

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Low latency MSDU aggregation]

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Source: [Zhou Lan, Chang-woo Pyo, Fumihide Kojima, Hiroyuki Nakase, Shuzo Kato, Gal Basson⁽²⁾]

Company [National Institute of Information and Communications Technology (NICT), Wilocity⁽²⁾]

Address¹[3-4 Hikari-no-oka, Yokosuka-shi, Kanagawa 239-0847, Japan]

Voice¹: [], FAX¹: []

E-Mail:[lan@nict.go.jp, other contributors are listed in “Contributors” slides]

Re: [In response to TG3c comments (IEEE P802.15-08-0020-09-003c)]

Abstract: [Comment resolutions]

Purpose: [To be considered in TG3C baseline document.]

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Comment # 43, 44, 47

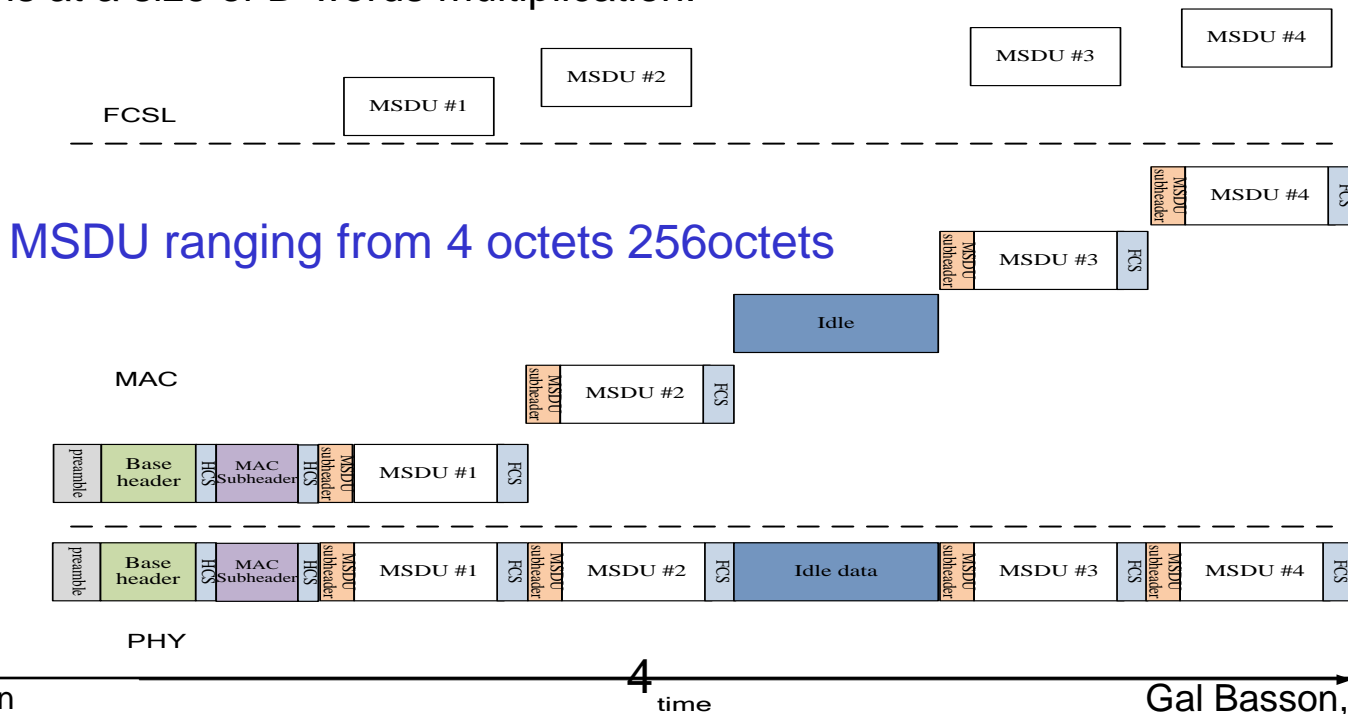
- Comment #43
 - Enable MSDU aggregation
- Comment#44
 - Enable Block Ack to be aggregated with data
- Comment #47
 - Enable CTA to be bi-directional (meaning interchanging transmissions between 2 DEV at the same CTA)
- Response
 - The necessary information is provided in the following presentation

Summary

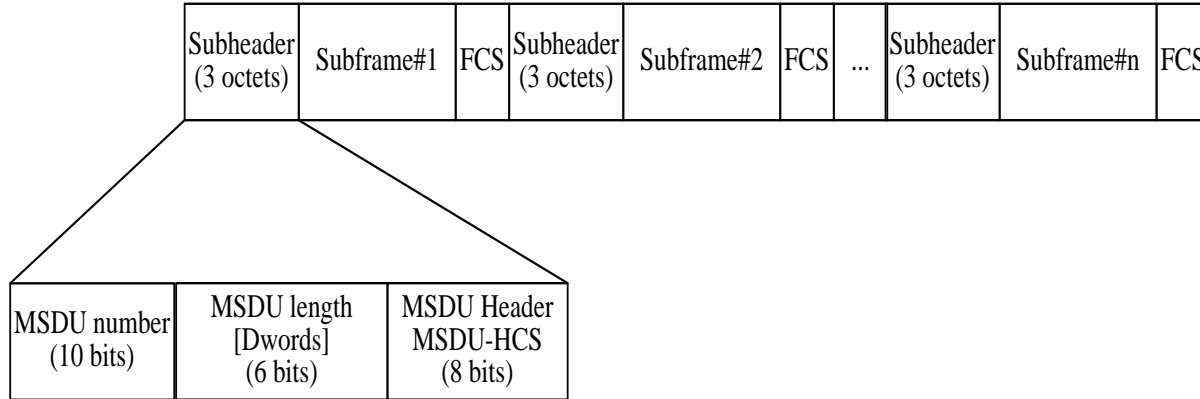
- To support application which requires low latency bi-directional communication such as USB, PCI express, USB, eSATA or wireless docking, a low latency A-MSDU aggregation method is proposed.
 - System requirement 15-05-0353-08-003c-draft-tg3c-system-requirements
 - A-MSDU aggregation
 - Use of Bi-Directional CTA (using the CTA relinquish bit)
 - Frame format
 - One bit in the PHY header to indicate the Bi-Directional low latency mode
 - Adding BA field in the MAC subheader
- The aggregation procedure can be easily accommodated in the current SC proposal with only 1 extra bit indication in PHY header

Low latency MSDU aggregation

- It is assumed that MSDU (4octets ~256octets) containing data which comes from upper layer, usually in a burst distribution.
- MAC, upon receiving a MSDU, attaches each MSDU a subheader and FCS, directly sent them out without waiting for the following MSDUs to be aggregated
- When the coming MSDU didn't arrive on time, idle data can be transmitted to fill the gap between real MSDUs (zeros as example)
 - Idle is at a size of D-words multiplication.



A-MSDU Header Definition

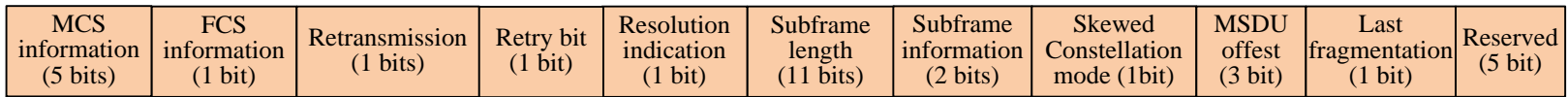


- MSDU sequence Number – 10 bits
- MSDU Length – Length in DWords Units [6 bits]
- MSDU-HCS- MSDU header checksum [8 bits]
 - Idles can be inserted as zero transmission is between MSDUs
 - Header will be identified by searching a pattern which corresponds to the MSDU-HCS
 - In the case of MSDU header HCS error, a new header can be identified

Low latency AMSDU aggregation frame format

- 2 different frame formats one for standard mode the other for low latency mode
 - Subheaders are encapsulated in between subframes (low latency mode)
 - Subframe length ranges from 4 octets to 256 octets (low latency mode)
 - Maximum number of aggregated MSDUs is **256**
 - Idles are transmitted in between MSDUs
 - MSDU header is identified using the MSDU header

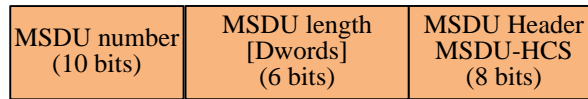
Standard aggregation mode



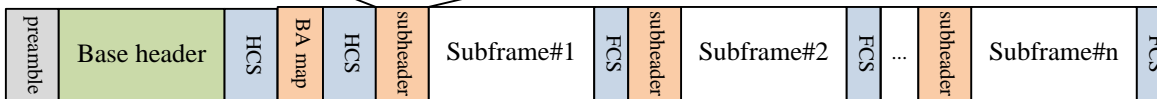
1 octet to 1Moctets

Up to 8 subframe

1 bit in Base header to indicate using Bi Directional low latency mode



Low latency mode

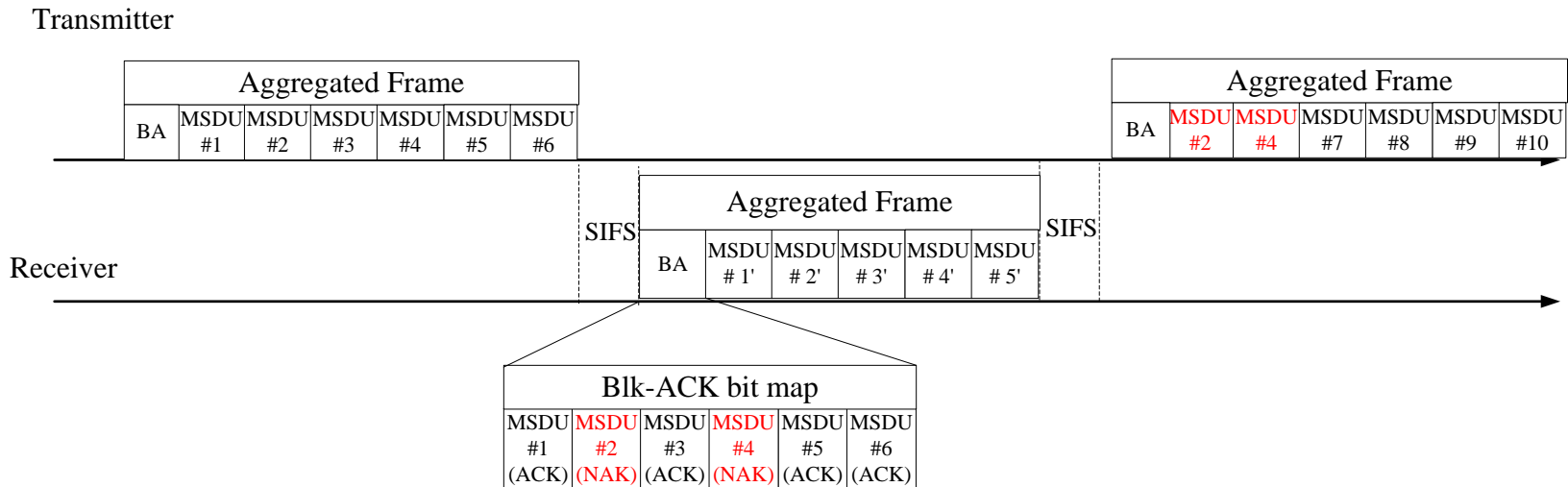


4 octet to 256 octets

Up to 256 MSDUs

Comment# 44 -Bi-directional data transmission

- When the Bi-directional low latency mode is set
 - Will be block ack
- Block ACK
 - Will be part of the MAC subheader
 - Each bit represent individual MSDU number



Frame format for Bi Directional Low Latency mode

- PHY Header addition
 - Low latency mode bit – when set:
 - the MAC subheader will be transmitted using the same MCS as the data
 - When set to 0
 - Standard aggregation mode
- Use CTA relinquish bit (MAC Header) to handover the control to the Destination device, and visa versa

