgorithmIdentifier ::= {
    algorithm id-ecPublicKey   -- (1.2.840.10045.2.1)
    parameters ANY ::= {
      AlgorithmIdentifier ::= {
        algorithm secp384r1    -- (1.3.132.0.34)
        }
      }
    }

DER:
  30 10 06 07 2A 86 48 CE 3D 02 01 06 05 2B 81 04 00 22
```

ECDH NIST-P-521

```
ASN.1:
  algorithm AlgorithmIdentifier ::= {
    algorithm id-ecPublicKey   -- (1.2.840.10045.2.1)
    parameters ANY ::= {
      AlgorithmIdentifier ::= {
        algorithm secp521r1    -- (1.3.132.0.35)
        }
      }
    }

DER:
  30 10 06 07 2A 86 48 CE 3D 02 01 06 05 2B 81 04 00 23
```

ECDH Brainpool-256

```
ASN.1:
  algorithm AlgorithmIdentifier ::= {
    algorithm id-ecPublicKey   -- (1.2.840.10045.2.1)
    parameters ANY ::= {
      AlgorithmIdentifier ::= {
        algorithm brainpoolP256r1   -- (1.3.36.3.3.2.8.1.1.7)
        }
      }
    }

DER:
  30 14 06 07 2A 86 48 CE 3D 02 01 06 09 2B 24 03 03 02 08 01 01 07
```

ECDH Brainpool-384

ASN.1:
```
  algorithm AlgorithmIdentifier ::= {
    algorithm id-ecPublicKey   -- (1.2.840.10045.2.1)
    parameters ANY ::= {
      AlgorithmIdentifier ::= {
        algorithm brainpoolP384r1   -- (1.3.36.3.3.2.8.1.1.11)
        }
      }
    }
```

DER:
```
  30 14 06 07 2A 86 48 CE 3D 02 01 06 09 2B 24 03 03 02 08 01 01 0B
```

X25519

ASN.1:
```
  algorithm AlgorithmIdentifier ::= {
    algorithm id-X25519   -- (1.3.101.110)
    }
```

DER:
```
  30 05 06 03 2B 65 6E
```

X448

ASN.1:
```
  algorithm AlgorithmIdentifier ::= {
    algorithm id-X448   -- (1.3.101.111)
    }
```

DER:
```
  30 05 06 03 2B 65 6F
```

Appendix D. Comparison with other Hybrid KEMs

D.1. X-Wing

This specification borrows extensively from the analysis and KEM combiner construction presented in [X-Wing]. In particular, X-Wing and id-MLKEM768-X25519-SHA3-256 are largely interchangeable. The one difference is that X-Wing uses a combined KeyGen function to generate the two component private keys from the same seed, which gives some additional binding properties. However, using a derived value as the seed for ML-KEM.KeyGen_internal() is, at time of writing, explicitly disallowed by [FIPS.203] which makes it impossible to create a FIPS-compliant implementation of X-Wing’s KeyGen or private key import functionality. For this reason, this specification keeps the key generation for both components separate and only loosely-specified so that implementers are free to use an existing certified hardware or software module for one or both components.

Due to the difference in key generation and security properties, X-Wing and id-MLKEM768-X25519-SHA3-256 have been registered as separate algorithms with separate OIDs, and they use a different domain separator string in order to ensure that their ciphertexts are not inter-compatible.

D.2. ETSI CatKDF

[ETSI.TS.103.744] section 8.2.3 defines CatKDF as:

```
1) Form secret = psk || k1 || k 2.
2) Set context = f(info, MA, MB), where f is a context formatting function.
3) key_material = KDF(secret, label, context, length).
4) Return key_material.

MA shall contain all of the public keys.
MB shall contain all of the corresponding public keys and ciphertexts.
```

The main difference between the Composite ML-KEM combiner and the ETSI CatKDF combiner is that CatKDF makes the more conservative choice to bind the public keys and ciphertexts of both components, while Composite ML-KEM follows the analysis presented in [X-Wing] that while preserving the security properties of the traditional component requires binding the public key and ciphertext of the traditional component, it is not necessary to do so for ML-KEM thanks to the rejection sampling step of the Fujisaki-Okamoto transform.

Additionally, ETSI CatKDF can be instantiated with either HMAC [RFC2104], KMAC [SP.800-185] or HKDF [RFC5869] as KDF. Using HMAC aligns with some of the KDF variants in this specification, but not the ones that use SHA3 which do not have an equivalent construction of CatKDF.

Appendix E. KEM Combiner Examples

This section provides examples of constructing the input for the KEM Combiner, showing all intermediate values. This is intended to be useful for debugging purposes. See Section 4.4 for additional information.

Each input component is shown. Note that values are shown hex-encoded for display purposes only, they are actually raw binary values.

* mlkemSS is the shared secret produced by the ML-KEM encapsulate or decapsulate function which is always 32 bytes.

* tradSS is the shared secret produce by the traditional algorithm.

* tradCT is either an elliptic curve public key or an RSA-OAEP ciphertext depending on the algorithm chosen.

* tradPK is the public key of the traditional component (elliptic curve or RSA) and therefore fixed-length.

* Domain is the specific domain separator for this composite algorithm. See Section 7.1

Next, the Combined KDF Input is given, which is simply the concatenation of the above values.

Finally, the KDF Function and the ss Output are shown as outputs. The ss is the Composite ML-KEM shared-secret generated by applying the KDF to the Combined KDF Input.

Examples are given for each recommended Composite ML-KEM algorithm from Section 11.3, which happens to demonstrate all three combiner functions.

Example 1:

Example of id-MLKEM768-ECDH-P256-HMAC-SHA256 Combiner function output.

```
# Inputs
mlkemSS:
13f3e2c8d43aaa1045f0e3ba5c53a495a03553965d78fb8c62f1de14a83f0d4e

tradSS:
90b5bd5efb23a8084a53da8fabc5e919c9f3e7d6e9e62d1019959dff41e6669b

tradCT:  040c9c634ff4e0a309e1a285b9b79cc09c9b06f7558dd948f46b880b4acbe
22061149a210e8c2d00f6c00837d52657d6c6b7ad94babb1cdfe0de85d869ec362a84

tradPK:  0436d5a0636fd2448488e5914d4820b9420c78f7ae14841c83d3b13f9550a
76e96344e509845b1c4d451d6d865d45c69f62659ca77ecd1d69668d22c6c24643704

Domain:  060b6086480186fa6b50050236


# Combined KDF Input:
#  mlkemSS || tradSS || tradCT || tradPK || Domain

Combined KDF Input: 13f3e2c8d43aaa1045f0e3ba5c53a495a03553965d78fb8c62
f1de14a83f0d4e90b5bd5efb23a8084a53da8fabc5e919c9f3e7d6e9e62d1019959dff
41e6669b040c9c634ff4e0a309e1a285b9b79cc09c9b06f7558dd948f46b880b4acbe2
2061149a210e8c2d00f6c00837d52657d6c6b7ad94babb1cdfe0de85d869ec362a8404
36d5a0636fd2448488e5914d4820b9420c78f7ae14841c83d3b13f9550a76e96344e50
9845b1c4d451d6d865d45c69f62659ca77ecd1d69668d22c6c24643704060b60864801
86fa6b50050236


# Outputs
# ss = HMAC-SHA256(Combined KDF Input)

ss: 8e9333dbfbd5057855fee30049790e9e835f24373334bd257e76ec19725e8f89
```

Example 2:

Example of id-MLKEM768-X25519-SHA3-256 Combiner function output.

```
# Inputs
mlkemSS:
542aba637e129ef540743b8420edb78b26e492af2a496f31d33138a5402239c3

tradSS:
8af825f1d07ad0b3bff6856a6f7aaa706eb1db11b6a7d2c44dfb06d041e7e261

tradCT:
1c5e3c085e7180ffe732c67b94f0d408e524af9dc2954e5ceea1fdfc03a76247

tradPK:
0cf7344981ef158017db99cce88de79194f0bf8ebc128d462b1f6a89b34fce7c

Domain:  060b6086480186fa6b50050235


# Combined KDF Input:
#  mlkemSS || tradSS || tradCT || tradPK || Domain

Combined KDF Input: 542aba637e129ef540743b8420edb78b26e492af2a496f31d3
3138a5402239c38af825f1d07ad0b3bff6856a6f7aaa706eb1db11b6a7d2c44dfb06d0
41e7e2611c5e3c085e7180ffe732c67b94f0d408e524af9dc2954e5ceea1fdfc03a762
470cf7344981ef158017db99cce88de79194f0bf8ebc128d462b1f6a89b34fce7c060b
6086480186fa6b50050235


# Outputs
# ss = SHA3-256(Combined KDF Input)

ss: 1fa931e383cd072d5df88a42865f1e2c14acac1c2820cfcf76fbbcd2444aadbd
```

Example 3:

```
Example of id-MLKEM1024-ECDH-P384-HMAC-SHA512 Combiner function output.

# Inputs
mlkemSS:
99308f288ab1c346bc501eca3f8c1c64315e91686e98920a1b97f60368ead216

tradSS:  30604eb9718fc42386217d9d9a71a678fea6b2381f4232624f80a9b176b8f
2323fe52cc6d477f024cffbea63c143bdb0

tradCT:  04e4f92e7dac57d1fe25c833011947e9ab41445392061b419cc75eaf15e2c
99615233a806899a092de01a3bc9cba8acf68f31b3c6b157178a8f890b6f268c6ac361
d9f14772c60f34873bbea46c9658462b4e99901c688d6edcfac2859706e6791

tradPK:  0408a746f5f561013de88c6f549b846002807d250470e6b101185caec9e3a
917afbe4c7bd00944f9924aaa95859c1030875d5455daabceca59ee3efd838ac6df1da
001a4ca317eb518b931aad0489e8b2bc1955cfdd4b4a62686933491d3ff01d3

Domain:  060b6086480186fa6b50050239


# Combined KDF Input:
#  mlkemSS || tradSS || tradCT || tradPK || Domain

Combined KDF Input: 99308f288ab1c346bc501eca3f8c1c64315e91686e98920a1b
97f60368ead21630604eb9718fc42386217d9d9a71a678fea6b2381f4232624f80a9b1
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d3ff01d3060b6086480186fa6b50050239


# Outputs
# ss = HMAC-SHA512(Combined KDF Input)

ss: 466c0ca23953241fddfd50a035b24ecb4e9ea66ce91ca3343b270457ecd63bf2
```

Appendix F. Test Vectors

The following test vectors are provided in a format similar to the NIST ACVP Known-Answer-Tests (KATs).

The structure is that a global cacert is provided which is used to sign each KEM certificate.

Within each test case there are the following values:

* tcId the name of the algorithm.

* ek the encapsulation public key.

* x5c the X.509 certificate of the encapsulation key, signed by the cacert.

* dk the raw decapsulation private key.

* dk_pkcs8 the decapsulation private key in a PKCS#8 object.

* c the ciphertext.

* k the derived shared secret key.

Implementers should be able to perform the following tests using the test vectors below:

1. Load the public key ek or certificate x5c and perform an encapsulation for it.

2. Load the decapsulation private key dk or dk_pkcs8 and the ciphertext c and ensure that the same shared secret key k can be derived.

Test vectors are provided for each underlying ML-KEM algorithm in isolation for the purposes of debugging.

Due to the length of the test vectors, some readers will prefer to retrieve the non-word-wrapped copy from GitHub. The reference implementation written in python that generated them is also available.

https://github.com/lamps-wg/draft-composite-kem/tree/main/src

TODO: lock this to a specific commit.

{
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Appendix G. Intellectual Property Considerations

The following IPR Disclosure relates to this draft:

https://datatracker.ietf.org/ipr/3588/

Appendix H. Contributors and Acknowledgments

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Authors' Addresses

Mike Ounsworth
Entrust Limited
2500 Solandt Road Suite 100
Ottawa, Ontario K2K 3G5
Canada
Email: mike.ounsworth@entrust.com

John Gray
Entrust Limited
2500 Solandt Road Suite 100
Ottawa, Ontario K2K 3G5
Canada
Email: john.gray@entrust.com

Massimiliano Pala
OpenCA Labs
New York City, New York,
United States of America
Email: director@openca.org

Jan Klaussner
Bundesdruckerei GmbH
Kommandantenstr. 18
10969 Berlin
Germany
Email: jan.klaussner@bdr.de

Scott Fluhrer
Cisco Systems
Email: sfluhrer@cisco.com