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Submission Title: TLV Format Signalling

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Re: 802.15.4 Maintenance Standing Committee

Abstract: This contribution proposes some options for signalling TLV IE format in 15.4 frames.

Purpose: To suggest possible mechanisms for signalling TLV structure IE format

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Possible Mechanisms to Signal TLV Format

TLV Team

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Summary

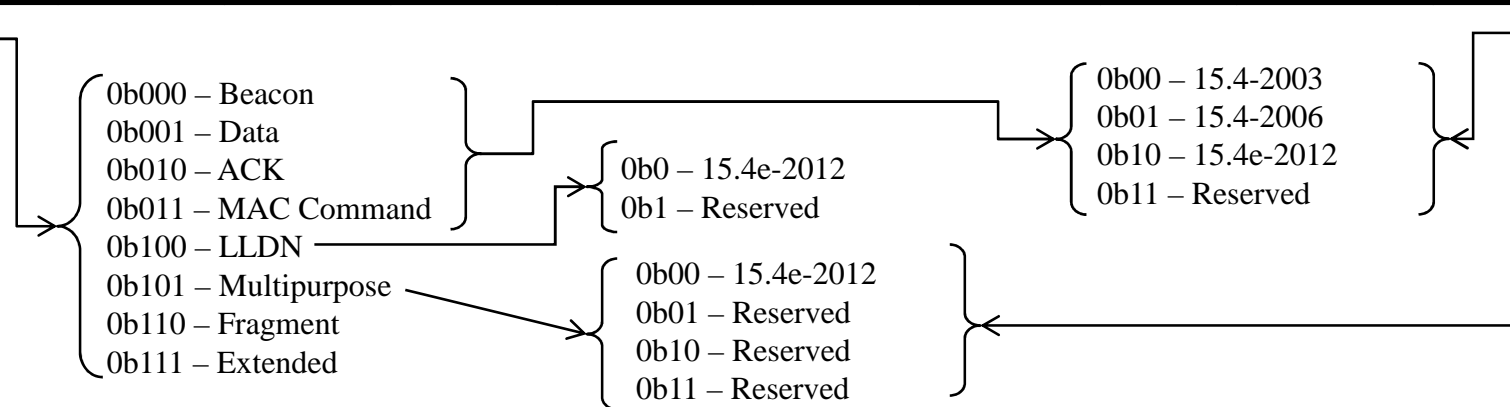
- Hawaii SC-Main meeting formed 3 teams to:
 - Suggest possible mechanisms for Frame ID extension
 - Suggest management method for 15.4 resource identifiers
 - Suggest possible mechanisms for differentiating between LTV and TLV format
- SC-M discussions had proposed:
 - Future Frame IDs use TLV format
 - But would lose compatibility with IE format defined for current versions of 15.4
 - Future Frame Version use TLV format
 - Allows updating IE format in ALL frame types
 - But only one Version number remains for 15.4-2011 frame types
- This submission proposes possible solutions to future 15.4 IE format
 - Goal is to bring 15.4 IE format in line with other standards
 - Possible side effect is to address limited version number space

15.4 Frame Format

- 15.4 Frame Format
 - Frame Control (16-bits)
 - Addressing
 - IEs
- Frame Control
 - Version number
 - 1 Reserved bit
 - Can't be used to signal version number as may/should be ignored on reception
 - All other bits used
- Frame Version
 - 0b10 Version 15.4-2011 frames may carry IEs
 - 0b00 Version 15.4e Multipurpose frames may carry IEs

Existing 15.4e Frame Control Field Format

Bits: 0-2	3	4	5	6	7	8	9	10-11	12-13	14-15
Frame ID	Security Enabled	Frame Pending	Ack Request	PAN ID Compression	Reserved	Sequence Number Suppression	IEs Present	Destination Addressing Mode	Version	Source Addressing Mode



Note: there is a precedent (see Table 4 15.4-2011) of using Frame Version & Security Enabled combinations to invalidate earlier frames

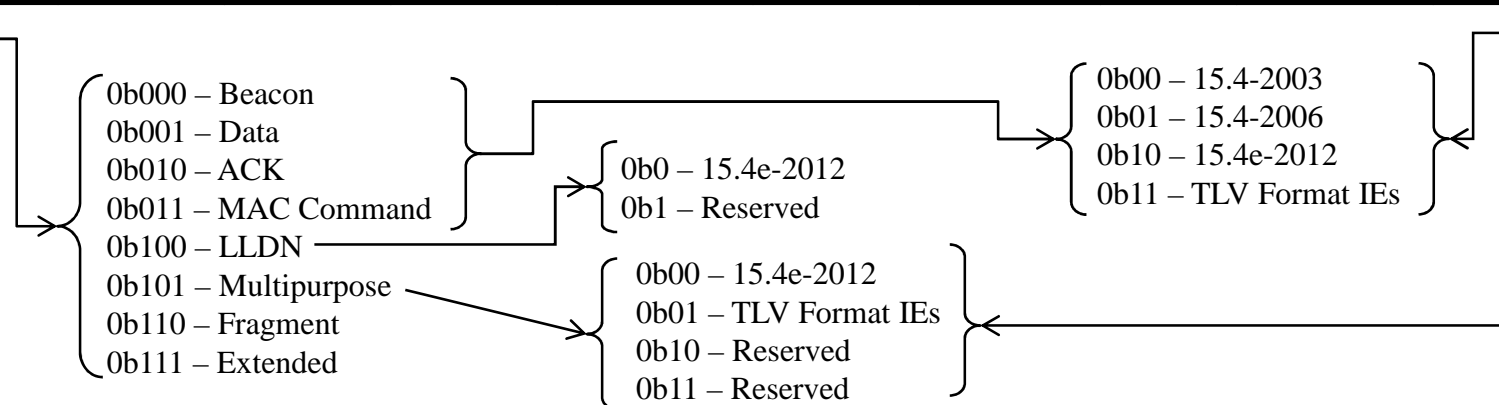
Options

1. Update IE Format using Version Number
 - Uses last version value for 15.4-2011 frames
 - Defines Multipurpose frame version 0b01
 - ALL future functionality via
 - **New IEs**
 - **Updated Multipurpose frames**
 - **Extended Frame ID values**

2. Define new Frame Control Field format for Version = 0b11
 - Provide expanded Version number space

TLV Options - #1 Version Number Field

Bits: 0-2	3	4	5	6	7	8	9	10-11	12-13	14-15
Frame ID	Security Enabled	Frame Pending	Ack Request	PAN ID Compression	Reserved	Sequence Number Suppression	IEs Present	Destination Addressing Mode	Version	Source Addressing Mode



Note:

- There is no future Version space available for 15.4-2011 frame types.
 - Future enhancements MUST be via IEs or new Frame IDs
- Use Version 0b01 Multipurpose frame
 - No IEs in 1-octet Frame Control Multipurpose frame
- LLDN does not use IEs, has a 1-bit Version field which is set to 0b0 for 15.4e-2012
- There is no Version field in Fragment frames

TLV Options - #2 New Frame Control Format

Bits: 0-2	3-11	12-13	14-15
Frame ID	Define new Frame Control format for Version 0b11 15.4-2011 frames (Beacon, Data, Ack, MAC Command) IEs are TLV Format	Version = 0b11	New Frame Control Format

0b000 – Beacon
 0b001 – Data
 0b010 – ACK
 0b011 – MAC Command
 0b100 – LLDN
 0b101 – Multipurpose
 0b110 – Fragment
 0b111 – Extended

- Allows extended Version Field definition
- Allows other updates to control field format

Recommended Action

- Option #1
 - For TLV IE Descriptor format use
 - Version 0b11 for 15.4-2011 frames
 - Version 0b01 for Multipurpose frame
 - For LTV IE Descriptor format use:
 - Version 0b10 for 15.4-2011 frames
 - Version 0b00 for Multipurpose frame

- Find use for Reserved bit or it will be wasted.