IEEE P802.11
Wireless LANs

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| Specification Framework for TGai |
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Abstract

This document provides the framework from which the draft TGai amendment will be developed. The document provides an outline of each of 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. As such it is expected to begin with minimal detail reflecting agreement on specific techniques and highlighting areas on which agreement is still required. 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.

As this document evolves, the most recent changes will be in track-change format. Older changes will be converted to normal text.

**Revision notes**

***R2:*** *Initial version accepted by 802.11ai TG*

# Definitions

1. **Link Setup**: the process of gaining the ability to send IP traffic with a valid IP address through the AP. Link Setup may involve more than one AP in an ESS. This includes AP/Network discovery and (secure) Association and Authentication. [1]
2. **Link-Attempt Rate** is the number of STAs attempting to establish a link for the first time to an AP within an ESS as measured over a one second time interval.
3. **Media Load** is the “busyness” of the wireless medium of the ESS. It is measured as the percentage of time the medium is in use.
4. **Link Setup Time** is defined as the process of gaining the ability to send IP traffic with a valid IP address through the AP. Link Setup may involve more than one AP in an ESS. This includes AP/Network discovery and (secure) Association and Authentication. Link Setup Time is the amount time required in the use case to establish link setup. Timing starts when the STA elects to perform Link Setup.

# Abbreviations and acronyms

FILS Fast Initial Link Setup

# Link Setup General Framework

## Optimizations (11-12/0160-03)

A TGai solution may allow AP and STA to initiate link setup optimizations.

# Security Framework

# IP Address Assignment

# Fast Network Discovery

## Active scanning

### Immediate Reporting (11-12/0153r9)

802.11ai shall define a mechanism to optimise the MLME-SCAN.confirm primitive to indicate the discovered APs fast and without additional delays.

### FILS Capability Indication (11-12/0153r9)

Probe Request, Probe Response and Beacon shall contain an indication of FILS capability.

### Probe Response (11-12/0153r9)

802.11ai shall have mechanism to transmit Probe Response frame to individual and/or broadcast address.

### BSS Information on Other Channels (11-12/0153r9)

802.11ai shall have mechanism to include information of the responding AP and other APs to the Probe Response frame.

### Probe Response Collision Avoidance (11-12/0153r9)

An AP may respond to multiple Probe Requests from one or more FILS capable STAs with a single broadcast addressed response frame.

### Ommision of Probe Response (11-12/0153r9)

An FILS Capable AP may omit transmission of Probe Response frame to FILS capable STAs if the TBTT occurs within a predefined time interval.

### Listening Duration (11-12/0158r3)

STA may include a wait-time-for-Probe-Response element to Probe Request to provide a max listening duration for which the STA indicates it will wait for Probe Response transmission.

### White List Element in GAS (11-12/0158r3)

STA may include an inclusion selection filter or ‘white’ list element to GAS Request to indicate selection for a set of APs to be included as part of Neighbor Report ANQP element in GAS Response

## Passive Scanning

### General Approach (11-12/0406r1)

The 802.11ai shall support improved passive scanning mechanisms to facilitate fast initial link setup, and/or to reduce the air time occupancy of MAC frames used for scanning.

### Power Consumption (11-12/0406r1)

Reducing power consumption of the passive scanning non-AP STAs is desirable.

### Configuration Change Element (11-12/0158r3)

AP may include a GAS configuration-change element in the Beacon and Probe Response to indicate changes in a set of static GAS parameters.

### AP Availability Indicator (11-12/0158r3)

AP may include an indicator for AP availability to attachment to the Beacon and Probe Response.

**References:**

[0] IEEE Std 802.11-2012

[1] 11-10/0238: TGai Use Cases

[2] 11-11/0811: TGai Evaluation Methodology

[3] 11-11/0745: TGai Functionl Requirements