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| Title | **Suggested remedy for Cmt #149 of LB8** |
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| Abstract | The handover specific commands, MIS\_Prereg\_Xfer and MIS\_N2N\_Prereg\_Xfer, deliver a handover specific key derivation key. 9.2.2 in Draft IEEE 802.21m/D01 includes a key derivation method only used by the handover specific key derivation key. This contribution suggests as follows:   1. Remove the key derivation method for the handover specific key derivation key from Draft IEEE 802.21m/D01. 2. ~~Modify 5.14 of Draft IEEE 802.21.1/D01 to include the removed text.~~   Modification for Draft IEEE 802.21.1/D01 will be proposed by another contribution. |
| Purpose | Suggested remedy for Cmt #149 in LB8. |
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Problem: Texts in 9.2.2 includes a handover specific key derivation procedure.

The handover specific key derivation procedure should be a part of 21.1.

Suggested remedy:

*Change 9.2.2 in* Draft IEEE 802.21m/D01 *as follows.*

* + 1. **Key derivation and key hierarchy**

Upon a successful MIS service access authentication, the authenticator (i.e., the PoS) obtains a master session key (MSK) or a re-authentication master session key (rMSK) via EAP to generate a KeyDerivationKey shared between the MN and the PoS.

The keys derived from KeyDerivationKey include a 128 bit authentication key (MIAK) used to generate a value AUTH, the session keys determined by the ciphersuite code *c* agreed upon between the MN and the serving PoS. If no ciphersuite code is specified by the MN, the default ciphersuite code is used as specified in Table 25 in 9.2.3. The session keys used for MIS message protection consist of an encryption key (MIEK) only, an integrity key (MIIK) only, or both an encryption key (MIEK) and an integrity key (MIIK). The concatenation of MIAK, MIEK, and MIIK is called the media independent session key (MISK). The length, *L*, of the MISK is specified in 9.2.3.

For the key derivation, the following notations and parameters are used.

*K* - key derivation key. It is truncated from a master session key (MSK) or re-authentication MSK (rMSK). The length of *K* is determined by the pseudorandom function (PRF) used for key derivation. If HMAC-SHA-1 or HMAC-SHA-256 is used as a PRF, then the full MSK or rMSK is used as the key derivation key *K*. If CMAC-AES is used as a PRF, then the first 128 bits of MSK or rMSK are used as the key derivation key *K*.

*L* - The binary length of derived keying material MISK. *L* is determined by the selected ciphersuite, which is specified in 9.2.3.

*h* - The output binary length of PRF used in the key derivation. That is, *h* is the length of the block of the keying material derived by one PRF execution. Specifically, for HMAC-SHA-1, *h* = 160 bits; for HMAC-256, *h* =256 bits; for CMAC-AES, *h* = 128 bits.

*n* - The number of iterations of PRF in order to generate *L*-bits keying material.

*Nonce-T* and *Nonce-N* - The nonces exchanged during the execution of service access authentication.

*c* - The ciphersuite code is a one octet string specified for each ciphersuite. The code is defined in 9.2.3.

*v* - The length of the binary representation of the counter and the length of keying material *L*. The default value for *v* is 32.

“MISK” - 0x4D49534B, ASCII code in hex for string “MISK.”

*[a]2* - Binary representation of integer *a* with a given length.

For a given PRF, the key derivation for MISK can be described in the following procedures:

**Fixed input values:** *h* and *v*.

**Input:** *K*, *Nonce-T*, *Nonce-N*, *L*, and ciphersuite code.

**Process:**

1. *n*:=[L/h];
2. If *n* >2*v* *-1*, then indicate an error and stop.
3. Result (0) :=empty string.
4. For *i* =*1* to *n*, do
   * 1. *K(i) := PRF(K, “MISK” || [i]2 || Nonce-T || Nonce-N || c || [L]2)*.
     2. *Result(i) = Result (i-1) || K(i)*.
5. Return *Result* *(n)* and *MISK* is the leftmost *L* bits of Result *(n)*.

The *MISK* is parsed in such a way that

*MISK = MIAK || MIIK || MIEK*.

With the above procedure, a key hierarchy is derived as shown in Figure 46.



1. **Figure 46—MIS Key Hierarchy**