

The use of 802.11 Timing Measurement by p802.1ASbt / p802.1AS-Rev PLUS What is asCapable for 802.11 ports

Rev2

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Questions

- What is *Fine* Timing Measurement?
- When should a dot11 port assert asCapable?

The new dot11 Fine Timing Measurement

- **IEEE Std. 802.1AS™-2011 specifies the use of Timing Measurement**
 - Which is published in IEEE Std. 802.11™-2012
 - “ A STA that supports the timing measurement procedure may transmit Timing Measurement frames addressed to a peer STA that also supports the timing measurement procedure. One higher-layer protocol for synchronizing a local clock time between STAs using this feature is specified in IEEE Std 802.1AS. ”
- **P802.11REV-mc adds Fine Timing Measurement**
 - It's nearly the same as Timing Measurement
 - Increased timestamp resolution (10ns→100ps)
 - Public Action Frame → Private Action Frame
 - Other changes expected
 - Expected to be published in late 2015
- **A change to P802.1ASbt is not recommended at this time**
 - In other words, stay with 802.11-2012 Timing Measurement

Determination of asCapable for dot11 links

“The per-port global variable asCapable shall be set to FALSE if the *timing measurement* bit ... indicates that the peer IEEE 802.11 station is incapable of participating in the timing measurement protocol. Otherwise, asCapable may be set to TRUE.”

This was intentionally ambiguous, to reflect special needs of battery-powered wireless devices

There are multiple approaches for a mobile device to advertise its need for precision time:

- Use an existing SIGNALING message
 - Redefine the default TimeSyncInterval as 127 (stop)
 - A subsequent SIGNALING message then set the TimeSyncInterval to something else, e.g. -3 or 1/8s
- TimingMeasurementReq Frame

This deserves further discussion and involvement of other experts

BACKUP

The following are from:

<http://www.ieee802.org/1/files/public/docs2013/ASbt-kbstanton-TimingMeasurements-status-1113-v01.pptx>

Residence Time of a Station-Bridge

- **P802.11ak introduces WLAN Stations that Bridge**
- **Residence Time of a WLAN Station-Bridge is large**
 - FOLLOWUP information for message n sent in message $n+1$
 - With fixed Sync Interval, Residence Time \geq sync interval
- **Implications to P802.1ASbt, if we do nothing:**
 - Introduces small lag in time propagation through Station Bridge
 - And this grows linearly with # of Station-Bridge
 - + = Sync Interval * # of Station-Bridges
- **Approaches**
 1. Bi-modal sync interval (“burst-of-two”)
 2. Increased sync rate
 3. Live with the lag
 - Probably fine for Stations, less fine for long chains of Station-Bridges

IEEE Std. 802.11™-2012 Timing Measurement

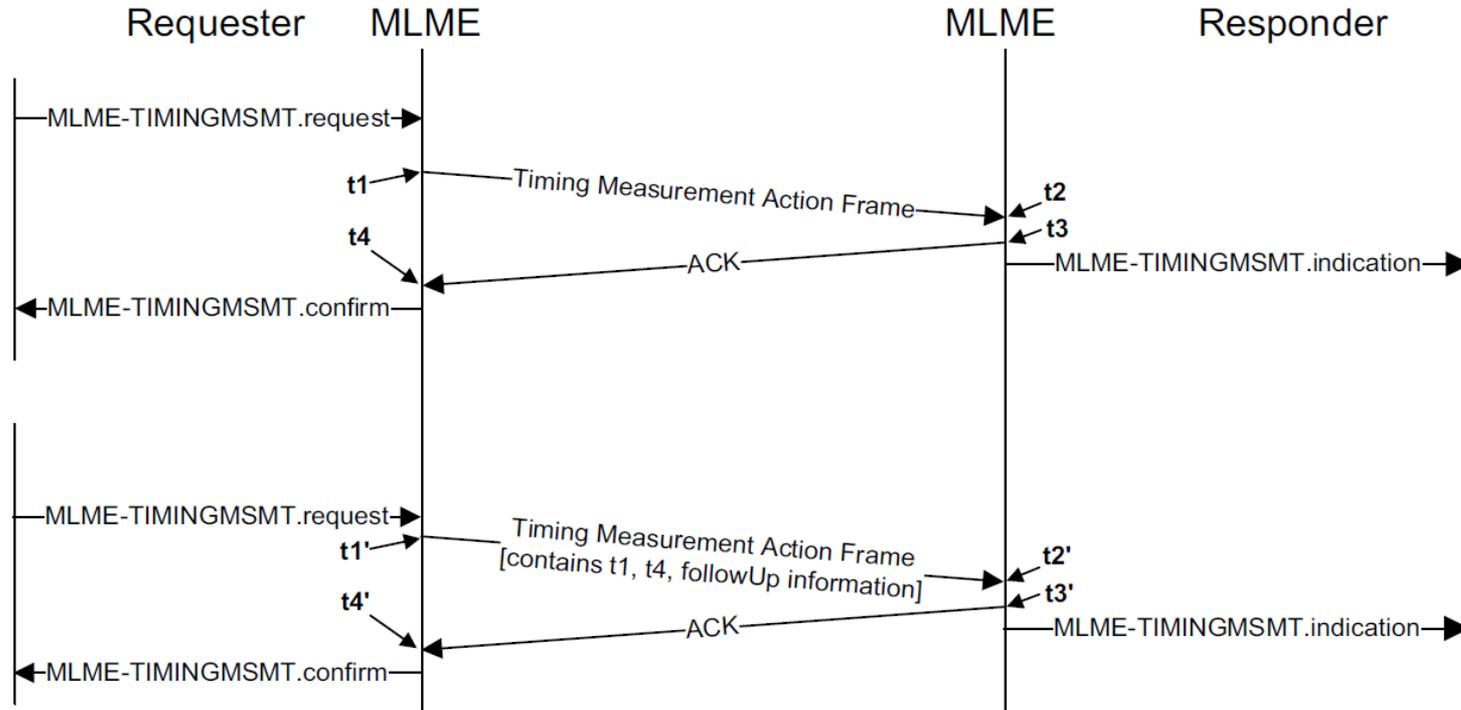


Figure 12-1—Timing measurement procedure for IEEE 802.11 links