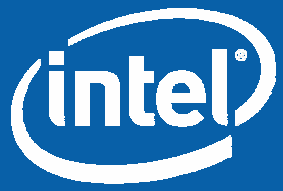


IEEE 802.11v
Wireless Network Management

Location and Presence Overview

Stuart Golden

TGv Objective on Location for 802.11

[Req2090] TGv shall provide a mechanism to coordinate the gathering and possibly generation of data to support various location methods such as time of arrival, time difference of arrival, and signal strength.

Overview of Voted-in Location Features

Address location measurements for

- Cell-ID (AP Location)
- Signal Strength
- Time-Based Methods (i.e. TOA)

3 Components in 802.11v location draft

- Presence Configuration Request/Response
  - Setting up multiple location measurements
- Presence Request/Response
  - Location measurement exchange
- Location Configuration Information Report
  - Where are you?, Where am I?

Design Goals of Location Proposal

Support a variety of end devices

Provide wireless clients with the ability to announce their presence

- Typically, ultra low-power devices (tags)

Support location-aware application on client and infrastructure devices

Support multiple methods for location calculation

Interoperate with legacy 802.11 clients

Provide improved location in the future

Presence Parameters Information Element

Identifier	Field Name
1	Presence Indication Parameters
2	Presence Indication Channels
3	Presence Request Options
4	Presence Status
5	Location Service Parameters
6	Radio Information
7	Timing Measurements
8	Motion
9	Location Descriptor
10	Location Data
11	Location ID
12-254	Reserved
255	Vendor Specific

Presence Request/Response

"I am out here" (without defining "here") rather than "Here I am"

New Presence Parameters Information Element (IE)

Exchange of location measurements

- Signal Strength of Presence Request in Radio Information
- Timestamp Diff. of Pres. Req. & ACK in Timing Information

Timing Measurements Field

EID (3)	Length(6)	Timestamp Difference	Timestamp Difference Units	Timestamp Difference Accuracy
Octets: 1	1	4	1	1

The Timestamp Difference field contains the time difference between the time that a unicast Presence Request frame was received from a STA, defined to occur at the PHY-RXEND.indication of the received Presence Request frame, and the time that the corresponding ACK frame was sent to the STA, defined to occur at the PHY-TXSTART.confirm of the ACK frame transmission.

Timing Difference Units	Meaning
0	Microseconds
1	Hundreds of Nanoseconds
2	Tens of Nanoseconds
3	Nanoseconds
4	Tenths of Nanoseconds
5 - 255	Reserved

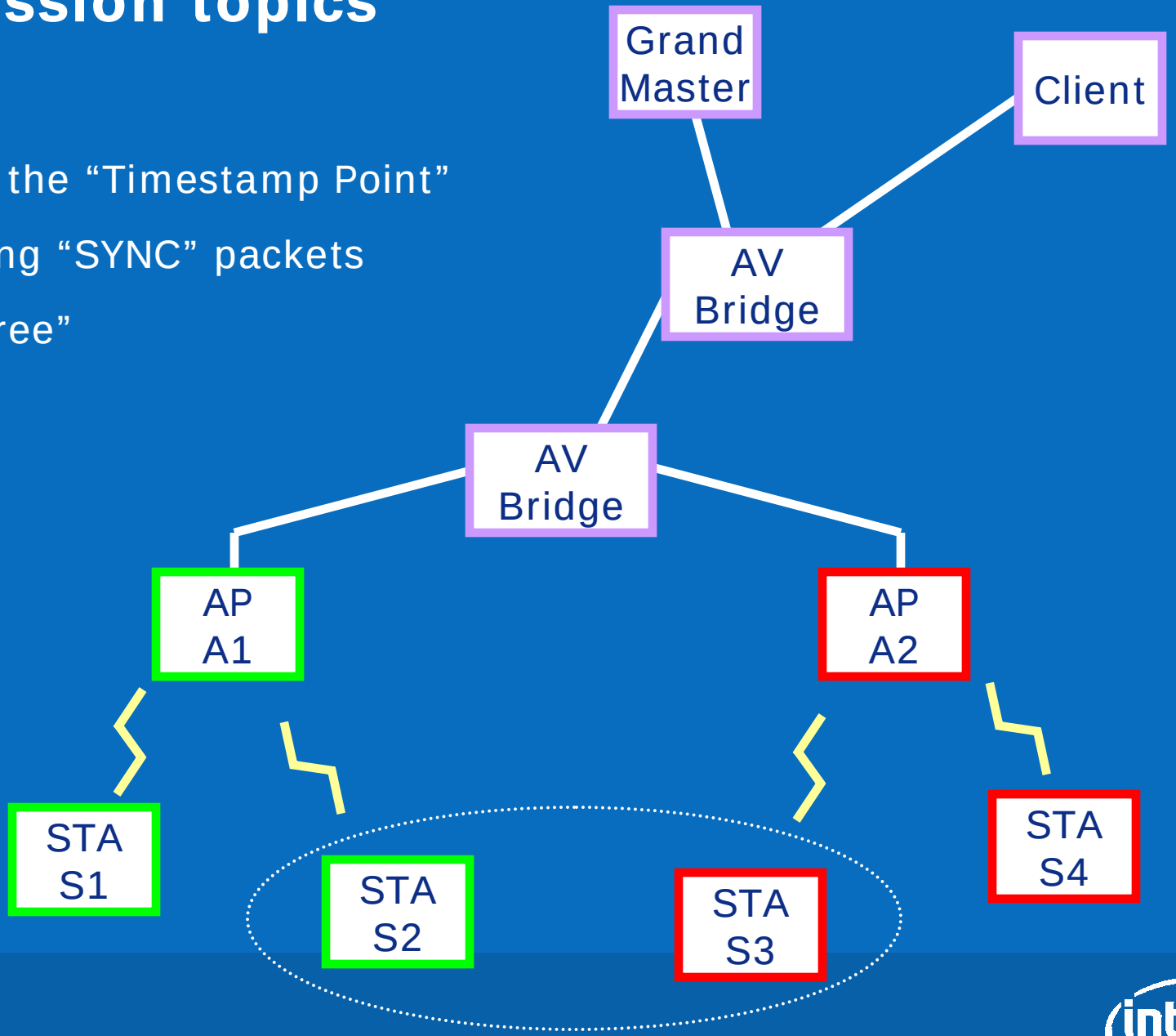
The Timestamp Difference Accuracy field contains the expected standard deviation of the timestamp difference of the timestamp in the units indicated in the Timestamp Difference Units field.

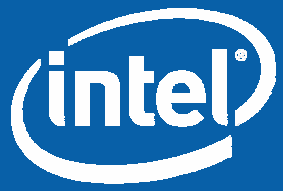
Discussion topics

Defining the “Timestamp Point”

Identifying “SYNC” packets

Clock “Tree”





Backup

Presence Configuration

Presence Configuration Request Frame

- Provides ability to setup STA Presence Indication parameters and channels
- Provides ability to setup STA “normal” and “in-motion” reporting intervals
- Provides ability to receive motion-related information
- Provides ability to control channels on which the STA announces its Presence

Presence Configuration Response Frame

- Acknowledges successful or failed presence configuration request
- Status allows STA to indicate refusal, failure or incapable
- Upon failed presence configuration request, provides current reporting parameters

Location Configuration Information

Infrastructure can provide location for itself or associated STA.

STA can announce location if STA is capable of calculating its location

Location Descriptor

- Used to describe the location data being requested or responded to
  - Format: Civic or Geospatial
  - Resolution: Building, AP, or XY
  - Encoding: LCI, Text, ASN.1

Location Data

- Used to contain the location data

Location Service Parameters

- Used to request or announce location services