IEEE 802.1AS REV D5.0 Review Comments

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Motivation/Background

- **IEEE 802.1AS REV project includes use of IEEE 802.11-2016 Fine Timing Measurement as an additional 802.11 protocol to generate timestamps that 802.1AS would use for clock synchronization**

- **IEEE 802.1AS REV project includes use of IEEE 802.11ak General Links for interfacing 802.11 MAC SAP to IEEE 802.1AC**

- **802.1AS Rev D5.0 WG Ballot is currently open and closes July 13th, 2017.**

Summary of comments

	Type	Count	
1	Editorial	4	
2	Technical	2	Needs discussion with ARC
		8	Needs discussion with 802.1AS
		1	Needs discussion with 802.11md amd 802.11az

Comments that need discussion with 802.11 ARC

- **802.11 MAC interfacing with ISS without support for 802.11ak**

- **Figures 7.8 and 8.2 in IEEE 802.1AS D5.0**

- **Open Issues:**
  - Should 802.1AS over 802.11 require 802.11ak?
  - If 802.11ak is required how would current implementations of 802.11 and 802.1AS-2011 be addressed?

Comments that requires discussion in 802.11md and/or 802.11az

- **What is the "disconnect" between IEEE 802.11-2016 and IEEE 802.1AS REV D5.0?**
  - IEEE 802.1AS D5.0
    - Use FTM with the following parameters
      - ASAP=1
      - Single Burst (Burst Exponent = 0)
      - FTMs per Burst – infinite number of FTMs (not explicit in D5.0)
  - IEEE 802.11-2016 Fine Timing Measurement
   - Does not have a mechanism to indicate "infinite" for FTMs per Burst

Requirements

- **Simple Change**
- **Must not break existing IEEE 802.11-2016 implementations of Fine Timing Measurement**

Proposed Solution-A

- **Amend 802.1AS REV D5.0 to use multiple burst instead of single burst**

- **Issues**

  - Still does not allow for "infinite" number of FTM frames to be sent; as the maximum number of bursts is limited to 2^{15}

  - May cause discontinuity in the flow of time information from the top of the network to the leaf

    - This is because all burst excepting the first one needs to be started with a FTM Request frame from the Slave to the Master

Recap of Multiburst FTM Session
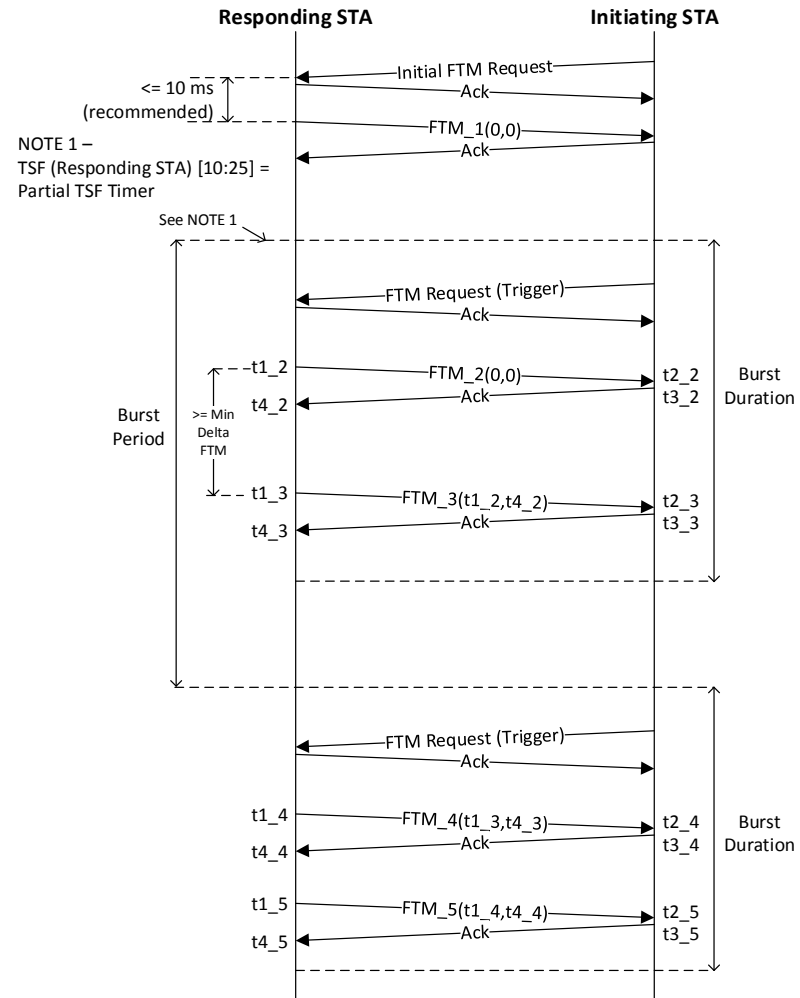
Fine Timing Measurement Parameters Element

	Category	Public Action	Trigger	LCI Measurement Request (optional)	Location Civic Measurement Request (optional)	Fine Timing Measurement Parameters (Mandatory)
Octets	1	1	1	variable	variable	11
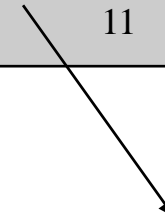
	Status Indication	Value	Reserved	Number of Bursts Exponent	Burst Duration	Min Delta FTM	Partial TSF Timer
Bits	2	5	1	4	4	8	16
	Partial TSF Timer No Preference	ASAP Capable	ASAP	FTMs per Burst	Reserved	Format and Bandwidth	Burst Period
bits	1	1	1	5	2	6	16

Burst Duration Field

Value	Represents
0-1	Reserved
2	250 us
3	500 us
4	1 ms
5	2 ms
6	4 ms
7	8 ,ms
8	16 ms
9	32 ms
10	64 ms
11	128 ms
12-14	Reserved
15	No Preference

Initiator: Burst Duration field set to 15 (no preference) and FTMs per Burst set to 0 (no preference)

Responder: Burst Duration field set to 12 (forever) and FTMs per Burst set to 0 (infinite)

12	forever
13-14	Reserved

Proposed Solution-B

- **Amend IEEE 802.11-2016 to allow for a new choice for the number of FTMs per Burst**
  - Use one of the reserved values from the possible values for Burst Duration (values 12-14 are reserved in IEEE 802.11-2016)
  - Initiator sets FTMs per burst to 0 (indicating no preference) and sets Burst Exponent to 0 (Single Burst)
  - Responder sets Burst Duration to 12 (indicating "Forever") and sets Burst Exponent to 0 (Single Burst)
  - Responder sets FTMs per Burst to 0 (currently disallowed in IEEE 802.11-2016) indicating "infinite" FTMs (new behavior)

Proposal-C

- **Open to other suggestions**

Comments to discuss with 802.1AS

- **Mandatory and optional support for Timing Measurement and Fine Timing Measurement protocols in Bridges and end-points**
  - Timing Measurement should be mandated to ensure interoperability
- **Some sub-sections of 802.1AS REV D5.0 need to be updated to address support for Fine Timing Measurement**
- **Determination of asCapable**
- **Fallback to Timing Measurement if FTM negotiation fails**