

SENSING MEASUREMENT REPORT FRAME FORMAT

CROSS-REFERENCE

[0001] This application claims the benefit of and priority to U.S. provisional patent application no. 63/320,879 filed on March 17, 2022, entitled “SENSING MEASUREMENT
5 REPORT FRAME FORMAT”, and U.S. non-provisional patent application no. 18/119,912, filed on March 10, 2023, also entitled “SENSING MEASUREMENT REPORT FRAME FORMAT,” the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure pertains to the field of communication networks, and
10 particularly to a method and a frame format related to sensing measurement report frames.

BACKGROUND

[0003] The IEEE 802.11bf (11bf) standard is intended to modify existing wireless local area network (WLAN) standards to enhance sensing capabilities through 802.11-compliant waveforms. Using IEEE 802.11bf, a station (STA) can detect features (e.g., range, velocity,
15 angular, motion, presence or proximity, gesture, etc.) of intended targets (e.g., objects, humans, animals, etc.) in an environment (e.g., house, office, room, vehicle, enterprise, etc.) using received Wi-Fi signals.

[0004] A Wi-Fi sensing session is initiated by a STA which serves as the sensing initiator. The sensing session generally has a setup phase to establish and exchange operation
20 parameters of the sensing session and a measurement phase during which sensing measurements are performed. The sensing session then has a reporting phase, during which sensing measurements are reported to or obtained by the sensing initiator, followed by a termination phase which ends the sensing session. During the reporting phase, non-access point (AP) STAs and APs may transmit sensing measurement report frames which include
25 one or more sensing measurement reports. However, certain details are missing in sensing measurement report frames in the IEEE 802.11bf draft standard. Therefore, there is a need

for a method and a frame format that obviates or mitigates one or more limitations of the prior art.

[0005] This background information is provided to reveal information believed by the applicant to be of possible relevance to the present disclosure. No admission is necessarily
5 intended, nor should be construed, that any of the preceding information constitutes prior art against the present invention.

SUMMARY

[0006] The present disclosure provides methods and apparatus related to providing details in a sensing management reporting frame. In one aspect, a measurement setup identifier field
10 is provided in the sensing management reporting frame. The measurement setup identifier field may be one octet (one byte) but may also be other appropriate sizes. The present disclosure also provides a sensing measurement report frame action field format which can be used to provide an aggregated channel state information report. This field format can be used to aggregate a plurality of different measurement setup identifiers, instance identifiers, and
15 measurement reports into a single sensing measurement report frame. The present disclosure also provides a measurement report frame format which can be used to enable sensing by proxy (SBP). The frame format can be used by an access point (AP) in a transmission to a non-AP station (STA) that initiated a sensing session. The frame format can aggregate a plurality of sensing measurement reports with identification of each device which generated
20 the sensing measurement reports. The present disclosure also provides two formats which can be used in the sensing management report control field. These two formats can be used for channel state information (CSI) feedback and for truncated channel impulse response (TCIR) feedback, respectively.

[0007] A first aspect of the disclosure provides for a method including receiving, by an AP
25 or a STA, a request to transmit at least one sensing measurement report. The method also includes transmitting, by the AP or the STA, a sensing measurement report frame including a category field, a public action field, and at least one measurement set-up identifier field and at least one sensing measurement report element.

[0008] In one aspect, the sensing measurement report frame can include a category field, a public action field, a dialog token field, a measurement set-up identifier field, and a sensing measurement report element. Each of the category field, the public action field, the dialog token field, and the measurement set-up identifier field may be one octet (one byte) in size.

5 The sensing measurement report field may also be another appropriate size.

[0009] In another aspect, the sensing measurement report frame may include a category field, a public action field, and a plurality of sensing measurement reports. For each of the sensing measurement reports, the frame can include a measurement set-up identifier field, a measurement instance identifier field, and a sensing measurement report field.

10 [0010] According to one aspect, the sensing measurement report frame can include a category field, a public action field, a measurement set-up identifier field, a measurement instance identifier field, and a plurality of sensing measurement reports. For each of the sensing measurement reports, the frame can include a station identifier field and a sensing measurement report field. The station identifier field may be an association identifier (AID)
15 field.

[0011] In another aspect, the at least one sensing measurement report element may include an element identifier field, a length field, an element identifier extension field, a sensing measurement report type field, a sensing measurement report control field, and a sensing measurement report field. When the sensing measurement report is a CSI report, the sensing
20 measurement report control field can include a feedback bandwidth subfield, an initiator to responder (I2R) number of space time streams (N_STS) subfield, a responder to initiator (R2I) N_STS subfield, a number of subcarrier groups (Ng) subfield, a scale factor subfield, and a CSI feedback bit size subfield. Alternatively, when the sensing measurement report is a TCIR report, the sensing measurement report control field can include a feedback bandwidth
25 subfield, an I2R N_STS subfield, an R2I N_STS subfield, and a number of TCIR taps subfield.

[0012] According to another aspect, an apparatus is provided, where the apparatus includes: a memory, configured to store a program; a processor, configured to execute the program stored in the memory, and when the program stored in the memory is executed, the processor
30 is configured to perform one or more of the methods described herein.

[0013] In another aspect, a computer readable medium is provided, where the computer readable medium stores program code executed by a device, and the program code is used to perform one or more of the methods the described herein.

5 [0014] According to another aspect, a chip is provided, where the chip includes a processor and a data interface, and the processor reads, by using the data interface, an instruction stored in a memory, to perform one or more of the methods the described herein.

[0015] Other aspects of the disclosure provide for apparatus, and systems configured to implement one or more of the methods disclosed herein. For example, wireless stations (STAs) and access points (APs) can be configured with machine readable memory containing
10 instructions, which when executed by the processors of these devices, configures the devices to perform one or more of the methods disclosed herein.

[0016] Embodiments have been described above in conjunction with aspects of the present invention upon which they can be implemented. Those skilled in the art will appreciate that embodiments may be implemented in conjunction with the aspect with which they are
15 described but may also be implemented with other embodiments of that aspect. When embodiments are mutually exclusive, or are incompatible with each other, it will be apparent to those skilled in the art. Some embodiments may be described in relation to one aspect, but may also be applicable to other aspects, as will be apparent to those of skill in the art.

BRIEF DESCRIPTION OF THE FIGURES

20 [0017] Further features and advantages of the present invention will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

[0018] FIG. 1 illustrates a sensing measurement report frame action field format, according to an embodiment of the present disclosure.

25 [0019] FIG. 2 illustrates a sensing measurement report element format, according to an embodiment of the present disclosure.

[0020] FIG. 3 illustrates a sensing measurement report control field subfield format, according to an embodiment of the present disclosure.

[0021] FIG. 4 illustrates another sensing measurement report control field subfield format, according to an embodiment of the present disclosure.

5 [0022] FIG. 5 illustrates an aggregated channel state information report format, according to an embodiment of the present disclosure.

[0023] FIG. 6 illustrates a network of devices which may transmit reports to enable sensing by proxy, according to an embodiment of the present disclosure.

10 [0024] FIG. 7 illustrates an aggregated measurement report field format which may be transmitted from an access point to a station, according to an embodiment of the present disclosure.

[0025] FIG. 8 is a schematic diagram of an electronic device that may perform any or all of operations of the above methods and features explicitly or implicitly described herein, according to different embodiments of the present disclosure.

15 [0026] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION

20 [0027] The IEEE 802.11bf standard is intended to add wireless local area network (WLAN) sensing (SENS) capabilities to allow a station (STA) to perform WLAN sensing and obtain measurement results. A sensing initiator is a STA which initiates a WLAN sensing session. These sessions generally have four phases: a setup phase, a measurement phase, a reporting phase, and a termination phase. During the reporting phase, STAs including both access points (APs) and non-AP STAs may report results of measurements performed during the measurement phase. These results will generally be reported to or obtained by the sensing
25 initiator and may be transmitted in Sensing Measurement Report frames.

[0028] In one aspect of the present disclosure, a sensing measurement report frame action field format is provided which includes both a field for the measurement instance identifier

and a field for the measurement setup identifier. Each of these fields may be one octet in size, although other sizes may also be selected as may be appropriate. The measurement instance identifier may be included in either a measurement instance identifier field or in a dialog token field and may indicate the WLAN sensing session associated with the sensing measurement report. The measurement setup identifier may be used to indicate the operational parameters of the WLAN sensing session.

[0029] In another aspect of the present disclosure, two subfield formats for a sensing measurement report control field are provided. The first subfield format may be appropriate to use when transmitting a channel state information (CSI) sensing measurement report. This subfield format may include a feedback bandwidth subfield, an initiator to responder (I2R) number of space time streams (N_STS) subfield, a responder to initiator (R2I) N_STS subfield, a number of subcarrier groups (Ng) subfield, a scale factor subfield, and a CSI feedback (FB) bit size subfield. A second subfield format may be appropriate to use when transmitting a truncated channel impulse response (TCIR) sensing measurement report. This subfield format may include a feedback bandwidth subfield, an I2R N_STS subfield, a R2I N_STS subfield, and a number of TCIR taps subfield.

[0030] One aspect of the present disclosure provides a sensing measurement report frame action field format for an aggregated CSI report. This frame may be used to aggregate multiple CSI reports with multiple measurement setup IDs and instance IDs into a single frame. The field format can include a category field and a public action field. The field format further includes multiple sensing measurement reports, and for each of those reports the field format includes a measurement set-up ID field, a measurement instance ID field, and a sensing measurement report field.

[0031] Another aspect of the present disclosure describes an aggregated measurement report field format which can be used to enable sensing by proxy (SBP). SBP can be used to allow client-based sensing, where both the sensing initiator and the sensing responder(s) are non-AP STAs, using an intermediary AP. In an SBP process, multiple non-AP STAs may each send sensing management reports to the AP. The AP may then aggregate those sensing measurement reports and send an aggregated sensing measurement report to the sensing initiator. The aggregated measurement report field format includes a category field, a public

action field, a measurement setup identifier field, a measurement instance identifier field, and multiple sensing measurement reports. For each sensing measurement report, the field format includes the sensing measurement report and an indication of the STA that generated the sensing measurement report. This indication may be an association identifier (AID).

5 [0032] FIG. 1 illustrates a sensing measurement report frame action field format **100**, according to an embodiment of the present disclosure. The sensing measurement report frame action field format **100** can have multiple fields including: a category field **104**, a public action field **106**, a dialog token field **108**, a measurement set-up ID field **110**, and a sensing measurement report element **112**.

10 [0033] Each field of the sensing measurement report frame action field format **100** may be allocated a certain size. The category field **104**, the public action field **106**, the dialog token field **108**, and the measurement set-up ID field **110** may each be assigned 1 octet. The sensing measurement report element **112** may be assigned a variable number of octets. While the measurement set-up ID field **110** is illustrated as being 1 octet, other sizes may also be
15 used as appropriate. Each octet is 8 bits or 1 byte.

[0034] A dialog token field **108**, or a measurement instance ID field, in the sensing measurement report frame action field format **100** may be used to provide an indication of the measurement instance identifier. The measurement set-up ID field **110** indicates the measurement setup identifier, which may be used to identify attributes of the sensing
20 measurement instance. As described above, the dialog token field **108** may be a one-byte field. This size may be insufficient to indicate both the measurement instance identifier and the measurement setup identifier. Therefore, it may be advantageous to include both a one-byte dialog token field **108** and a one-byte measurement set-up ID field **110** as in field format **100**.

25 [0035] FIG. 2 illustrates a sensing measurement report element format **200**, according to an embodiment of the present disclosure. The sensing measurement report element format **200** may be used as a format for the sensing measurement report element **112** of FIG. 1. The sensing measurement report element format **200** can have multiple fields including: an element ID field **204**, a length field **206**, an element ID extension field **208**, a sensing measurement report type field **210**, a sensing measurement report control field **212**, and a
30

sensing measurement report field **214**.

[0036] Each field of the sensing measurement report element format **200** is allocated a certain size. The element ID field **204**, length field **206**, and the element ID extension field **208** can each be assigned 1 octet, namely 8 bits. The sensing measurement report type field **210** and the sensing measurement report control field **212** can be each assigned a length which may also be an octet or other size which may be subsequently defined. The sensing measurement report field **214** may be assigned a variable number of octets.

[0037] In some embodiments, the sensing measurement report type field **210** may have a value from 0 to 255 which identifies the type of sensing measurement report which is being included. A sensing measurement report type field **210** with a value of 0 may be used to signal a CSI sensing measurement report, while a value between 1 and 255 may be reserved for other uses.

[0038] The sensing measurement report field **214** may be used to report sensing measurements obtained by a sensing receiver. The sensing measurement report control field **212** contains information which may be necessary to interpret the sensing measurement report field **214**. The sensing measurement report control field **212** may itself include one or more subfields, such as N subfields numbered from subfield 1 to subfield N. The number of subfields used and the length of each of these subfields may vary depending, at least in part, on the feedback type indicated in the sensing measurement report type field **210**.

[0039] FIG. 3 illustrates a sensing measurement report control field subfield format **300**, according to an embodiment of the present disclosure. The sensing measurement report control field subfield format **300** may be used as a format for the sensing measurement report control field **212** of FIG. 2 and may be appropriate for a CSI sensing measurement report, as signaled in the sensing measurement report type field **210**.

[0040] According to embodiments, the sensing measurement report control field subfield format **300** can include multiple subfields including: a feedback bandwidth subfield **304**, an I2R N_STS subfield **306**, a R2I N_STS subfield **308**, a Ng subfield **310**, a scale factor subfield **312**, and a CSI FB bit size subfield **314**. Each of these subfields may be assigned an appropriate number of bits.

[0041] FIG. 4 illustrates another sensing measurement report control field subfield format **400**, according to an embodiment of the present disclosure. The sensing measurement report control field subfield format **400** may be used as a format for the sensing measurement report control field **212** of FIG. 2 and may be appropriate for a TCIR sensing measurement report, as signaled in the sensing measurement report type field **210**.

[0042] According to embodiments, the sensing measurement report control field subfield format **400** can have multiple subfields including: a feedback bandwidth subfield **404**, an I2R N_STS subfield **406**, a R2I N_STS subfield **408**, and a number of TCIR taps subfield **410**. Each of these subfields may be assigned an appropriate number of bits.

[0043] FIG. 5 illustrates a sensing measurement report frame action field format **500** for an aggregated CSI report, according to an embodiment of the present disclosure. The sensing measurement report frame action field format **500** may be used for aggregating multiple CSI sensing measurement reports, with each report including a measurement setup identifier and a measurement instance identifier. As illustrated, the sensing measurement report frame action field format **500** includes N sensing measurement reports, numbered from 1 to N, and can include three fields for each of the N sensing measurement reports: a measurement set-up ID field, a measurement instance ID field, and a sensing measurement report field.

[0044] According to embodiments, the sensing measurement report frame action field format **500** can have multiple fields including: a category field **504** and a public action field **506**. The field format **500** can further include N sensing measurement reports numbered from 1 to N. The field format **500** can include a measurement set-up ID 1 field **508**, a measurement instance ID 1 field **510**, a sensing measurement report 1 field **512**, wherein there can be multiple copies of each of these fields such that the number of copies of these fields can align with that as identified in the measurement set-up ID N field **514**. The field format **500** can further include a measurement instance ID N field **516** and a sensing measurement Report N field **518**. Each of these fields may be assigned an appropriate number of bits.

[0045] FIG. 6 illustrates a network of devices **600** which may transmit reports to enable sensing by proxy, according to an embodiment of the present disclosure. Generally, SBP is client-based sensing, where both the sensing initiator and the sensing responder(s) can be

STAs which are not APs. However, some wireless communication systems may not allow peer-to-peer sensing among non-AP STAs. Thus, the SBP may be accomplished using an AP which can communicate with the sensing initiator and one or more sensing responders.

[0046] In this example, STA i 602 may initiate the WLAN sensing process by transmitting a request for sensing reports to AP 608. The AP 608 may receive the request and may communicate this request to a plurality of STAs, such as N STAs identified as STA r1 604 to STA rN 606. Each of the N STAs may send sensing measurement reports back to AP 608, such as report 610 from STA r1 604 and report 612 from STA rN 606. Each of the reports 610, 612 from the STAs 604, 606 to the AP 608 may use the formats described above, such as field formats 100, 500. The AP 608 may then aggregate the N reports 610, 612 from the STAs 604, 606 and transmit an aggregated measurement report 614 to STA i 602.

[0047] FIG. 7 illustrates an aggregated sensing measurement report field format 700 which may be transmitted from an AP to a STA, according to an embodiment of the present disclosure. This field format 700 may be used for transmitting aggregated management reports such as report 614. An aggregated sensing measurement report may include a plurality of sensing measurement reports and may include an indication of the identity of each STA which generated each of the plurality of sensing measurement reports. The indication of identity can be an association identifier. For example, the aggregated sensing measurement report may include N sensing measurement reports.

[0048] The aggregated measurement report field format 700 can have multiple fields including: a category 704, a public action 706, a measurement set-up ID 708, and a measurement instance ID 710. The field format further includes N sensing management reports and an AID for each of those reports, ranging from AID 1 712 and sensing management report 1 714 up to AID N 716 and sensing management report N 718. Each of the AIDs may indicate the identity of the STA which generated the associated sensing management report, such as AID 1 712 indicating the identity of the STA which generated sensing management report 1 714.

[0049] FIG. 8 is a schematic diagram of an electronic device 800 that may perform any or all of operations of the above methods and features explicitly or implicitly described herein, according to different embodiments of the present disclosure. For example, a computer

equipped with network function may be configured as electronic device **800**. In some embodiments, the electronic device **800** may be a user equipment (UE), an AP, a STA, or the like as appreciated by a person skilled in the art.

[0050] As shown, the electronic device **800** may include a processor **810**, such as a central processing unit (CPU) or specialized processors such as a graphics processing unit (GPU) or other such processor unit, memory **820**, non-transitory mass storage **830**, input-output interface **840**, network interface **850**, and a transceiver **860**, all of which are communicatively coupled via bi-directional bus **870**. According to certain embodiments, any or all of the depicted elements may be utilized, or only a subset of the elements. Further, electronic device **800** may contain multiple instances of certain elements, such as multiple processors, memories, or transceivers. Also, elements of the hardware device may be directly coupled to other elements without the bi-directional bus. Additionally, or alternatively to a processor and memory, other electronics, such as integrated circuits, may be employed for performing the required logical operations.

[0051] The memory **820** may include any type of non-transitory memory such as static random access memory (SRAM), dynamic random access memory (DRAM), synchronous DRAM (SDRAM), read-only memory (ROM), any combination of such, or the like. The mass storage element **830** may include any type of non-transitory storage device, such as a solid state drive, hard disk drive, a magnetic disk drive, an optical disk drive, USB drive, or any computer program product configured to store data and machine executable program code. According to certain embodiments, the memory **820** or mass storage **830** may have recorded thereon statements and instructions executable by the processor **810** for performing any of the aforementioned method operations described above.

[0052] Embodiments of the present disclosure can be implemented using electronics hardware, software, or a combination thereof. In some embodiments, the disclosure is implemented by one or multiple computer processors executing program instructions stored in memory. In some embodiments, the disclosure is implemented partially or fully in hardware, for example using one or more field programmable gate arrays (FPGAs) or application specific integrated circuits (ASICs) to rapidly perform processing operations.

[0053] It will be appreciated that, although specific embodiments of the technology have

been described herein for purposes of illustration, various modifications may be made without departing from the scope of the technology. In particular, it is within the scope of the technology to provide a computer program product or program element, or a program storage or memory device such as a magnetic or optical wire, tape or disc, or the like, for storing
5 signals readable by a machine, for controlling the operation of a computer according to the method of the technology and/or to structure some or all of its components in accordance with the system of the technology.

[0054] Acts associated with the method described herein can be implemented as coded instructions in a computer program product. In other words, the computer program product is
10 a computer-readable medium upon which software code is recorded to execute the method when the computer program product is loaded into memory and executed on the microprocessor of the wireless communication device.

[0055] Further, each operation of the method may be executed on any computing device, such as a personal computer, server, personal digital assistant (PDA), or the like and pursuant
15 to one or more, or a part of one or more, program elements, modules or objects generated from any programming language, such as C++, Java, or the like. In addition, each operation, or a file or object or the like implementing each said operation, may be executed by special purpose hardware or a circuit module designed for that purpose.

[0056] Through the descriptions of the preceding embodiments, the present disclosure may
20 be implemented by using hardware only or by using software and a necessary universal hardware platform. Based on such understandings, the technical solution of the present disclosure may be embodied in the form of a software product. The software product may be stored in a non-volatile or non-transitory storage medium, which can be a compact disc read-only memory (CD-ROM), USB flash disk, or a removable hard disk. The software product
25 includes a number of instructions that enable a computer device (personal computer, server, or network device) to execute the methods provided in the embodiments of the present disclosure. For example, such an execution may correspond to a simulation of the logical operations as described herein. The software product may additionally or alternatively include a number of instructions that enable a computer device to execute operations for

configuring or programming a digital logic apparatus in accordance with embodiments of the present disclosure.

5 [0057] According to embodiments, the present disclosure may be implemented as a chip, where the chip includes a processor and a data interface, and the processor reads, by using the data interface, an instruction stored in a memory, to perform one or more of the methods the described herein.

10 [0058] For example, a chip can be configured as a system on a chip or system-on-chip (SOC) which is readily understood to be an integrated circuit or package that integrates most or all components of a computer or other electronic system. These components can include a central processing unit (CPU), memory interfaces, on-board memory, on-chip input/output devices, input/output interfaces and secondary storage interfaces, potentially alongside other components such as radio modems and a graphics processing unit (GPU) on a single substrate or microchip. A SOC may contain one or more of digital, analog, mixed signal radio frequency signal processing functions, as would be readily understood.

15 [0059] As another example, a chip can be configured as a wireless chipset, which as is readily understood, is a piece of internal hardware designed to allow a device to communicate with another wireless-enabled device. This type of chipset can be found inside computers as well as a number of other wireless products, which can include an access point (AP), mobile station (STA), user equipment (UE) or other wireless device as would be readily understood.

20 [0060] Although the present invention has been described with reference to specific features and embodiments thereof, it is evident that various modifications and combinations can be made thereto without departing from the invention. The specification and drawings are, accordingly, to be regarded simply as an illustration of the invention as defined by the appended claims, and are contemplated to cover any and all modifications, variations, 25 combinations, or equivalents that fall within the scope of the present invention.

CLAIMS

1. A method comprising:
receiving, by an access point (AP) or a station (STA), a request to transmit at least one sensing measurement report; and
transmitting, by the AP or the STA, a sensing measurement report frame comprising a category field, a public action field, and at least one measurement set-up identifier field and at least one sensing measurement report element.
2. The method of claim 1, wherein the sensing measurement report frame comprises a category field, a public action field, a dialog token field, a measurement set-up identifier field, and a sensing measurement report element.
3. The method of claim 1 or 2, wherein each of the category field, the public action field, the dialog token field, and the measurement set-up identifier field are one octet.
4. The method of any of claims 1 to 3, wherein the sensing measurement report frame comprises a category field, a public action field, and a plurality of sensing measurement reports, each sensing measurement report of the plurality of sensing measurement reports comprising a measurement set-up identifier field, a measurement instance identifier field, and a sensing measurement report field.
5. The method of any of claims 1 to 4, wherein the sensing measurement report frame comprises a category field, a public action field, a measurement set-up identifier field, a measurement instance identifier field, and a plurality of sensing measurement reports, each sensing measurement report of the plurality of sensing measurement reports comprising a station identifier field and a sensing measurement report field.
6. The method of claim 5, wherein the station identifier field comprises an association identifier (AID) field.
7. The method of any of claims 1 to 6, wherein the at least one sensing measurement report element comprises an element identifier field, a length field, an element identifier field,

a sensing measurement report type field, a sensing measurement report control field, and a sensing measurement report field.

8. The method of claim 7, wherein the sensing measurement report control field comprises a feedback bandwidth subfield, an initiator to responder (I2R) number of space time streams (N_STS) subfield, a responder to initiator (R2I) N_STS subfield, a number of subcarrier groups (Ng) subfield, a scale factor subfield, and a channel state information (CSI) feedback (FB) bit size subfield.

9. The method of claim 7, wherein the sensing measurement report control field comprises a feedback bandwidth subfield, an I2R N_STS subfield, an R2I N_STS subfield, and a number of truncated channel impulse response (TCIR) taps subfield.

10. An apparatus comprising:

at least one processor and at least one machine-readable medium storing executable instructions which when executed by the at least one processor configure the apparatus for:

receiving, by an access point (AP) or a station (STA), a request to transmit at least one sensing measurement report; and

transmitting, by the AP or the STA, a sensing measurement report frame comprising a category field, a public action field, and at least one measurement set-up identifier field and at least one sensing measurement report element.

11. The apparatus of claim 10, wherein the sensing measurement report frame comprises a category field, a public action field, a dialog token field, a measurement set-up identifier field, and a sensing measurement report element.

12. The apparatus of claim 10 or 11, wherein the sensing measurement report frame comprises a category field, a public action field, and a plurality of sensing measurement reports, each sensing measurement report of the plurality of sensing measurement reports comprising a measurement set-up identifier field, a measurement instance identifier field, and a sensing measurement report field.

13. The apparatus of any of claims 10 to 12, wherein the sensing measurement report frame comprises a category field, a public action field, a measurement set-up identifier field, a measurement instance identifier field, and a plurality of sensing measurement reports, each sensing measurement report of the plurality of sensing measurement reports comprising a station identifier field and a sensing measurement report field.
14. The apparatus of any of claims 10 to 13, wherein the at least one sensing measurement report element comprises an element identifier field, a length field, an element identifier field, a sensing measurement report type field, a sensing measurement report control field, and a sensing measurement report field.
15. A non-transitory computer-readable medium storing executable instructions which when executed by a processor of a device configure the device for:
- receiving, by an access point (AP) or a station (STA), a request to transmit at least one sensing measurement report; and
 - transmitting, by the AP or the STA, a sensing measurement report frame comprising a category field, a public action field, and at least one measurement set-up identifier field and at least one sensing measurement report element.
16. The non-transitory computer-readable medium of claim 15, wherein the sensing measurement report frame comprises a category field, a public action field, a dialog token field, a measurement set-up identifier field, and a sensing measurement report element.
17. The non-transitory computer-readable medium of claim 15 or 16, wherein the sensing measurement report frame comprises a category field, a public action field, and a plurality of sensing measurement reports, each sensing measurement report of the plurality of sensing measurement reports comprising a measurement set-up identifier field, a measurement instance identifier field, and a sensing measurement report field.
18. The non-transitory computer-readable medium of any of claims 15 to 17, wherein the sensing measurement report frame comprises a category field, a public action field, a measurement set-up identifier field, a measurement instance identifier field, and a plurality of

sensing measurement reports, each sensing measurement report of the plurality of sensing measurement reports comprising a station identifier field and a sensing measurement report field.

19. The non-transitory computer-readable medium of any of claims 15 to 18, wherein the at least one sensing measurement report element comprises an element identifier field, a length field, an element identifier field, a sensing measurement report type field, a sensing measurement report control field, and a sensing measurement report field.

20. The non-transitory computer-readable medium of claim 19, wherein the sensing measurement report control field comprises a feedback bandwidth subfield, an initiator to responder (I2R) number of space time streams (N_STS) subfield, an responder to initiator (R2I) N_STS subfield, a number of subcarrier groups (Ng) subfield, a scale factor subfield, and a channel state information (CSI) feedback (FB) bit size subfield.