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Abstract	
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TEK Transfer in Relay Systems

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Introduction

This contribution describes necessity of decrypting MAC-PDUs at RS and proposes to transfer TEK to RS.

In the current 16e systems, Security Association would be established between (MR-)BS and MS. So, MR-BS and MS shares security keys, such as AK and TEK. In the same manner, it would be expected to establish SA and share security keys between MR-BS and RS in relay systems. However lack of MS's TEK knowledge at RS might cause several problems, especially in distributed scheduling model.

(1) Subheaders

According to the current standards, subheaders are encrypted as a part of payload of MAC-PDU (see 6.3.2 and 6.3.3.6 in [1]). Therefore, when a relay station adds or alters the information in a subheader or derives information from a subheader, it needs to encrypt or decrypt the MAC-PDU.

An example of deriving information from subheader is "piggybacked bandwidth request". In distributed scheduling relay system, RS allocates bandwidth on its access link. So, the RS needs to know all BW request information. So, RS needs to decrypt MAC-PDU (if encrypted) and get bandwidth request information from the Grant Management subheader.

An example of adding a subheader is RS sending Fast Feedback Allocation subheader to MS in distributed scheduling systems.

(2) Fragment/Packing

In distributed scheduling systems, fragmentation and/or packing at RS would be necessary in order to accommodate difference of link performance between access and relay-link and improve efficiency in bandwidth usage.

In order to fragment a MAC-PDU or pack multiple SDUs into a single MAC-PDU, RS needs to decrypt and encrypt those PDUs and insert/alter any associated subheaders.

In order to enable RS to encrypt and/or decrypt MAC-PDUs, it is necessary for RS to have the TEKs shared by MR-BS and MS. Therefore, when MR-BS sends PKMv2 Key_Reply message to MS in response to PKMv2 Key_Request message, it sends a duplicate PKMv2 Key_Reply message, which is protected HMAC/CMAC calculated with a key derived from the RS AK, to RS. The duplicate PKMv2 Key _Reply message contains MS's basic CID in addition to the same TEK parameters in PKMv2 Key_Reply, but those parameters are encrypted with the KEK shared between MR-BS and RS.

Specific Text Changes

[To be added]

References

[1] IEEE802.16-2004

[2] IEEE802.16e-2005