IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Location Related Comments | | | | |
| Date: 2013-12-09 | | | | |
| Author(s): | | | | |
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##### Baseline is 11mc D2.1. Changes indicated by a mixture of Word track-changes and instructions. For equation changes, Tex notation is sometimes used. E.g. a\_{xyz}^b denotes axyzb .

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2403 | 692.00 |  | 8.4.2.21.10 |  |  | LCI report assumes that when the feature is supported, location is known. A valid scenario is when the STA supports the feature, but does not know its location. | add a sentence saying "The value of FFFF for longitude, latitude and altitude fields is reserved, a STA sets these fields to FFFF when it does not know its location." Same change to 8.4.4.12. | Revised, see changes in 13/xxxxr0 that correct the parsing of the LCI field. When a field is unknown, it is indicated by massive tiny resolutions |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2404 | 701.00 |  | 8.4.2.21.13 |  |  | Location civic report assumes the STA is configured with its civic location. A valid use case is when the feature is supported but the STA does not know its civic location. Add a sentence which describes how the STA indicates in the Location Civic Report that it does not know its civic location. | add a sentence to this extent: "when the country code in the civic location field (figure 8-194) is set to an invalid value (see ISO3166 for valid country codes), it indicates that the reporting STA does not know its civic location." same change for 8.4.4.13 AP Civic Location ANQP-element subclause. | Revised. Accepted |

***Discussion 2403:***

1)

Gabor’s presentation <XXXX> to address CIDs 2402, 2492, 2491 and 2493 adopts the newer “uncertainty” fields over the older “resolution” fields and makes other changes. Hence we indicate an unknown location by 1) max-ing out the uncertainty and 2) including an invalid lat/long. RFC6225’s encoding of lat/long uncertainty is “back-to-front”, probably for rough alignment with the less-preferred resolution, as:

“uncertainty = 2 ^ ( 8 - x )”

So a lower value of x indicates max uncertainty; but we can’t use zero …

“A value of 0 is reserved to indicate that the uncertainty is unknown;”

so then we propose to use 1 for lat/long uncertainty. This is +-128deg, so, with respect to a latitude of 0, the lat uncertainty allows the whole globe to be part of the uncertainty region. For alt, RFC6225 already defines how an unknown altitude is sent (i.e. Altitude Type = 0).

The RFC limits Longitude to +-180 deg, so for an unknown location, set the longitude to an invalid value (i.e. 255.999… deg). As per the commenter, the advantage of using an invalid value of longitude (versus reserved, equal to 0) for an unknown location is that, even if the uncertainty fields are lost during various transfers, there is no ambiguity whether this is a valid location or not.

2)

Further, the LCI figure includes an element ID and length but there is no text on how they are set, no element ID is assigned and in fact this figure is for the LCI field that is a suffix to the Measurement Report element where no element ID or length is needed. Clean this up by deleting element ID and length.

3)

LCI lacks AP height above floor and floor number (Civic provides floor string but not floor number). Add suitable optional subelement.

4)

LCI is also useful for FTM procedure. Add optional LCI request/response within FTM request/next FTM frame

5)

LCI is also useful within the Neighbor Report. Add optional LCI request/response within Neighbor Report Req/Resp exchange

***Discussion 2404:***

6)

Parsibility of response is fragile – could become difficult to distinguish start of Civic Location type from another optional subelement. Issue also affects Public Identifier URI field in Location Identifier Report.

Proposed fix is to prefix these fields by Element ID and Length octets.

Examples of payloads

|  |
| --- |
| D 0 1 2 3  H 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1  C +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  P | GEOCONF\_CIVIC | N | what | country |  V +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  4 | code | civic address elements ...  +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  D 0 1 2 3  H 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1  C +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  P | OPTION\_GEOCONF\_CIVIC | option-len |  V +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  6 | what | country code | .  +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+ .  . civic address elements .  . ... .  +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  GEOCONF\_CIVIC = 99; OPTION\_GEOCONF\_CIVIC = 36, presumably in network byte order (big endian) so 0x00-34. So if we defined a sub-element with Element ID = 0 or 99, parsing would be very difficult / impossible. Or if IETF prepared a new RFC (e.g. “DHCPv9”) with a new leading octet, parsing would also be much more difficult.  Basically we are creating an unnecessary coupling between layers. |

7)

The RFC is an IETF standard, with network coding (big-endian) ordering, unlike 802.11, so we need to be explicit if this is little-endian or big-endian. Propose little endian as per 8.2.2 (same as LCI)

8)

Then, when the Civic Location is unknown, then set the Length to 0. This aligns with a discussion with an IETF representative (Marc Linsner), who says “In the IETF, lack of data indicates I don't know.”

9)

Location Civic is also useful for FTM procedure. Add optional Civic request/response within FTM request/next FTM frame

10)

Location Civic is also useful within the Neighbor Report. Add optional Civic request/response within Neighbor Report Req/Resp exchange

11)

Fix up URI encoding

|  |
| --- |
| For the URI, consider <http://www.example.com>, [ftp.example.com](ftp://ftp.example.com), gopher:, mailto:, news:, telnet: etc etc. So if we defined a sub-element with Subelement ID = 104, 102, 103, 109, 110, 116, parsing would be very difficult / impossible. Or if a new URI prefix became popular (e.g. “!!!://”) with a new leading octet, parsing would also be much more difficult.  Basically we are creating an unnecessary coupling between layers. |

***Change:***

**8.4.2.21.10 Location Configuration Information Report**

***802.11m editor: also renumber bits by subtracting 16.***

***802.11m editor: Gabor’s presentation <XXXX> will update other fields in this figure***



***Note to reader (not for inclusion in the 11mc draft): Another good path is to convert Element Id to subelement Id, and assign. Then “unknown” could be an empty subelement. Obviously backwards compatibility issues are not high priority here given that Element Id was never assigned by the ANA.***

The definition of elements within the LCI report are as defined in Section 2.2 of IETF RFC 6225(#1692)

(July 2011) or as defined herein.

***802.11m editor: immediately after the above text, insert the following***

For Datum values 1, 2 or 3, an unknown location is indicated by Latitude Uncertainty equal to 1, Latitude Fraction equal to 0, Latitude Integer equal to 0, Longitude Uncertainty equal to 1, Longitude Fraction equal to 33554431 (25 binary 1’s), and Longitude Integer equal to +255.

NOTE 1: With respect to a latitude of 0, a Latitude Uncertainty of 1 indicates +/-128 degrees of latitude uncertainty, which encompasses the globe. The Longitude Fraction and Longitude Integer fields encode an invalid longitude.

NOTE 2: RFC 6225 indicates an unknown altitude when Altitude Type is equal to 0.

**Table 8-99—Optional subelement IDs for Location Configuration Information Report**

***11mc editor: Insert new row and renumber reserved rows***

|  |  |  |
| --- | --- | --- |
| **Subelement ID** | **Name** | **Extensible** |
| 4 | Z | Subelements |

***11mc editor: Insert at end of subclause***

The Z subelement is used to report the floor and location of the STA with respect to the floor level.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Sub-element ID | Length | AP Height Above Floor Integer | AP Height Above Floor Fraction | AP Height Above Floor Uncertainty | AP Floor Info |
| Octets | 1 | 1 | 1 | 1 | 1 | 2 |

Figure 8-188xxx – Z subelement format

The Subelement ID field is equal to the value for Z in Table 8-99.

The Length field is defined in 8.4.3.

The AP Height Above Floor Integer and AP Height Above Floor Fraction fields indicate the height of the AP above the floor according to Table 8-99xxz:

Table 8-99xxz: Interpretation of AP Height Above Floor Integer and AP Height Above Floor Fraction fields

|  |  |  |
| --- | --- | --- |
| AP Height Above Floor Integer (signed, units of meters) | AP Height Above Floor Fraction (unsigned, units of 1/256 meters) | AP height above floor in meters |
| 127 | 255 | Unknown |
| 127 | 254 | >= 127 + 254/256 meters |
| -128 | 0 | <= -128 meters |
| All other combinations | | AP Height Above Floor Integer + AP Height Above Floor Fraction/256 meters |

An AP Height Above Floor Uncertainty value of 0 indicates an unknown AP height above floor uncertainty; otherwise a value between 1 and 18 inclusive indicates that the actual AP height above floor is bounded according to:

***Note to reader (not for inclusion in the 11mc draft): this somewhat unnatural encoding follows RFC6225’s encoding for latitude uncertainty, which in turn is due to attempting to align with the original RFC3825 “Resolution” encoding.***

AP height above floor in meters - 29 - AP Height Above Floor Uncertainty <= actual AP height above floor <= AP height above floor in meters + 29 - AP Height Above Floor Uncertainty

The value of 1 is used if the AP height above floor in meters is unknown (see Table 8-99xxz). Values of 19 or higher are reserved.

The format of the AP Floor Info field is defined in Figure 8-188xxy

|  |  |  |  |
| --- | --- | --- | --- |
|  | AP Floor Number Integer | AP Floor Number Fraction | Reserved |
| Bits | B0 B9 | B10 B13 | B14 B15 |

Figure 8-188xxy-AP Floor Info field format

The AP Floor Number Integer field is a signed integer indicating the floor number, where a higher value indicates a higher floor, and the integer most closely approximates the floor number labels used at the venue (especially in the stairwells and elevators, if present).

The AP Floor Number Fraction field is an unsigned integer indicating intermediate floors between integer-labelled floors, where a higher value indicates a higher intermediate floor.

NOTE: For example, a UK building with floors labelled B1, G, M, 1, and 2 has the floors identified by (AP Floor Number Integer,AP Floor Number Fraction) equal to (-1,0), (0,0), (0,8), (1,0), and (2,0) respectively.

**8.4.2.21.13 Location Civic Report**

The Location Civic Report includes the location information defined in Civic format for the location subject provided in the Location Civic measurement request, as shown in Figure 8-194 (Location Civic Report field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Civic Location Type | Location Civic subelement | Optional Subelements |  |
| Octets: | 1 | variable | variable |  |

**Figure 8-194—Location Civic Report field format**

The Civic Location Type field contains the format of location information in the Civic Location field, as

indicated in Table 8-84 (Civic Location Type).

**Table 8-84—Civic Location Type**

|  |  |
| --- | --- |
| **Civic Location Type value** | **Description** |
| 0 | IETF RFC4776-2006 starting at the country code field (i.e. excluding the GEOCONF\_CIVIC/ OPTION\_GEOCONF\_CIVIC, N/ option-len and what fields); includes all subsequent RFCs that define additional civic address Types. |

***11mc editor: move Table 8-104 to here***

**Table 8-104—Subelement IDs for Location Civic Report(#1429)**

|  |  |  |
| --- | --- | --- |
| **Subelement ID** | **Name** | **Extensible** |
| 0 | Location Civic | No |
| 1 | Originator Requesting STA MAC Address | No |
| 2 | Target MAC Address | No |
| 3 | Location Reference |  |
| 4 | Location Shape |  |
| 5 | Map Image |  |
| 6–220 | Reserved |  |
| 221 | Vendor Specific |  |
| 222–255 | Reserved |  |

The Location Civic subelement of the Location Civic Report (see Figure 8-194 (Location Civic Report field format)) is formatted according to Figure XXX1.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Subelement ID | Length | Location Civic |
| Octets | 1 | 1 | Variable |

Figure XXX1: Location Civic Report subelement format

The Subelement ID is equal to Location Civic as defined inTable 8-104.

The Location Civic field contains the location information in the format as indicated in the Civic Location Type field. When the Civic Location Type is IETF RFC4776-2006:

* Location Civic field is formatted according to IETF RFC4776-2006 but starting at the country code field (i.e. excluding the GEOCONF\_CIVIC/ OPTION\_GEOCONF\_CIVIC, N/ option-len and what fields)
* An unknown Civic Location is indicated by a subelement Length of 0 and an empty Locaiton Civic field
* The Civic Location field follows the little-endian octet ordering

When the Civic Location Type is IETF RFC4776-2006, the Optional Subelements field optionally(#1677) includes the Location Reference, Location Shape, Map Image, and Vendor Specific subelements as defined in Table 8-104 (Subelement IDs for Location Civic Report(#1429)).

When the Civic Location Type value is Vendor Specific, a Vendor Specific subelement is included in the Optional Subelements field that identifies the Organization Identifier corresponding to the Civic Location Type.

The Optional Subelements field format contains zero or more subelements with subelement ID greater than or equal to 1, each consisting of a 1-octet Subelement ID field, a 1-octet Length field, and a variable-length Data field, as shown in Figure 8-504 (Subelement format). The optional subelements are ordered by nondecreasing subelement ID.

The Subelement ID field values for the defined subelements are shown in Table 8-104 (Subelement IDs for Location Civic Report(#1429)). A Yes in the Extensible column of a subelement listed in Table 8-104 (Subelement IDs for Location Civic Report(#1429)) indicates that the length of the subelement might be extended in future revisions or amendments of this standard. When the Extensible column of an element is Subelement, then the subelement might be extended in future revisions or amendments of this standard by defining additional subelements within the subelement. See 9.25.9 (Extensible subelement parsing).

**8.4.2.21.14 Location Identifier Report**

The Location Identifier (#1294)report includes an indirect reference to the location information for the

location subject provided in the Location Identifier measurement request, as shown in Figure 8-207

(Location Identifier (#1294)report field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Expiration TSF | Public Identifier URI subelement | Optional Subelements |  |
| Octets: | 8 | variable | variable |  |

**Figure 8-207—Location Identifier (#1294)report field format**

The Expiration TSF field is the value of the TSF when the Public Identifier URI field value is no longer

valid. The Expiration TSF field set to 0 indicates the Public Identifier URI does not expire.

***11mc editor: move Table 8-107 to here***

**Table 8-107—Subelement IDs for Location Identifier report(#1294)(#1429)**

|  |  |  |
| --- | --- | --- |
| **Subelement ID** | **Name** | **Extensible** |
| **0** | **Public Identifier URI** | **No** |

The Public Identifier URI subelement of the Location Identifier Report (see Figure 8-207 (Location Identifier report field format)) is formatted according to Figure XXX2.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Subelement ID | Length | Public Identifier URI |
| Octets | 1 | 1 | Variable |

Figure XXX2: Public Identifier URI subelement format

The Subelement ID is equal to Public Identifier URI as defined inTable 8-107.

The Public Identifier URI field contains a value in URI format that points to a location object. It can be used to return the location value for the requesting STA. The format of the location value returned when the URI is dereferenced is dependent on the provider of the URI and is beyond the scope of this document. The Public Identifier URI field confirms the validity of the location estimate to an external agent when a STA forwards a location estimate to that agent. The protocol used to query the infrastructure for a location report based on the Public Identifier URI field is beyond the scope of this standard.

The Optional Subelements field format contains zero or more subelements with subelement ID greater than or equal to 1, each consisting of a 1-octet

Subelement ID field, a 1-octet Length field and a variable-length Data field, as shown in Figure 8-516

(Subelement format). Any optional subelements are ordered by nondecreasing subelement ID.

The Subelement ID field values for the defined subelements are shown in Table 8-107 (

subelement IDs for Location Identifier report(#1294)(#1429)). A Yes in the Extensible column of a subelement listed in Table 8-107 (subelement IDs for Location Identifier report(#1294)(#1429))

indicates that the (Ed)subelement might be extended in future revisions or amendments of this standard.

When the Extensible column of an element is Subelement, then the subelement might be extended in future

revisions or amendments of this standard by defining additional subelements within the subelement. See

9.25.9 (Extensible subelement parsing).

The Originator Requesting STA MAC Address subelement contains the MAC address of the STA that

requested the Location Information and it is present whenever the location subject definition field in the

corresponding Location Identifier (#1294)request was set to 2. The format of the Originator Requesting

STA MAC Address subelement is shown in Figure 8-146 (Originator Requesting STA MAC Address

subelement format).

The Target MAC Address subelement contains the MAC address of the STA whose Location Information

was requested and it is present whenever the location subject definition field in the corresponding Location

Identifier (#1294)request was set to 2. The format of the Target MAC Address subelement is shown in

Figure 8-147 (Target MAC Address subelement format).

**8.4.2.36 Neighbor Report element**

**Table 8-131—Optional subelement IDs for neighbor report**

***11mc editor: Insert new row and renumber reserved rows***

|  |  |  |
| --- | --- | --- |
| **Subelement ID** | **Name** | **Extensible** |
| 39 | Measurement Report | Subelements |

***11mc editor: Insert at the end of this subclause***

A Measurement Report subelement of Measurement Type equal to LCI report (see Table 8-90) is optionally present. If present, the subelement has the same format as the Measurement Report element of Measurement Type equal to LCI report.The subelement indicates the LCI of the neighbour STA and further includes the Z subelement, or the subelement indicates an unknown LCI (see 10.24.6.2). The Late, Incapable and Refused bits in the Measurement Report Mode field are equal to 0.

A Measurement Report subelement of Measurement Type equal to Location Civic report (see Table 8-90) is optionally present. If present, the subelement has the same format as the Measurement Report element of Measurement Type equal to Location Civic report, and the subelement indicates the Civic address of the transmitting STA or an unknown Civic address (see 10.24.6.2). The Late, Incapable and Refused bits in the Measurement Report Mode field are equal to 0.

**8.6.7.6 Neighbor Report Request frame format**

***11mc editor: Replace subelement by element throughout the baseline clause.***

**Table 8-256—Optional element IDs for Neighbor Report Request frame**

***11mc editor: Insert new row and renumber reserved rows***

|  |  |  |
| --- | --- | --- |
| **Element ID** | **Name** | **Extensible** |
| 38 | Measurement Request | Subelements |

***11mc editor: Insert at the end of this subclause***

A Measurement Request element of Measurement Type equal to LCI request (see Table 8-66) is optionally present. If present, the element indicates a request for a Measurement Report subelement of Measurement Type equal to LCI report for each Neighbor Report element (see 10.11.10.2). The Enable bit within the Measurement Request Mode field within the Measurement Request element is equal to 0. The Location Subject field within the Measurement Request field of the Measurement Request element is equal to Location Subject Remote (see Table 8-78).

NOTE: Given these settings, the Request, Report and Duration Mandatory bits within the Measurement Request Mode field within the Measurement Request element are reserved (see 8.4.2.20.1)

A Measurement Request element of Measurement Type equal to Location Civic request (see Table 8-66) is optionally present. If present, the element indicates a request for a Measurement Report subelement of Measurement Type equal to Location Civic report for each Neighbor Report element (see 10.11.10.2). The Enable bit within the Measurement Request Mode field within the Measurement Request element is equal to 0. The Location Subject field within the Measurement Request field of the Measurement Request element is equal to Location Subject Remote (see Table 8-78). The Location Service Interval Units field within the Measurement Request field of the Measurement Request element is equal to 0.

NOTE: Given these settings, the Request, Report and Duration Mandatory bits within the Measurement Request Mode field within the Measurement Request element are reserved (see 8.4.2.20.1)

**8.6.8.25 Fine Timing Measurement Request frame format**

***11mc editor: Append the two elements shown to fixed-length fields in the frame***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  | 0 or 1 | 0 or 1 |
|  | Category | Action | Trigger | Measurement Request element of Measurement Type LCI request | Measurement Request element of Measurement Type Location Civic request |
| Octets: | 1 | 1 | 1 | Variable | Variable |

***11mc editor: Insert at the end of this subclause***

A Measurement Request element of Measurement Type equal to LCI request (see Table 8-66) is optionally present. If present, the element indicates a request for a Measurement Report element of Measurement Type equal to LCI (see 10.24.6.2). The Enable bit within the Measurement Request Mode field within the Measurement Request element is equal to 0. The Location Subject field within the Measurement Request field of the Measurement Request element is equal to Location Subject Remote (see Table 8-78).

NOTE: Given these settings, the Request, Report and Duration Mandatory bits within the Measurement Request Mode field within the Measurement Request element are reserved (see 8.4.2.20.1)

A Measurement Request element of Measurement Type equal to Location Civic request (see Table 8-66) is optionally present. If present, the element indicates a request for a Measurement Report element of Measurement Type equal to Location Civic report (see 10.24.6.2). The Enable bit within the Measurement Request Mode field within the Measurement Request element is equal to 0. The Location Subject field within the Measurement Request field of the Measurement Request element is equal to Location Subject Remote (see Table 8-78). The Location Service Interval Units field within the Measurement Request field of the Measurement Request element is equal to 0.

NOTE: Given these settings, the Request, Report and Duration Mandatory bits within the Measurement Request Mode field within the Measurement Request element are reserved (see 8.4.2.20.1)

**8.6.8.26 Fine Timing Measurement frame format**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | 0 or 1 | 0 or 1 |
|  | Category | Action | Dialog Token | Follow Up Dialog Token | TOD | TOA | Max TOD Error | Max TOA Error | Measurement Report element of Measurement Type LCI report | Measurement Report element of Measurement Type Location Civic report |
| Octets: | 1 | 1 | 1 | 1 | 6 | 6 | 2 | 2 | Variable | Variable |

Figure 8-589—Fine Timing Measurement frame format

***11mc editor: Insert at the end of this subclause***

A Measurement Report element of Measurement Type equal to LCI report (see Table 8-90) is optionally present. If present, the element indicates the LCI of the transmitting STA and includes the Z subelement or the element indicates an unknown LCI (see 10.24.6.2). The Late, Incapable and Refused bits in the Measurement Report Mode field are equal to 0.

A Measurement Report element of Measurement Type equal to Location Civic report (see Table 8-90) is optionally present. If present, the element indicates the Civic address of the transmitting STA or an unknown Civic address (see 10.24.6.2). The Late, Incapable and Refused bits in the Measurement Report Mode field are equal to 0.

**10.11.10.2 Requesting a neighbor report**

A STA requesting a neighbor report from an AP shall send a Neighbor Report Request frame to its associated AP.

The requesting STA, to request the LCI of neighboring APs of its associated AP that advertises Fine Timing Measurement capability (see 8.4.2.26) within the Neighbor Report procedure, shall include a Measurement Request element of Measurement Type equal to LCI request within the Neighbor Report Request frame.

The requesting STA, to request the Location Civic of neighboring APs of its associated AP that advertises Fine Timing Measurement capability (see 8.4.2.26) within the Fine Timing Measurement procedure, shall include a Measurement Request element of Measurement Type equal to Location Civic request within the Neighbor Report Request frame.

**10.11.10.3 Receiving a neighbor report**

If dot11RMNeighborReportActivated is true, an AP receiving a neighbor report request shall respond with a

Neighbor Report Response frame containing zero or more Neighbor Report elements. If an SSID element is

specified in the corresponding Neighbor Report Request frame, the Neighbor Report element(s) shall

contain information only concerning neighbor APs that are members of the current ESS identified by the

SSID element contained within the neighbor report request. If the SSID element is omitted, the Neighbor

Report element(s) shall contain information concerning neighbor APs that belong to the same ESS as the

requesting STA. If the wildcard SSID element is specified in the corresponding Neighbor Request frame, the

Neighbor Report element(s) shall contain information concerning all neighbor APs. If there are no neighbor

APs available, the AP shall send a Neighbor Report Response frame with no Neighbor Report elements.

If dot11RMNeighborReportActivated is false in an AP receiving a neighbor report request, it shall ignore

the request and return a Neighbor Report frame with the Incapable bit in the Measurement Report Mode

field set to 1.

A STA receiving a neighbor report element with an unknown subelement identifier shall ignore the

unknown subelement and continue to process remaining subelements. A STA receiving a neighbor report

element containing a Vendor Specific subelement with an unknown Organization Identifier should ignore

this vendor-specific subelement and shall continue to process any remaining Vendor Specific subelements.

A serving AP shall include a TSF (#136)subelement in the Neighbor Report element if it is able to guarantee

an accumulated error of 1.5 TU or better on the TSF Offset subfield. Otherwise, the AP shall not include a

TSF (#136)subelement in the Neighbor Report element.

When an AP that has dot11FineTimingMsmtActivated equal to true receives a Measurement Request element of Measurement Type equal to LCI request within a Neighbor Report Request frame, the AP shall include a Measurement Report subelement of Measurement Type equal to LCI report in each Neighbor Report element in the Neighbor Report response frame. If the LCI information of the neighbor is unknown, the AP shall indicate an unknown LCI for the neighbor following the format defined in 8.4.2.21.10.

When an AP that has dot11FineTimingMsmtActivated equal to true receives a Measurement Request element of Measurement Type equal to Location Civic request within a Neighbor Report Request frame, the AP shall include a Measurement Report subelement of Measurement Type equal to Location Civic report in each Neighbor Report element in the Neighbor Report response frame. If the Location Civic information of the neighbor is unknown, the AP shall indicate an unknown Civic address following the format defined in 8.4.2.21.13.

Each Measurement Report subelement returned shall have the same Measurement Token as in the corresponding Measurement Request element.

***11mc editor: demote contents of 10.24.6 to 10.24.6.1 with new title shown below***

**10.24.6 Fine timing measurement procedure**

**10.24.6.1 Fine timing measurement**

**…**

**10.24.6.2 LCI and Location Civic retrieval using Fine timing measurement procedure**

Within the Fine Timing Measurement procedure, a STA, to request the LCI of an AP that advertises Fine Timing Measurement capability (see 8.4.2.26), shall include a Measurement Request element of Measurement Type equal to LCI request within the Fine Timing Measurement Request frame.

Within the Fine Timing Measurement procedure, a STA, to request the Location Civic of an AP that advertises Fine Timing Measurement capability (see 8.4.2.26), shall include a Measurement Request element of Measurement Type equal to Location Civic request within the Fine Timing Measurement Request frame.

When an AP that has dot11FineTimingMsmtActivated equal to true receives a Measurement Request element of Measurement Type equal to LCI request within a Fine Timing Measurement Request frame, the AP shall include a Measurement Report element of Measurement Type equal to LCI report in the following Fine Timing Measurement frame. If the LCI information is unknown, the AP shall indicate an unknown LCI following the format defined in 8.4.2.21.10.

When an AP that has dot11FineTimingMsmtActivated equal to true receives a Measurement Request element of Measurement Type equal to Location Civic request within a Fine Timing Measurement Request frame, the AP shall include a Measurement Report element of Measurement Type equal to Location Civic report in the following Fine Timing Measurement frame. If the Location Civic information is unknown, the AP shall indicate an unknown Civic address following the format defined in 8.4.2.21.13.

Each Measurement Report element returned shall have the same Measurement Token as in the corresponding Measurement Request element. The Fine Timing Measurement frame containing the Measurement Report element(s) should be returned without undue delay to the STA.

***Note to reader, for inclusion in a future draft:***

* ***A further extension is for FTM measurements to be made available to the network (since it is difficult for APs to change channel to exchange frames with a client that might be in doze state)***
* ***Do this via a 11k-style Measurement req/rep exchange with a new measurement type equal to FTM measurements***
* ***The Measurement Request causes the client to perform FTM with nearby APs on their channels***
  + - ***Discussion topic: The request lists BSSID and channel of APs versus SSID***
* ***In the Measurement Response, the client reports all its FTM measurements with nearby APs***
  + - ***Discussion topic: FTM measurements are timestamps versus ranges***