Message Encryption and MS Identity Privacy in 802.16m

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Venue:

Re: Security: MAC; in response to the TGm Call for Contributions and Comments 802.16m-08/033 for Session 57

Base Contribution:

This is the base contribution.

Purpose:

To be discussed and adopted by TGm for the 802.16m SDD

Notice:

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Release:

Patent Policy:

Motivation (1)

- In 802.16e, MAC management messages are sent over the air interface with clear text.
- HMAC or CMAC is applied to MAC management message to provide message authentication, but no encryption is used.
- An intruder can obtain the information carried in the MAC management message sent from/to other MSs by simply listening to the air interface and issue security attack.
  - Example 1: By listening to RNG-REQ/RSP messages, an intruder can obtain MS's MAC address, station identifier and mapping between them.
  - Example 2: By listening to DSA-REQ/RSP messages, the intruder can obtain what type of application an MS is running and their correspondent IP address and port number.
- Using the current 16e approach, the following 16m requirement cannot be reached.
  - "Confidentiality of user-related data (e.g., location privacy, user identity)"

Motivation (2)

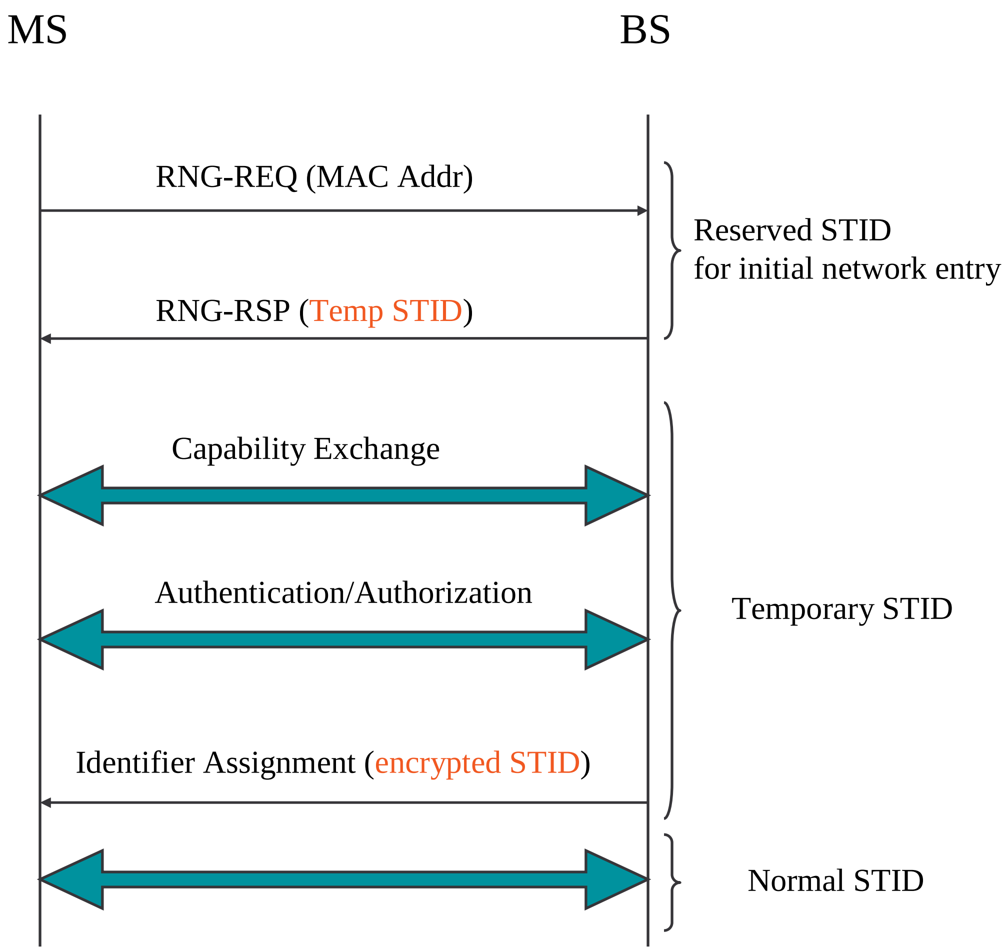
- Sending MAC address over the air is not an issue and cannot be completely avoided.
  - MAC address is needed for BS to obtain MS related information from other network entities.
  - MAC address is used by BS to generate various security keys.
  - Certificate which contains MAC address is sent over the air in clear text.
- Revealing the mapping between MAC address and Station ID is the real problem to be solved.
  - By monitoring the ranging procedures, an intruder can obtain the mapping between MAC address and Station ID, based on which perform specific attack to that specific user.

Proposed Solution – Encryption of MAC Management Messages

- MAC management messages that carry user-related data are encrypted.
- Special flow identifiers can be used to carry MAC management messages that are encrypted.
- The key used for encryption/decryption could be the same as TEK in 16e or a different key (FFS).

Proposed Solution - Temporary Station Identifier

- Temporary Station Identifier (STID) is assigned during initial ranging process.
- After being assigned, it is used for the subsequent network entry procedures until the normal STID is allocated.
- Normal STID is assigned during/after authentication process, and the assignment message shall be encrypted.
- The temporary STID is then released and normal STID is used for all the remaining transactions.



Proposed SDD Text

Section 10.12: Security

- MAC management messages that carry user-related data are encrypted. Different management connections are used to carry encrypted and non-encrypted MAC management messages.

Section 10.x: Network Entry

- Two types of station identifiers are assigned to MS during network entry process and one of them will be used for the certain time period.
- A temporary station identifier is assigned during initial ranging process, and is used during the subsequent network entry procedures until the normal station identifier is allocated.
- The normal station identifier is assigned during authentication process, and the assignment message is encrypted.
- The temporary station identifier is released after normal station identifier is assigned, and the normal station identifier is used for all the remaining transactions.