
**Information technology —
Telecommunications and information
exchange between systems — Local
and metropolitan area networks —
Specific requirements —**

**Part 11:
Wireless LAN medium access control
(MAC) and physical layer (PHY)
specifications**

**AMENDMENT 2: Sub 1 GHz license
exempt operation**

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Réseaux locaux et métropolitains —
Exigences spécifiques —*

*Partie 11: Spécifications du contrôle d'accès du milieu sans fil (MAC)
et de la couche physique (PHY)*

*AMENDEMENT 2: Fonctionnement sans licence dans les bandes de
fréquences inférieures à 1 GHz*



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Institute of Electrical and Electronics Engineers, Inc
3 Park Avenue, New York
NY 10016-5997, USA

Email: stds.ipr@ieee.org

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Keywords: IEEE 802.11ah™, long transmission range, low power consumption, MAC, medium access control, narrower bandwidth, OFDM, orthogonal frequency division multiplexing, PHY, physical layer, sub 1 GHz, wireless local area network, WLAN

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Yunbo Li	Demir Rakanovic	George A. Vlantis
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Chih-Che Lin	Ivan Reede	Haiming Wang
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Hongyuan Zhang
Jiayin Zhang
Yan Zhang
Mu Zhao

Jun Zheng
Shoukang Zheng
Mingtuo Zhou
Yuan Zhou
Chunhui Zhu

Hufei Zhu
Yan Zhuang
Lan Zhuo
Wei-Xia Zou
Juan Carlos Zuniga

Major contributions were received from the following individuals:

Alfred Asterjadhi
Stefan Aust
Shahrnaz Azizi
Eugene Baik
Raja Banerjee
George Calcev
Minho Cheong
Rojan Chitrakar
Jinsoo Choi
Li-Chia Choo
Liwen Chu
Rolf J. de Vegt
Klaus Doppler
Matthew J. Fischer
Chittabrata Ghosh
Daning Gong
David Halasz
Mark A. Hamilton
Anh Tuan Hoang
Po-Kai Huang
Mitsuru Iwaoka

Amin Jafarian
Jeongki Kim
Young Hoon Kwon
James Lansford
Jae Seung Lee
Zhongding Lei
Jianhan Liu
Yong Liu
Kaiying Lv
Simone Merlin
Kenichi Mori
Ronald Murias
Anna Pantelidou
Minyoung Park
Jaya Shankar Pathmasuntharam
Ron Porat
Yongho Seok
Huairong Shao
Shusaku Shimada
Jae-Hyung Song
Bo Sun

Joseph Teo
Bin Tian
Fei Tong
Masahiro Umehira
Sameer Vermani
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Haiguang Wang
James June Wang
Lin Wang
Xiaofei Wang
Menzo M. Wentink
Eric Wong
Mingguang Xu
Xun Yang
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Richard Alfvén
Nobumitsu Amachi
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Butch Anton
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This amendment defines modifications to both the IEEE 802.11™ physical layer (PHY) and the medium access control (MAC) sublayer to enable operation of license-exempt IEEE 802.11 wireless networks in frequency bands below 1 GHz, excluding the television (TV) White Space bands, with a transmission range up to 1 km and a minimum data rate of at least 100 Kb/s.

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**IEEE Standard for Information technology—
Telecommunications and information exchange between systems
Local and metropolitan area networks—
Specific requirements**

**Part 11: Wireless LAN Medium Access Control
(MAC) and Physical Layer (PHY) Specifications**

**Amendment 2: Sub 1 GHz License Exempt
Operation**

[This amendment is based on IEEE Std 802.11™-2016, as amended by IEEE Std 802.11ai™-2016.]

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strike through~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editorial instructions, change markings and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.¹

¹Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

3. Definitions, acronyms, and abbreviations

3.2 Definitions specific to IEEE 802.11

Change the following definition in 3.2 as shown:

~~very high throughput (VHT) single medium access control (MAC) protocol data unit (VHT single S-MPDU):~~ An MPDU that is the only MPDU in an aggregate MPDU (A-MPDU) ~~carried in a VHT physical layer (PHY) protocol data unit (PPDU)~~ and that is carried in an A-MPDU subframe with the EOF subfield of the MPDU delimiter field equal to 1.

Insert the following definitions into 3.2:

1 MHz mask physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted using the 1 MHz transmit spectral mask defined in Clause 23 and that is a 1 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW1).

1 MHz physical layer (PHY) protocol data unit (PPDU): A Clause 23 1 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW1).

2 MHz mask physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted using the 2 MHz transmit spectral mask defined in Clause 23 and that is one of the following:

- a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW1)
- b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW2)

2 MHz physical layer (PHY) protocol data unit (PPDU): A Clause 23 2 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW2) or a Clause 23 2 MHz S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW2).

4 MHz mask physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted using the 4 MHz transmit spectral mask defined in Clause 23 and that is one of the following:

- a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW1)
- b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW2)
- c) A 4 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW4)

4 MHz physical layer (PHY) protocol data unit (PPDU): A Clause 23 4 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW4), a Clause 23 4 MHz S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW4), or a Clause 23 4 MHz S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW4).

8 MHz mask physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted using the 8 MHz transmit spectral mask defined in Clause 23 and that is one of the following:

- a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW1)
- b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW2)

- c) A 4 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW4)
- d) An 8 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW8)

8 MHz physical layer (PHY) protocol data unit (PPDU): A Clause 23 8 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW8), a Clause 23 8 MHz S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW8), or a Clause 23 8 MHz S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW8).

16 MHz mask physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted using the 16 MHz transmit spectral mask defined in Clause 23 and that is one of the following:

- a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW1)
- b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW2)
- c) A 4 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW4)
- d) An 8 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW8)
- e) An 16 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate (TXVECTOR parameter CH_BANDWIDTH equal to CBW16)

16 MHz physical layer (PHY) protocol data unit (PPDU): A Clause 23 16 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW16), a Clause 23 16 MHz S1G 1 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW16), or a Clause 23 16 MHz S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH_BANDWIDTH equal to CBW16).

centralized authentication controller (CAC) access point (AP): A sub 1 GHz (S1G) AP with dot11S1GCentralizedAuthenticationControlActivated equal to true. A CAC AP is able to alleviate wireless medium contention when a large number of stations (STAs) are trying to, or are expected to, reconnect to the AP at about the same time.

centralized authentication controlled (CAC) station (STA): A sub 1 GHz (S1G) non-access point (non-AP) STA with dot11S1GCentralizedAuthenticationControlActivated equal to true. A CAC STA supports a CAC access point (AP) to alleviate wireless medium contention when a large number of STAs are trying to, or are expected to, reconnect to the AP at about the same time.

energy limited (EL) station (STA): A sub 1 GHz (S1G) STA whose limited energy supply requires the STA to transmit or receive in certain intervals of time determined by an EL Operation element.

non-sensor station (STA): A sub 1 GHz (S1G) non-access point (non-AP) STA transmitting or receiving data frames not subject to limitation of payload size. A non-sensor STA might not have the power and traffic volume limitation expected for a sensor STA.

non-traffic indication map (non-TIM) mode: A sub 1 GHz (S1G) non-access point (non-AP) station (STA) power save mode in which an S1G non-AP STA need not listen for traffic indication map (TIM) Beacon frames but transmits at least one PS-Poll or trigger frame to the associated AP every listen interval.

non-traffic indication map (non-TIM) station (STA): A sub 1 GHz (S1G) non-access point (non-AP) station (STA) that has entered the non-TIM mode.

null data packet (NDP) 1M (NDP_1M): An NDP carrying medium access control (MAC) information (CMI) frame that is transmitted using the S1G_1M format.

null data packet (NDP) 2M (NDP_2M): An NDP carrying medium access control (MAC) information (CMI) frame that is transmitted using the S1G_SHORT format.

null data packet (NDP) carrying medium access control information (CMAC) frame: A physical layer (PHY) protocol data unit (PPDU) with no Data field used by the PHY to provide to the medium access control (MAC) the service of carrying MAC information in the SIGNAL field of the sub 1 GHz (S1G) PPDU.

paged association identifier (AID): An AID of a sub 1 GHz (S1G) non-access point (non-AP) station (STA) whose corresponding bit value in a transmitted traffic indication map (TIM) encoded in AID with differential encoding (ADE) mode is 1.

primary 1 MHz channel: In a 2 MHz, 4 MHz, 8 MHz, or 16 MHz sub 1 GHz (S1G) basic service set (BSS), the 1 MHz channel that is used to transmit 1 MHz physical layer (PHY) protocol data units (PPDUs).

primary 2 MHz channel: In a 4 MHz, 8 MHz, or 16 MHz sub 1 GHz (S1G) basic service set (BSS), the 2 MHz channel that is used to transmit 2 MHz physical layer (PHY) protocol data units (PPDUs).

primary 4 MHz channel: In an 8 MHz or 16 MHz sub 1 GHz (S1G) basic service set (BSS), the 4 MHz channel that is used to transmit 4 MHz physical layer (PHY) protocol data units (PPDUs).

primary 8 MHz channel: In a 16 MHz sub 1 GHz (S1G) basic service set (BSS), the 8 MHz channel that is used to transmit 8 MHz physical layer (PHY) protocol data units (PPDUs).

protocol version 0 (PV0) medium access control (MAC) protocol data unit (MPDU): An MPDU that has the Protocol Version field of the Frame Control field of the MPDU header equal to 0.

protocol version 1 (PV1) medium access control (MAC) protocol data unit (MPDU): An MPDU that has the Protocol Version field of the Frame Control field of the MPDU header equal to 1.

restricted access window (RAW): A medium access interval for a group of stations (STAs) during which a STA in the RAW group indicated by the RAW parameter set (RPS) element is allowed to contend for access to the medium.

secondary 1 MHz channel: In a 2 MHz sub 1 GHz (S1G) basic service set (BSS), the 1 MHz channel adjacent to the primary 1 MHz channel that with the primary 1 MHz channel forms the 2 MHz channel of the 2 MHz S1G BSS. In a 4 MHz, 8 MHz, and 16 MHz S1G BSS, the 1 MHz channel adjacent to the primary 1 MHz channel that together form the primary 2 MHz channel of the S1G BSS.

secondary 2 MHz channel: In a 4 MHz sub 1 GHz (S1G) basic service set (BSS), the 2 MHz channel adjacent to the primary 2 MHz channel that with the primary 2 MHz channel forms the 4 MHz channel of the 4 MHz S1G BSS. In an 8 MHz and 16 MHz S1G BSS, the 2 MHz channel adjacent to the primary 2 MHz channel that together form the primary 4 MHz channel of the S1G BSS.

secondary 4 MHz channel: In an 8 MHz sub 1 GHz (S1G) basic service set (BSS), the 4 MHz channel adjacent to the primary 4 MHz channel that with the primary 4 MHz channel forms the 8 MHz channel of the 8 MHz S1G BSS. In a 16 MHz S1G BSS, the 4 MHz channel adjacent to the primary 4 MHz channel that together form the primary 8 MHz channel.

secondary 8 MHz channel: In an 16 MHz sub 1 GHz (S1G) basic service set (BSS), the 8 MHz channel adjacent to the primary 8 MHz channel that with the primary 8 MHz channel forms the 16 MHz channel of the 16 MHz S1G BSS.

sensor station (STA): A sub 1 GHz (S1G) non-access point (AP) STA that has certain traffic and device characteristics (e.g., limited payload size, limited traffic volume, battery operated device) and is allowed to associate with an AP that transmits an S1G Beacon, a Probe Response, or a PV1 Probe Response frame containing the S1G Capabilities element with the STA Type Support subfield indicating a sensor basic service set (BSS) or a mixed BSS.

short beacon interval: The interval between the consecutive target short beacon transmission times (TSBTTs) of beacons containing a minimal set of information elements.

sub 1 GHz (S1G) physical layer (PHY) protocol data unit (PPDU): A PPDU transmitted with the TXVECTOR parameter FORMAT equal to S1G, S1G_DUP_1M, or S1G_DUP_2M. The PPDU is transmitted with the S1G_SHORT, S1G_LONG, or S1G_1M preamble.

sub 1 GHz 1M (S1G_1M) physical layer (PHY) protocol data unit (PPDU): A 1 MHz PPDU or 1 MHz duplicate PPDU that is transmitted with S1G_1M preamble.

sub 1 GHz long (S1G_LONG) physical layer (PHY) protocol data unit (PPDU): A 2 MHz, 4 MHz, 8 MHz, or 16 MHz PPDU with long preamble format.

sub 1 GHz modulation and coding scheme (S1G-MCS): A specification of the S1G physical layer (PHY) parameters that consists of modulation order (e.g., BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM) and forward error correction (FEC) coding rate (e.g., 1/2 rep2, 1/2, 2/3, 3/4, 5/6) that is used in an S1G PHY protocol data unit (PPDU).

sub 1 GHz short (S1G_SHORT) physical layer (PHY) protocol data unit (PPDU): A 2 MHz, 4 MHz, 8 MHz, 16 MHz, or 2 MHz duplicate PPDU with short preamble format.

subchannel selective transmission (SST) channel: A channel that is permitted for the subchannel selective transmission indicated by either an SST element or an RPS element.

target wake time (TWT): A specific time or set of times for individual stations (STAs) to wake in order to exchange frames with other STAs.

target wake time (TWT) responder: A station (STA) that has accepted a TWT agreement that was requested by another STA and that assigns TWT service period (SP) start times to the requesting STA.

target wake time (TWT) service period (SP): A period of time during which a TWT station (STA) is awake to transmit and/or receive frames.

target wake time (TWT) service period (SP) start time: The value of the timing synchronization function (TSF) at the beginning of a TWT SP.

target wake time (TWT) requester: A station (STA) that has had a requested TWT agreement accepted by another STA and that receives TWT service period (SP) start times from that STA.

3.4 Abbreviations and acronyms

Insert the following abbreviations into 3.4 in alphabetical order:

ADE	AID with differential encoding
BAT	block acknowledgment TWT
BDT	bidirectional TXOP
BPN	base packet number
CAC	centralized authentication controller (for access points) or controlled (for stations)
EL	energy limited
EOM	end of multi-user
MAD	maximum away duration
OLB	offset length bitmap
PRAW	periodic restricted access window
PV0	protocol version 0
PV1	protocol version 1
RAW	restricted access window
RID	response indication deferral
RPS	RAW parameter set
S1G	sub 1 GHz
SC	sequence counter
SID	short identifier
S-MPDU	single MAC protocol data unit
SST	subchannel selective transmission
STACK	short TWT acknowledgment
TACK	TWT acknowledgment
TSBTT	target short beacon transmission time
TWT	target wake time
USF	unified scaling factor

4. General description

Change the following phrase throughout IEEE Std 802.11:

from “[a] VHT Single MPDU” to “[an] S-MPDU”

4.3 Components of the IEEE 802.11 architecture

Insert the following subclauses (4.3.13a through 4.3.13a.2) after 4.3.13:

4.3.13a Sub 1 GHz (S1G) STA

4.3.13a.1 Overview

The IEEE 802.11 S1G STA operates in frequency bands below 1 GHz excluding the TV White Space bands.

An S1G STA supports S1G features identified in Clause 9, Clause 10, Clause 11, Clause 12, and Clause 23.

The main PHY features in an S1G STA are the following:

- Mandatory support for 1 MHz and 2 MHz channel width
- Mandatory support for S1G_1M, S1G_SHORT PPDU
- Mandatory support for S1G_LONG PPDU if ≥ 4 MHz channel width is supported
- Mandatory support for detection and decode of SIG-A field of the S1G_LONG preamble
- Mandatory support for single spatial stream S1G-MCS 0 to S1G-MCS 2 and S1G-MCS 10 (for 1 MHz PPDU only)
- Mandatory support for single spatial stream S1G-MCS 3 to S1G-MCS 7 for an S1G AP
- Mandatory support for binary convolutional coding
- Mandatory support for normal guard interval
- Mandatory support for fixed pilots
- Optional support for 2, 3 and 4 spatial streams (transmit and receive)
- Optional support for S1G_LONG PPDU if only 2 MHz channel width is supported
- Optional support for beamforming sounding (by sending an S1G NDP frame)
- Optional support for compressed beamforming feedback
- Optional support for STBC, LDPC (transmit and receive)
- Optional support for S1G MU PPDU (transmit and receive)
- Optional support for 4 MHz, 8 MHz, or 16 MHz channel width
- Optional support for S1G-MCSs 8 and 9 (transmit and receive)
- Optional support for short guard interval
- Optional support for traveling pilots

The main MAC features supported for S1G STA are the following:

- Mandatory support for NDP Ack, NDP BlockAck, and NDP CTS frames; mandatory support for the reception of NDP Probe Request frame for S1G AP; optional support for other NDP CMAC frames
- Mandatory support for the reception of PV1 MPDUs but optional support for the transmission of PV1 MPDUs
- Mandatory support for the second virtual carrier sensing - RID
- Mandatory support for the hierarchical structure of TIM element by an S1G AP

- Mandatory support for extended BSS max idle periods and extended listen intervals with USF
- Optional support for RAW
- Optional support for Relay
- Optional support for grouping of non-AP STAs and group AID
- Optional support for TWT
- Optional support for BDT
- Optional support for sectorization
- Optional support for non-TIM STA operation
- Optional support for asymmetric block ack operation, fragment block ack operation
- Optional support for page slicing, dynamic AID assignment for an S1G AP
- Optional support for authentication control
- Optional support for SST
- Optional support for rescheduling STA's doze/awake cycle
- Optional support for either a sensor STA or a non-sensor STA
- Optional support for an EL STA

NOTE—Some NDP CMAC frames are mandatory under certain conditions as indicated in B.4.4.2.

Most S1G features help either reduce a STA's energy consumption or increase the usable range between an AP and a non-AP STA.

An S1G STA is a non-mesh STA, and a QoS STA that does not support HCCA.

4.3.13a.2 S1G Relay

The S1G relay is a mechanism for expanding the coverage area of an AP. The AP is referred to as the root AP. An S1G relay consists of an S1G relay AP and an S1G relay STA. An S1G relay forwards frames between STAs associated to its S1G relay AP and the AP to which its S1G relay STA is associated.

5. MAC service definition

5.1 Overview of MAC services

5.1.2 Security services

Insert the following paragraph at the end of 5.1.2:

An S1G STA shall not use the pairwise cipher suite selectors WEP-40, WEP-104, TKIP, or “Use group cipher suite”.

5.1.5 MAC data service architecture

Insert the following subclause (5.1.5.6, including Figure 5-7) after 5.1.5.5:

5.1.5.6 S1G Relay

An S1G relay comprises a relay AP, a relay STA and a relay function (see Figure 5-7).

A relay STA is a non-AP STA associated to a root AP or the relay AP of another relay. A relay AP is an AP that offers the relay function to its associated non-AP STAs, and provides access to the DS indirectly through the relay STA’s path to the root AP. The relay function performs local reception or selective forwarding of MSDUs between the relay STA and relay AP, based on the destination address, as described in 10.50.

The MAC data plane architecture of an S1G relay is shown in Figure 5-7.

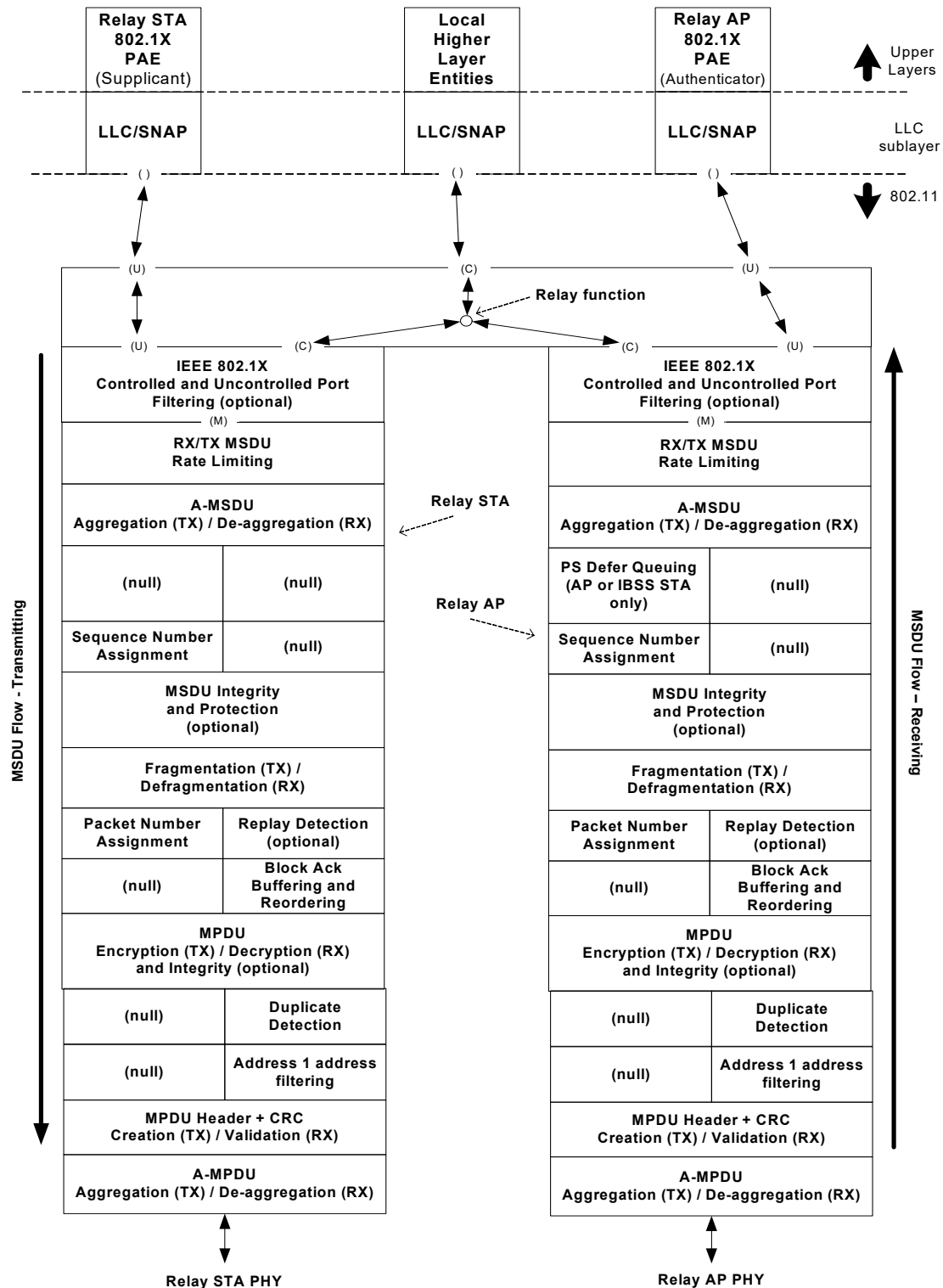


Figure 5-7—S1G relay data plane architecture

6. Layer management

6.3 MLME SAP interface

6.3.2 Power management

6.3.2.2 MLME-POWERMGT.request

6.3.2.2.2 Semantics of the service primitive

Change the primitive parameter list in 6.3.2.2.2 as follows:

The primitive parameters are as follows:

```
MLME-POWERMGT.request(
    PowerManagementMode,
    ReceiveDTIMs,
    ReceiveTIMs
)
```

Insert the following row at the end of the parameter table in 6.3.2.2.2:

Name	Type	Valid range	Description
ReceiveTIMs	Boolean	true, false	The parameter is present if dot11S1GOptionImplemented is true; otherwise not present. This parameter is set to the boolean complement of dot11NonTIMModeActivated. When true, this parameter causes the S1G STA to awaken to receive a Beacon frame, as determined by the STA's ListenInterval and the ReceiveDTIMs parameter. When this parameter is false, the S1G STA transmits at least one frame every listen interval without receiving a Beacon frame.

6.3.3 Scan

6.3.3.2 MLME-SCAN.request

6.3.3.2.2 Semantics of the service primitive

Change the primitive parameter list in 6.3.3.2.2 as follows:

The primitive parameters are as follows:

```
MLME-SCAN.request(
    BSSType,
    BSSID,
    SSID,
    ScanType,
    ActiveScanType,
    ProbeDelay,
    ChannelList,
    MinChannelTime,
    MaxChannelTime,
```

RequestInformation,
 SSID List,
 ChannelUsage,
 AccessNetworkType,
 HESSID,
 MeshID,
 DiscoveryMode,
 FILSRequestParameters,
 ReportingOption,
 APConfigurationSequenceNumber,
S1GRelayDiscovery,
PV1ProbeResponseOption,
S1GCapabilities,
ChangeSequence,
ELOperation,
MaxAwayDuration,
 VendorSpecificInfo
)

Insert the following row into the parameter table in 6.3.3.2.2 after the “ScanType” row:

Name	Type	Valid range	Description
ActiveScanType	Enumeration	FRAME, NDP	Indicates active scanning type by the transmission of either Probe Request frames or NDP Probe Request frames. This parameter is optionally present if dot11S1GOptionImplemented is true and if ScanType is ACTIVE; otherwise not present.

Insert the following rows into the parameter table in 6.3.3.2.2 before the “VendorSpecificInfo” row:

Name	Type	Valid range	Description
S1GRelayDiscovery	S1G Relay Discovery element	As defined in 9.4.2.208	Indicates link budget information and QoS requirements for relay discovery. This element is optionally present if dot11RelaySTAImplemented is true; otherwise not present.
PV1ProbeResponseOption	PV1 Probe Response Option element	As defined in 9.4.2.210	Indicates which optional information is requested to be included in the PV1 Probe Response frame. This element is optionally present if dot11PV1ProbeResponseOptionImplemented is true; otherwise not present.
S1GCapabilities	S1G Capabilities element	As defined in 9.4.2.201	Indicates S1G capabilities of an S1G STA. The S1G Capabilities element is present if dot11S1GOptionImplemented is true; otherwise not present.
ChangeSequence	Change Sequence element	As defined in 9.4.2.199	Specifies the parameters within the Change Sequence element that are supported by the MAC entity. The parameter is optionally present if dot11S1GOptionImplemented is true; otherwise not present.

Name	Type	Valid range	Description
ELOperation	EL Operation element	As defined in 9.4.2.211	Specifies the parameters within the EL Operation element that are supported by the MAC entity. The parameter is present if dot11S1GELOperationActivated is true; otherwise not present.
MaxAwayDuration	Integer	0–65 535 inclusive	Indicates the maximum duration, in TUs, that the AP is unavailable for communications with the STA. The parameter is optionally present if dot11MaxAwayDuration is nonzero; otherwise not present.

6.3.3.3 MLME-SCAN.confirm

6.3.3.3.2 Semantics of the service primitive

Change the second paragraph in 6.3.3.3.2 as follows:

Each BSSDescription consists of the parameters shown in the following table, in which the term *peer STA* refers to the STA transmitting the Beacon frame, S1G Beacon frame, or Probe Response frame, or PV1 Probe Response frame from which the BSSDescription was determined and the term *local STA* refers to the STA performing the scan, and in which the “IBSS adoption” column indicates whether

- This parameter is adopted by a STA that is joining an IBSS.
- This parameter is adopted by a STA that is a member of an IBSS that receives a beacon or S1G Beacon from a STA that is a member of the same IBSS and that has a timestamp value that is greater than the local TSF value (see 11.1.5).

Change the following row in the BSSDescriptionSet table in 6.3.3.3.2 as shown:

Name	Type	Valid range	Description	IBSS adoption
Timestamp	Integer	N/A	The timestamp of the received frame (Probe Response/ <u>Beacon, or PV1 Probe Response/S1G Beacon</u>) from the found BSS. <u>When a PV1 Probe Response or an S1G Beacon frame is received, the timestamp is reconstructed as described in 11.1.3.10.3.</u>	Adopt

Insert the following rows at the end of the BSSDescriptionSet table in 6.3.3.3.2:

Name	Type	Valid range	Description	IBSS adoption
Compressed SSID	Integer	N/A	The Compressed SSID of the received frame (PV1 Probe Response or S1G Beacon) from the found BSS. This parameter is optionally present if dot11S1GOptionImplemented is true; otherwise not present.	Adopt

Name	Type	Valid range	Description	IBSS adoption
Next TBTT	Integer	N/A	Highest 3 octets of the 4 least significant octets of the next TBTT. This parameter is optionally present if dot11S1GOptionImplemented is true; otherwise not present.	Adopt
S1G Relay Discovery	As defined in frame format	As defined in 9.4.2.208	The values from the S1G Relay Discovery element if such an element was present in the Probe Response, PV1 Probe Response, or S1G Beacon frame. More description is provided in 10.50.6.	Do not adopt
RPS	RPS element	As defined in 9.4.2.192	The parameter set for group-based restricted medium access, if such element was present in the S1G Beacon, PV1 Probe Response, or Probe Response frame, else null. The support of the feature is described on RAW-based medium access (10.22.5).	Do not adopt
Page Slice	Page Slice element	As defined in 9.4.2.193	The set of page slices present in DTIM interval, if such element was present in the S1G Beacon, or Probe Response, or PV1 Probe Response frame, else null. The support of the feature is described 10.47.	Do not adopt
S1G Capabilities	As defined in frame format	As defined in 9.4.2.201	The values from the S1G Capabilities element. The parameter is present if dot11S1GOptionImplemented is true and an S1G Capabilities element was present in the S1G Beacon, or Probe Response, or PV1 Probe Response, frame from which the BSSDescription was determined; otherwise not present.	Adopt
TSF Timer Accuracy	TSF Timer Accuracy element	As defined in 9.4.2.204	The values from the TSF Timer Accuracy element if such an element was present in the Probe Response, PV1 Probe Response, or S1G Beacon frame, else null. The parameter is optionally present if dot11TSFTimerAccuracyImplemented is true; otherwise not present.	Adopt
Change Sequence	As defined in frame format	As defined in 9.4.2.199	A Change Sequence element indicates the change of system information within a BSS. The support of the feature is described 10.42.2.	Do not adopt

Name	Type	Valid range	Description	IBSS adoption
S1GRelay	As defined in frame format	As defined in 9.4.2.205	The S1G Relay element is present in the S1G Beacon if dot11RelayAPOperationActivated is true or if dot11RelayAPIImplemented is true; otherwise not present. The S1G Relay element is optionally present in Probe Response, or PV1 Probe Response, if dot11RelayAPIImplemented is true. More description is provided in 10.50.	Do not adopt
S1GOperation	As defined in frame format	As defined in 9.4.2.213	The values from the S1G Operation element if such an element was present in the Probe Response, PV1 Probe Response, or S1G Beacon frame, else null. The parameter is optionally present if dot11S1GOptionImplemented is true; otherwise not present.	Adopt
ShortBeaconPeriod	As defined in frame format	As defined in 9.4.2.198	The short beacon period, in TUs, of the found BSS if the Short Beacon Interval element was present in the Probe Response, PV1 Probe Response, or S1G Beacon frame, else null. The parameter is optionally present if dot11S1GOptionImplemented is true; otherwise not present.	Adopt
ShortBeaconDTIM Period	As defined in frame format	As defined in 9.4.2.6	The values from the TIM element if such an element was present in the S1G Beacon frame, else null. The parameter is optionally present if dot11S1GOptionImplemented is true; otherwise not present.	Adopt
MaxAwayDuration	Integer	0–65 535 inclusive	Indicates the maximum duration, in TUs, that the AP is unavailable for communications with the STA. The parameter is optionally present if dot11MaxAwayDuration is nonzero; otherwise not present.	Do not adopt

6.3.4 Synchronization

6.3.4.2 MLME-JOIN.request

6.3.4.2.4 Effect of receipt

Insert the following paragraph at the end of 6.3.4.2.4:

If the MLME of an S1G STA receives an MLME-JOIN.request primitive with a SelectedBSS parameter containing a BSSDescription with a Basic S1G-MCS and NSS Set field in the S1G Operation element that contains any unsupported <S1G-MCS, NSS> tuple, the ResultCode parameter in the MLME's responding invocation of the MLMEJOIN.confirm primitive shall contain a value that is not SUCCESS.

6.3.5 Authenticate

6.3.5.2 MLME-AUTHENTICATE.request

6.3.5.2.3 When generated

Insert the following paragraph at the end of 6.3.5.2.3:

When dot11S1GCentralizedAuthenticationControlActivated is true and a STA's local MAC variable AuthenticationRequestTransmission is false, then the STA shall not invoke this primitive.

6.3.7 Associate

6.3.7.2 MLME-ASSOCIATE.request

6.3.7.2.2 Semantics of the service primitive

Change the primitive parameter list in 6.3.7.2.2 as follows:

The primitive parameters are as follows:

MLME-ASSOCIATE.request(
 PeerSTAAddress,
 BSSMaxIdlePeriod,
 ListenInterval,
 Supported Channels,
 RSN,
 QoSCapability,
 Content of FT Authentication elements,
 SupportedOperatingClasses,
 SM Power Save,
 QoSTrafficCapability,
 TIMBroadcastRequest,
 EmergencyServices,
 DMG Capabilities,
 Multi-band local,
 Multi-band peer,
 MMS,
 FILSHLPContainer,
 FILSIPAddressAssignment,
 AID Request,
 S1G Capabilities.)