IEEE P802.11
Wireless LANs

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| **Specification Framework for TGaz** |
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| **Author(s):** |
| **Name** | **Affiliation** | **Address** | **Phone** | **email** |
| Chao-Chun Wang | MediaTek Inc | 2840 Junction Ave, San Jose, CA | +1-408-526-1899 | chao-chun.wang@mediatek.com  |

Abstract

This document provides the framework from which sections of the draft TGaz amendment.

The document provides an outline of each the functional blocks that will be a part of the final amendment. The document is intended to reflect the working consensus of the group on the broad outline for the draft specification and is derived from the set of functional requirements. As such it is expected to begin with minimal detail reflecting agreement on specific techniques and highlighting areas on which agreement is still required (<TBD> in the document). It may also begin with an incomplete feature list with additional features added as they are justified. The document will evolve over time until it includes sufficient detail on all the functional blocks and their inter-dependencies so that work can begin on the draft amendment itself.

**Revision history**

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| --- | --- | --- |
| Revision | Date | Changes |
| 0 | Mar 14, 2016 | Initial Version |
| 1 | March 13, 2017 |  |
| 1.1 | May 11th , 2017 | 02 |

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# Definitions

FTM Initiator – the STA initiating the FTM procedure.

FTM Responder – the STA responding to the FTM Procedure establishment request

IFTM – Initial FTM frame.

IFTMR – Initial FTM Request frame.

# Abbreviations and acronyms

MU – Multi User

SU – Single User

NDP – Null Data Packet

NDPA – NDP Announcement

VHT NDP Sounding-based .11az SU protocol (VHTz)

HEW NDP Sounding-based .11az MU protocol (HEWz)

TOF – Time Of Flight

BRP – Beam Refinement Protocol

# Positioning Protocol for Improved Accuracy and Coverage over 2.4 and 5 GHz bands

## General

1. The .11az protocol shall extend the REVmc iFTMR/iFTM for .11az ToF measurement parameter negotiation
2. The .11az protocol shall define the following phases
* Negation Phase (Capability discovery)
* Measurement Phase (a Time of Flight (ToF) measurement parameter negotiation)
* A set of ToF measurement exchanges

Note: Other protocol phases may be defined as needed and is <TBD> based on more discussion(s)

## Protocol Description

1. Negotiation phase shall support an enhancement to FTM Request frame in both SU and MU modes for both associated and unassociated STAs
2. The Measurement phase for the ranging protocol for MU shall be only based on NDP sounding and have the following frame exchange sequence:



* Note : the detailed design of DL Trigger, DL NDPA, UL NDP, DL NDP are TBD.
1. The measurement phase for the ranging protocol for SU shall be based on IEEE 802.11 VHT sounding protocol and have the following frame exchange sequence



Note: the contents of NDP Announce (.11az), NDP (.11az) and Measurement Feedback; and the spacing between the NDP (.11az) and Measurement Feedback are TBD.

1. In 11az NDP ranging measurement phase, the NDPA has the following properties

B0 B1 bits value of the Sounding Dialog Token field shall be set to 0b10 to indicate 11az sequence

AID field will be used to indicate the receiver participating in the sounding exchange

Feedback Type field will be in 4-byte per STA info field (refer to the figure below)

Reserved

Reserved

Feedback

Type

B26

1. The ID for ranging operation for an unassociated STA used for measurement phase will be in the FTM Rsp frame

# Positioning Protocol while operating in the 60 GHz band

## General

1. The 11az protocol shall define at least one mode in which LOS/NLOS estimation (an estimation likelihood that the measurement is performed on a LOS path) is provided as part of the measurement.”
2. The 11az protocol shall define at least one mode in which BRP training may operate on the LOS path (rather than on the strongest path).”

# Scalability aspects of the Positioning Protocol

This section describes the protocol features that enable operation in a dense environment.

# Using Angle of Departure and Angle of Arrival to estimate position

# Positioning Protocol for STA to STA topologies

# Frame formats

**“The ID for ranging operation for an unassociated STA used for measurement phase will be in the FTM Rsp frame”**

# References

Missing refrences to submissions the SFD description comes from.