MBS (Multimedia Multicast/Broadcast Service) Security Framework proposal

Document Number: **IEEE C802.16e-04/63**
Date Submitted: 2004-05-07
Source:

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Venue:
[Cite the specific meeting and any known agenda details.]
Base Document:**?**
Purpose:
Proposing MBS (Multimedia Multicast/Broadcast Service) Security Framework proposal

802.16e MBS (Multimedia Broadcast Service) Security Framework Proposal

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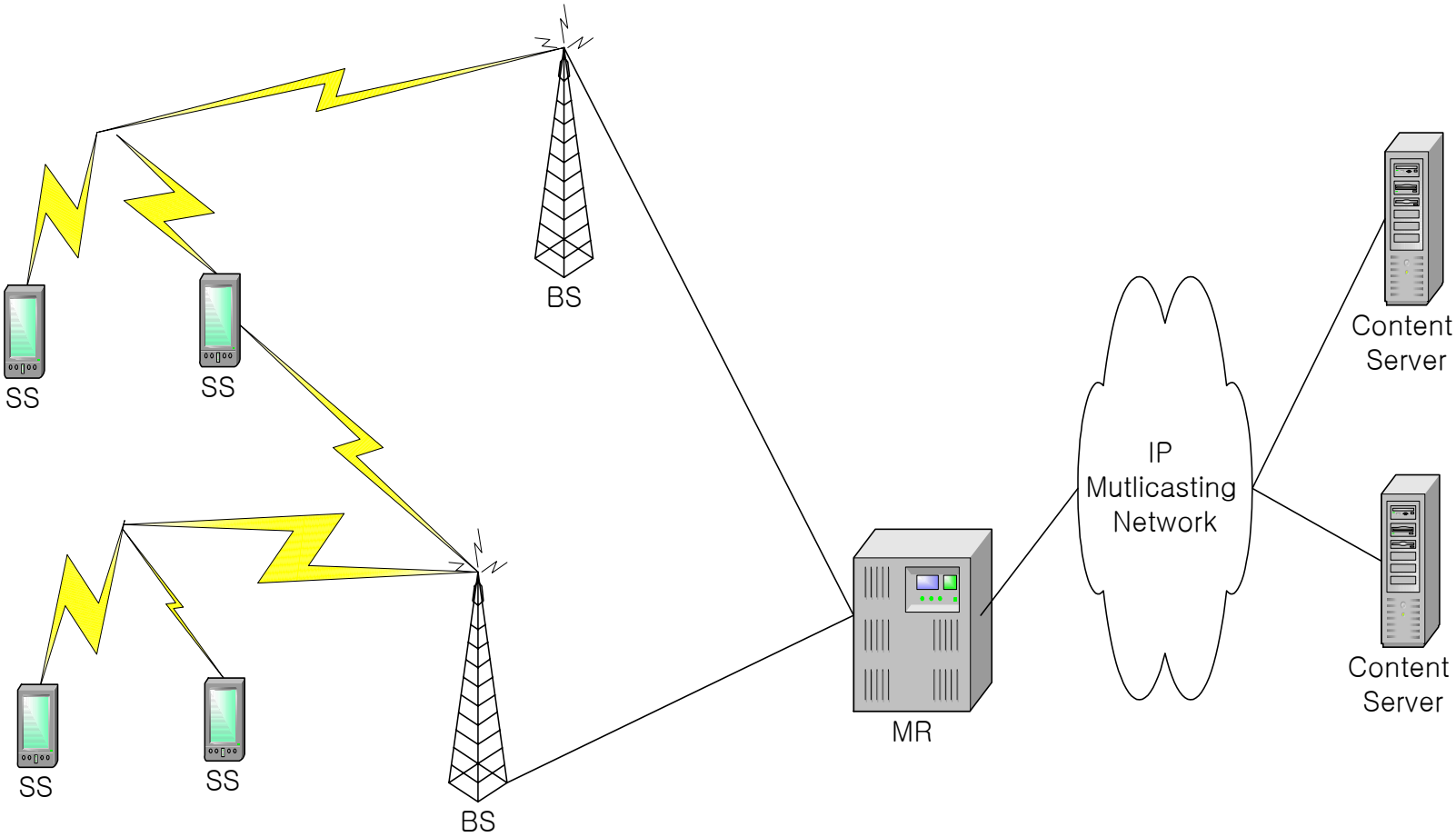
MBS Architecture Overview



MBS Security Overview

- Shall support either Link Layer Encryption and Application Layer Encryption (Support of Application Layer Encryption is outside scope of 802.16e and *only Link Layer Encryption shall be defined*)
- MBS Security shall not use PKM messages for key delivery and key management
- SS shall obtain MBS Encryption keying materials and optionally obtain MIK materials for message integrity check from MBS Content server
- Shall support high speed Link Layer Encryption for Access Control
- May support Null Message Authentication and 32/64/80bits message authentication

MBS Key Management

- PKM is not optimized for MBS because of the following reasons:
  - Service Authorization is only possible through MBS content server, since BS is agonistic to Application Service Information such as MBS contents
  - Key Materials and Key Management for MBS will be unique for each MBS Channel, which is service provider dependent
  - Idle Mode SS will not have valid SA and Key materials
  - Exiting TEK cannot support Macro diversity among multiple AP because of TEK boundary in current specification is limited to BS

Cont.

- MBS Traffic Encryption Key Management
  - 128 bits MAK (MBS Authorization Key) shall be used for both Link layer and Application layer encryption
  - MAK shall be delivered to SS with MBS session information, upon successful Service Authorization from MBS content server
  - Delivery of MAK to BS from Content Server for Link Layer Encryption is outside of this standard (ex. SAP (Session Announcement Protocol)
  - BS shall broadcast MBS cipher suites, mapping between MBS_ID and MBS CID over MBS Configuration messages

Cont.

- MAK Keying Materials
  - MAK
  - MAK ID
  - MAK Sequence Number
  - MAK Lifetime

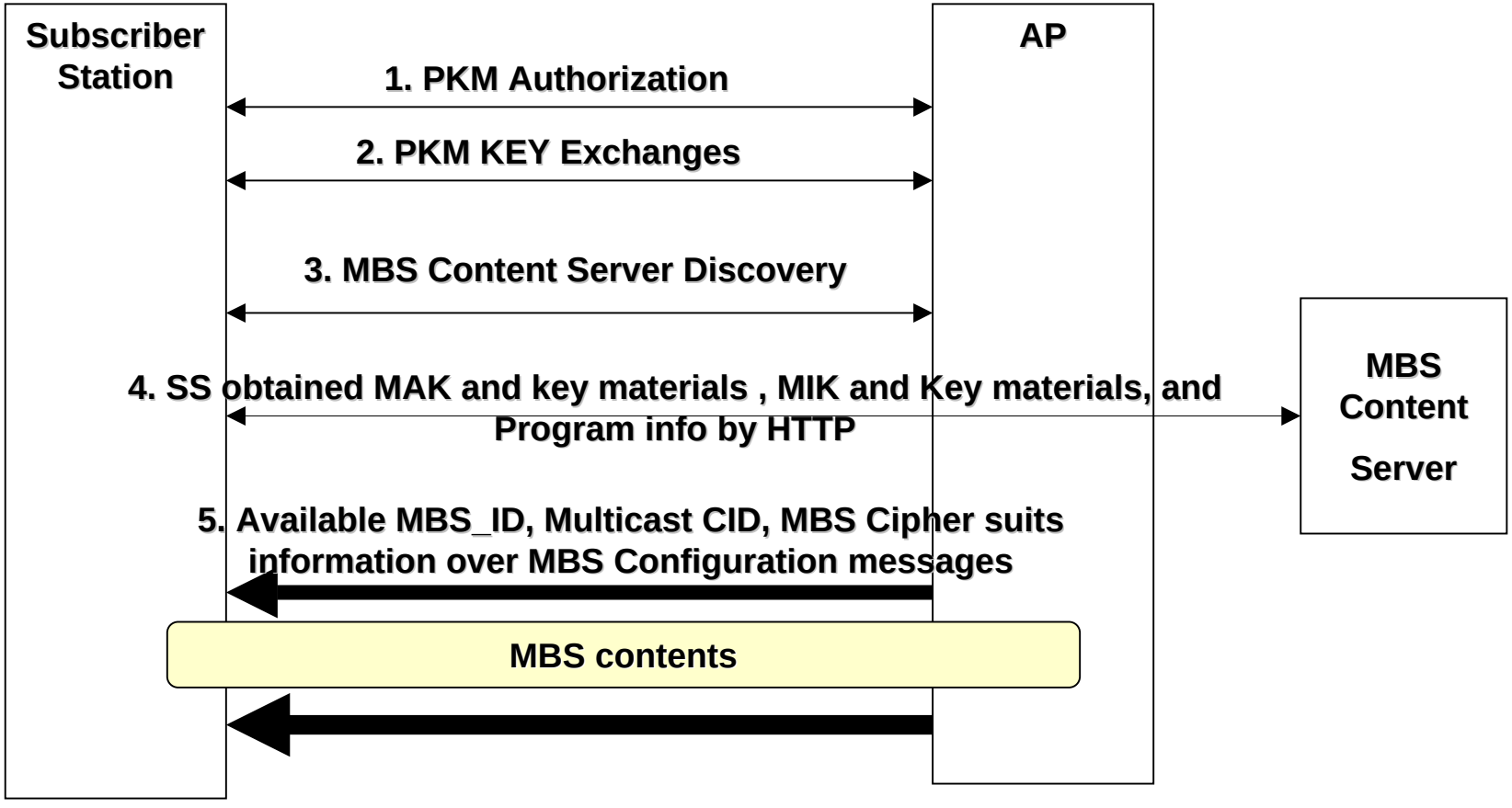
Cont.

- MBS Traffic Message Integrity Check Key Management
  - 160 bits MIK (MBS Message Integrity Key) shall be given to SS by one of the following method:
    - Derived from MAK by SHA-1 algorithm
    - Delivered to SS with MAK from MBS Content Server

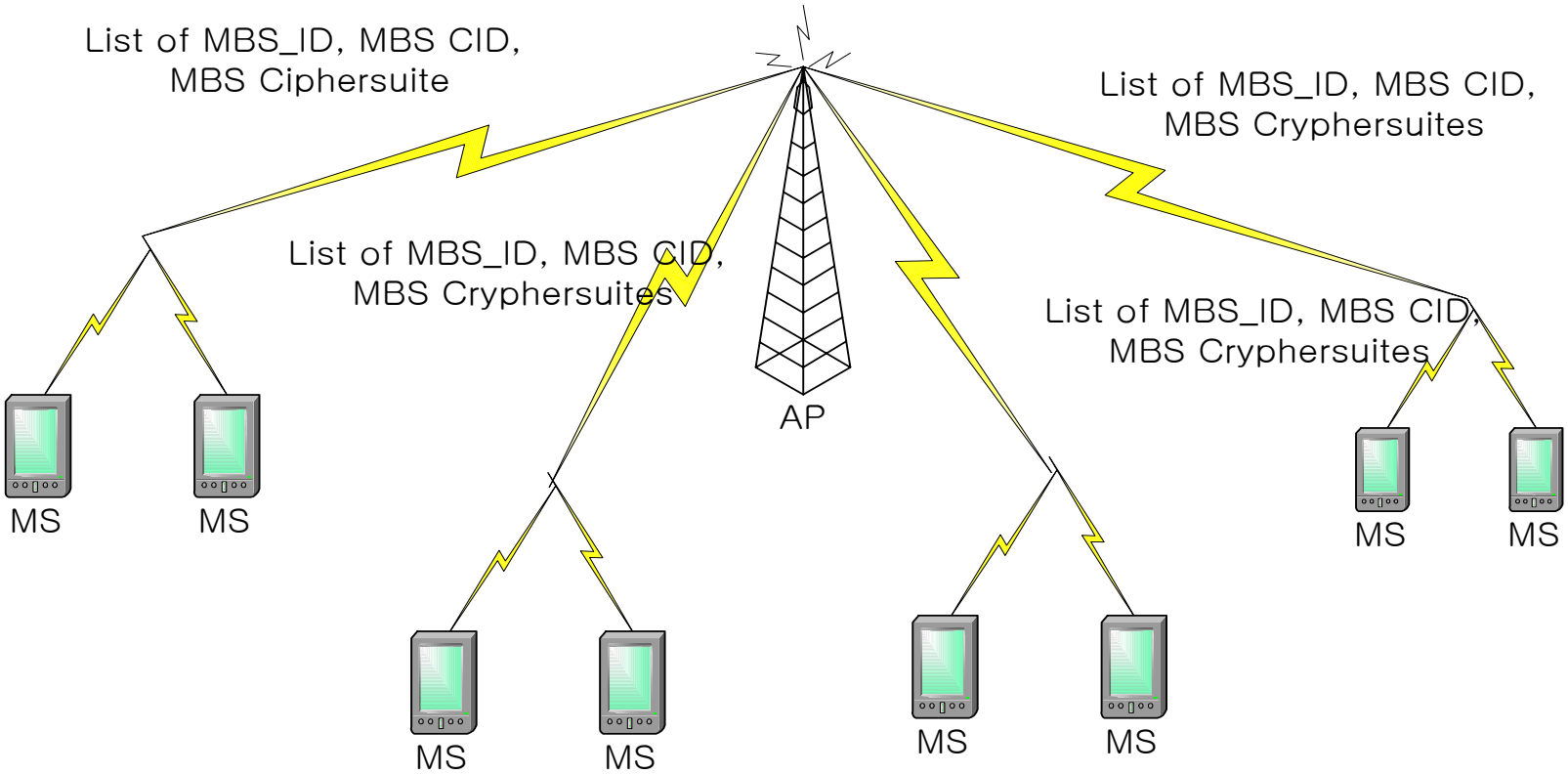
MBS Ciphersuits

- MBS ID and MBS CID
- Support of Link Layer Encryption or Application Layer Encryption
- Support of MBS Message Integrity support (Null Authentication, 32/64/80/bits Authentication)
- Encryption Algorithm, default value is AES Counter mode
- MAC Algorithm, default value is HMAC-SHA1
- MAK_ID and MAK Sequence Number
- Size of Nonce 32/64/128bits

MAK Distribution Call flow



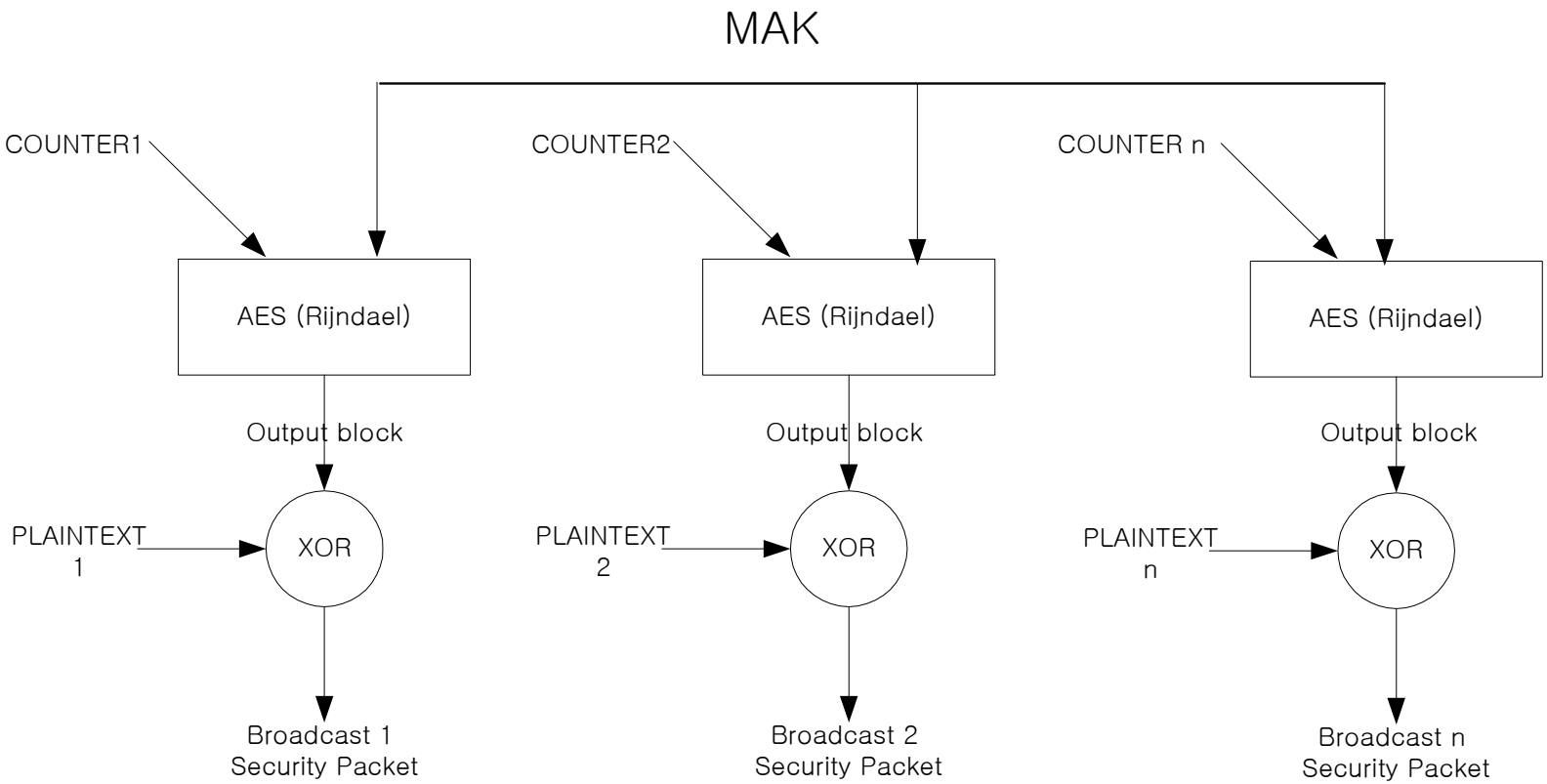
MBS Configuration Messages



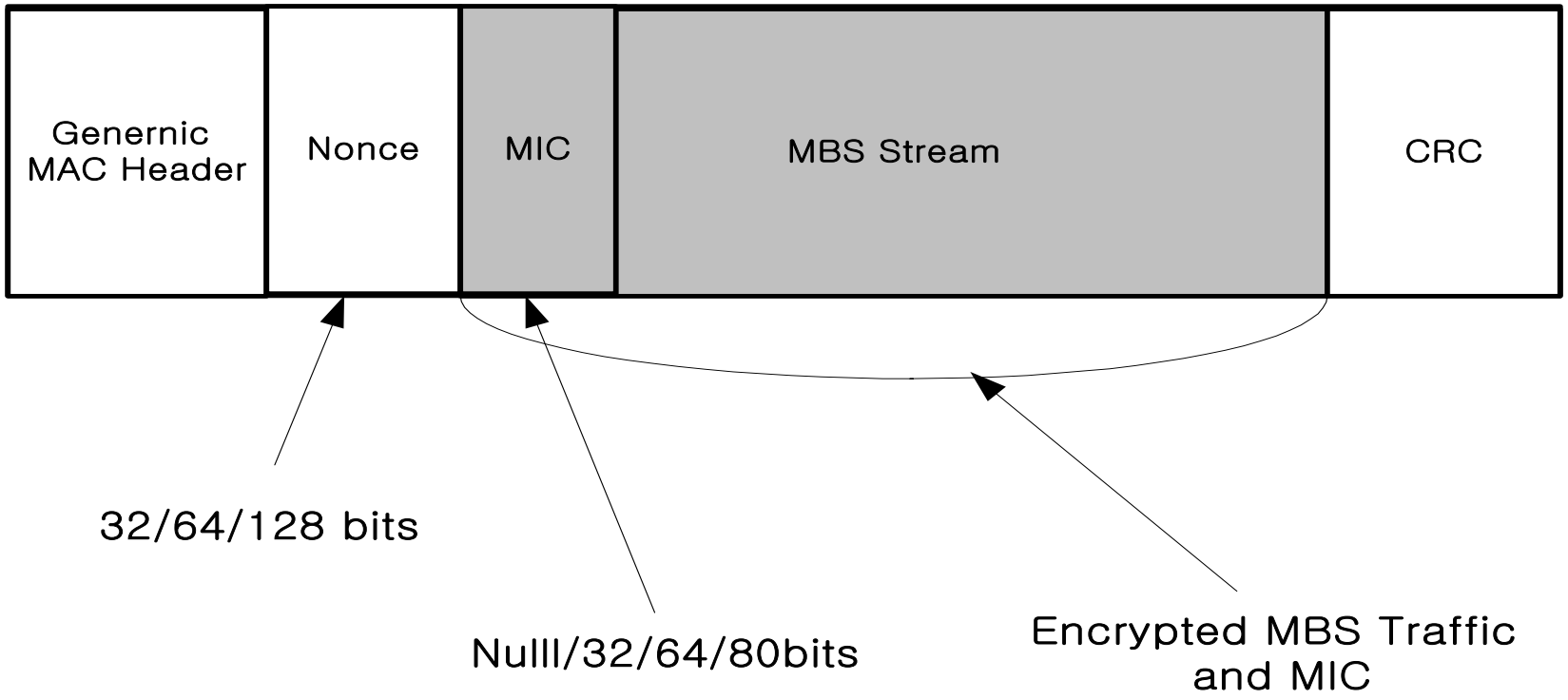
MBS Link Layer Encryption

- Based on 128bits key and block size AES Encryption algorithm
- Federal standard based algorithm, CTR mode defined in NIST Special Publication 800-38A is recommended because of high speed data encryption
- Traffic Inband Nonce support

CTR mode Encryption



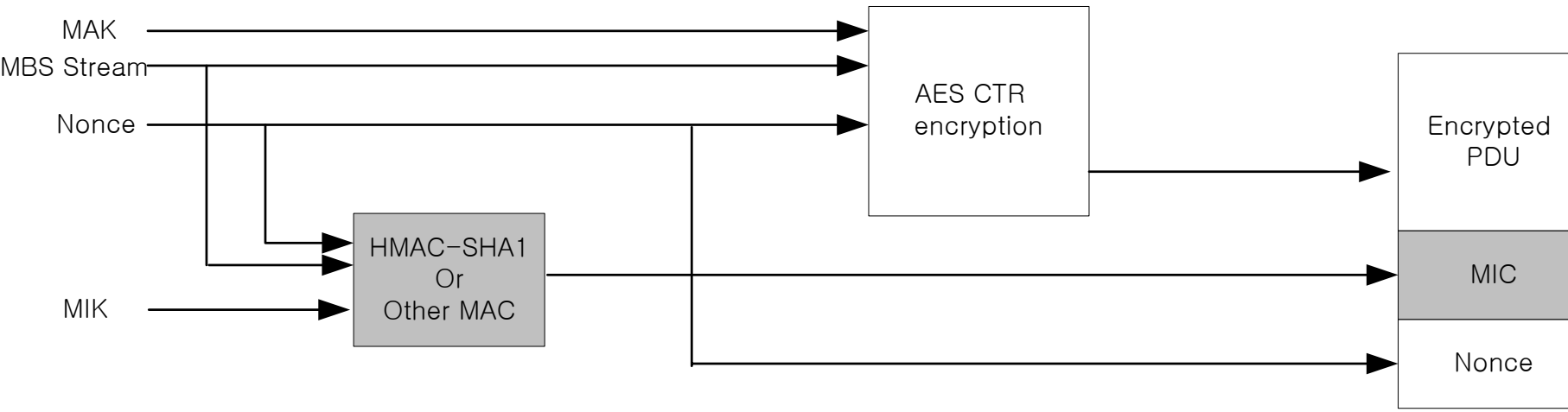
PDU Payload


Generic MAC Header
Nonce
MIC
MBS Stream
CRC
32/64/128 bits
Nulll/32/64/80bits
Encrypted MBS Traffic and MIC

MBS Message Integrity Check (MIC)

- HMAC-SHA1 shall be the default message authentication code.
- The default session authentication key is 160bits
- MIC length is variable to null/32/64/80bits
- Secure HASH over Nonce, MBS traffic
- Encrypted MAC support

MBS AES CTR with HMAC-SHA1 MAC Encapsulation Block Diagram



Risk Evaluation of Null Authentication

- It is unlikely that an adversary can broadcast forged MBS traffic stream with same physical, MAC, Transport, Applications information (Encoding scheme and session information)
- It is unlikely that an adversary can modify MBS traffic stream so that SS decrypts to an intelligible value
- Bandwidth saving is imperative in Wireless environment (With nonce 160bits and MIC 80bits, will have 26 bytes overhead)