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Part 1AE:

Media access control (MAC) security

**AMENDMENT 2: Extended Packet
Numbering**

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Partie 1AE: Sécurité du contrôle d'accès aux supports (MAC)

AMENDEMENT 2



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IEEE Standard for
Local and metropolitan area networks—

Media Access Control (MAC) Security

Amendment 2: Extended Packet Numbering

IEEE Computer Society

Sponsored by the
LAN/MAN Standards Committee

IEEE
3 Park Avenue
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(Amendment to
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12 February 2013

**IEEE Standard for
Local and metropolitan area networks—**

Media Access Control (MAC) Security

**Amendment 2:
Extended Packet Numbering**

Sponsor

**LAN/MAN Standards Committee
of the
IEEE Computer Society**

Approved 7 February 2013

IEEE-SA Standards Board

Abstract: The optional use of Cipher Suites that make use of a 64-bit (PN) to allow more than 2^{32} MACsec protected frames to be sent with a single Secure Association Key are specified by this amendment.

Keywords: authorized port, confidentiality, data origin authenticity, IEEE 802.1AE, IEEE 802.1AEbw, integrity, LANs, local area networks, MAC Bridges, MAC security, MAC Service, MANs, metropolitan area networks, port based network access control, secure association, security, transparent bridging

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Introduction

This introduction is not part of IEEE Std 802.1AEbw-2013, IEEE Standard for Local and metropolitan area networks—Media Access Control (MAC) Security—Amendment 2: Extended Packet Numbering.

The first edition of IEEE Std 802.1AE™ was published in 2006. A first amendment, IEEE Std 802.1AEbn™-2011, added the option of using the GCM-AES-256 Cipher Suite. This second amendment adds optional Cipher Suites, GCM-AES-XPB-128 and GCM-AES-XPB-256, that allow more than 2^{32} frames to be protected with a single Secure Association Key (SAK) and so ease the timeliness requirements on key agreement protocols for very high speed (100 Gb/s plus) operation.

Relationship between IEEE Std 802.1AE and other IEEE Std 802 standards

IEEE Std 802.1X™-2010 specifies Port-based Network Access Control, and provides a means of authenticating and authorizing devices attached to a LAN, and includes the MACsec Key Agreement protocol (MKA) necessary to make use of IEEE 802.1AE.

This standard is not intended for use with IEEE Std 802.11™ Wireless LAN Medium Access Control. An amendment to that standard, IEEE Std 802.11i™-2004, also makes use of IEEE Std 802.1X™, thus facilitating the use of a common authentication and authorization framework for LAN media to which this standard applies and for Wireless LANs.

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3. Definitions

Change the definition of packet number as follows:

3.27 packet number (PN): A monotonically increasing value ~~used to uniquely identify a MACsec frame in the sequence of frames transmitted using an SA~~ that is guaranteed unique for each MACsec frame transmitted using a given SAK.

Insert the following definition, in the appropriate collating order:

3.xx Short Secure Channel Identifier (SSCI): A 32-bit value, managed by the key agreement protocol, that is unique for each SCI within the context of all SecYs using a given SAK.

4. Abbreviations and acronyms

Insert the following abbreviation(s), in the appropriate collating sequence:

MKA MACsec Key Agreement protocol

SSCI Short SCI

7. Principles of secure network operation

Change the note that appears in 7.1 as follows:

NOTE—An SC can be required to last for many years without interruption, since interrupting the MAC Service can cause client protocols to re-initialize and recalculate aggregations, spanning trees, and routes (for example). An SC lasts through a succession of SAs, each using a new SAK, to defend against a successful attack on a key while it is still in use. In contrast it is desirable to use a new SAK at periodic intervals to defend against a successful attack on a key while it is still in use. In addition, the MACsec protocol (Clause 8 and Clause 9) only allows ~~a limited number of $2^{32}-1$~~ frames to be protected with a single key unless a Cipher Suite that supports extended packet numbering is used. Since 2^{32} minimum-sized IEEE 802.3 frames can be sent in approximately 5 min at 10 Gb/s, this can force the use of a new SA.

7.1.2 Secure Channel (SC)

Change the first paragraph of 7.1.2 as follows:

Each SecY transmits frames conveying secure MAC Service requests on a single SC. Each SC provides unidirectional point-to-multipoint communication, and it can be long lived, persisting through SAK changes. Each SC is identified by a Secure Channel Identifier (SCI) comprising a uniquely allocated 48-bit MAC address concatenated with a 16-bit port number.