**IEEE P802.11
Wireless LANs**

|  |
| --- |
| **1024 QAM for S1G** |
| **Date: 2023-03-07** |
| **Author(s):** |
| **Name** | **Affiliation** | **Address** | **Phone** | **email** |
| **David Halasz** | **Morse Micro** |  |  | **dave.halasz@morsemicro.com** |
| **Surendra Raju** | **Morse Micro** |  |  | **surendra.raju@morsemicro.com** |

**Abstract**

This document adds 1024 QAM to S1G.

*Discussion:*

Changes are made from IEEE P802.11-REVme/D2.0

Companion presentation is 11-23-0038-00-0wng-S1G+FollowUp.pptx

22/0039r1, Formatting on data rates in S1G-MCS tables. Update Table 23-44 MCS 12 data rate value.

22/0039r2, Update header to the correct year.

22/0039r3,

* Remove the creation of the S1G Extended Capabilities IE and use the S1G Capabilities IE for the Extended Supported S1G MCS and NSS Set.
* In the Extended Supported S1G-MCS and NSS Set subfields, added clarification text to “all channels”.
* Updated the PICS

22/0039r4, Updated Table 23-32, MCS Index for Preferred MCS value 11-12.

22/0039r5, Updates from TGme review call on February 27, 2023.

22/0039r6,

* Editorial change to note added in section 9.4.2.200.3
* Added cross reference in section 9.4.2.200.3
* Removed some text in section 23.3.17.4.3 regarding constellation error

*Proposed change for clause 3.2 :*

**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, 1024-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).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

*Proposed change for clause 9.4.2.200.1 S1G Capabilities element structure*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | S1G Capabilities Information | Supported S1G-MCS and NSS Set | Extended Supported S1G-MCS and NSS Set |
| Octets: | 1 | 1 | 10 | 5 | 2 |

**Figure 9-772— S1G Capabilities element format**

*Proposed change for clause 9.4.2.200.3 Supported S1G-MCS and NSS Set field : (First paragraph)*

The Supported S1G-MCS and NSS Set field and the Extended Supported S1G-MCS and NSS Set field ~~is~~are used to convey the combinations of S1G-MCSs and spatial streams that a STA supports for reception and the combinations that it supports for transmission.

NOTE- The Extended Supported S1G-MCS and NSS Set field not being present will convey that neither S1G-MCS 11 nor S1G-MCS 12 are supported. (see 9.4.2.200.4 (Extended Supported S1G-MCS and NSS Set field))

*Proposed change for clause 9.4.2.200.3 Supported S1G-MCS and NSS Set field : (Figure 9-775)*

**Figure 9-775 Rx S1G-MCS Map and Tx S1G-MCS Map subfields ~~and Basic S1G-MCS and NSS Set field format~~**

The Max S1G-MCS for *n* SS subfield (where *n*=1,...,4) is encoded as follows:

— 0 indicates support for S1G-MCS 2 for n spatial streams

— 1 indicates support for S1G-MCS 7 for n spatial streams

— 2 indicates support for S1G-MCS 9 or more (see 9.4.2.200.4 (Extended Supported S1G-MCS and NSS Set field)) for n spatial streams

— 3 indicates that n spatial streams is not supported

*Proposed change for clause 9.4.2.200 Add 9.4.2.200.4 Extended Supported S1G-MCS and NSS Set field :*

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |

**9.4.2.200.4 Extended Supported S1G-MCS and NSS Set field**

The Extended Supported S1G-MCS and NSS Set field is used to convey the combinations of S1G-MCSs and spatial streams that a STA supports for reception and the combinations that it supports for transmission. The structure of the field is shown in Figure 9-<YY2> (Extended Supported S1G-MCS and NSS Set field format).

|  |  |  |
| --- | --- | --- |
|   | B0 B7 | B8 B15 |
|   | Ext Rx S1G-MCSMap | Ext Tx S1G-MCSMap |
| Bits: | 8 | 8 |
|  **Figure 9-<YY2>—Extended Supported S1G-MCS and NSS Set field format** |

The Extended Supported S1G-MCS and NSS Set subfields are defined in Table 9-YY3 (Extended Supported S1G-MCS and NSS Set subfields).

|  |
| --- |
|  **Table 9-YY3—Extended Supported S1G-MCS and NSS Set subfields** |
| **Subfield** | **Definition** | **Encoding** |
| Ext Rx S1G-MCS Map | Indicates the maximum value of the RXVECTOR parameter MCS of a PPDU that can be received at all channel widths, where the MCS is valid for the channel width, supported by this STA for each number of spatial streams. | The format and encoding of this subfield are defined in Figure 9-YY4 (Ext Rx S1G-MCS Map and Ext Tx S1G-MCS Map subfields) and the associated description.  |
| Ext Tx S1G-MCS Map | Indicates the maximum value of the TXVECTOR parameter MCS of a PPDU that can be transmitted at all channel widths, where the MCS is valid for the channel width, supported by this STA for each number of spatial streams. | The format and encoding of this subfield are defined in Figure 9-YY4 (Ext Rx S1G-MCS Map and Ext Tx S1G-MCS Map subfields) and the associated description. |

 The Rx S1G-MCS Map subfield and the Tx S1G-MCS Map subfield have the structure shown in Figure 9-YY4 (Rx S1G-MCS Map and Tx S1G-MCS Map subfields and Basic S1G-MCS and NSS Set field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | B0 B1 | B2 B3 | B4 B5 | B6 B7 |
|   | Ext Max S1G-MCS For 1 SS | Ext Max S1G-MCS For 2 SS | Ext Max S1G-MCS For 3 SS | Ext Max S1G-MCS For 4 SS |
| Bits: | 2 | 2 | 2 | 2 |
|  **Figure 9-YY4—Ext Rx S1G-MCS Map and Ext Tx S1G-MCS Map subfields** |

The Max S1G-MCS for n SS subfield (where n=1,...,4) is encoded as follows:

— 0 indicates support for S1G-MCS 11 for n spatial streams

— 1 indicates support for S1G-MCS 12 for n spatial streams

— 2 is reserved

— 3 indicates that n spatial streams is not supported for S1G-MCS 11

OTE-Neither S1G-MCS 11 nor S1G-MCS 12 can be in the basic S1G-MCS and NSS set.

*Proposed change for clause 10.6.6.5.3 :*

2) Find the highest rate MCS or <S1G-MCS, NSS> tuple of the CandidateMCSSet for which the modulation value of each stream is less than or equal to the modulation value of each stream of the MCS of the received frame and for which the coding rate is less than or equal to the coding rate of the MCS from the received frame. This MCS or <S1G-MCS, NSS> tuple is the primary MCS for the response transmission. The mapping from MCS or <S1G-MCS, NSS> tuple to modulation and coding rate is dependent on the attached PHY; see 23.5 (Parameters for S1G-MCSs). For the purpose of comparing modulation values, the following sequence shows increasing modulation values: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM.

*Proposed change for clause 10.6.14 Rate selection constraints for S1G STAs :*

**10.6.14 Rate selection constraints for S1G STAs**

**10.6.14.1 RX Supported S1G-MCS and NSS Set**

The Rx Supported S1G-MCS and NSS Set of an S1G STA is determined for each <S1G-MCS, NSS> tuple NSS = 1, …, 4 and bandwidth (1 MHz, 2 MHz, 4 MHz, 8 MHz, and 16 MHz) from its Supported S1G-MCS and NSS Set field and Extended Supported S1G-MCS and NSS Set field as follows:

— If the Extended Supported S1G-MCS and NSS Set field is present then if the Ext Max S1G-MCS For n SS subfield (n = NSS) in the Ext Rx S1G-MCS Map field indicates support then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on receive.

— Otherwise, i~~I~~f support for the S1G-MCS for NSS spatial streams at that bandwidth is mandatory (see 23.5 (Parameters for S1G-MCSs)), then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on receive.

— Otherwise, if the Max S1G-MCS For n SS subfield (n = NSS) in the Rx S1G-MCS Map field indicates support and the Rx Highest Supported Long GI Data Rate subfield is equal to 0, then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on receive.

— Otherwise, if the Max S1G-MCS For n SS subfield (n = NSS) in the Rx S1G-MCS Map subfield indicates support and the data rate (expressed in megabits per second) for long GI of the MCS for NSS spatial streams at that bandwidth (if the data rate is not an integer, the data rate value is rounded down to the next integer) is less than or equal to the rate represented by the Rx Highest Supported Long GI Data Rate subfield, then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on receive.

— Otherwise the <S1G-MCS, NSS> tuple at that bandwidth is not supported by the STA on receive.

An S1G STA shall not, unless explicitly stated otherwise, transmit an S1G PPDU unless the <S1G-MCS, NSS> tuple and bandwidth used are in the Rx Supported S1G-MCS and NSS Set of the receiving STA(s) or the Extended Supported S1G-MCS and NSS Set.

NOTE—Support for a <S1G-MCS, NSS> tuple at a given bandwidth implies support for long GI.

**10.6.14.2 TX Supported S1G-MCS and NSS Set**

The Tx Supported S1G-MCS and NSS Set of an S1G STA is determined for each <S1G-MCS, NSS> tuple NSS = 1, …, 4 and bandwidth (1 MHz, 2 MHz, 4 MHz, 8 MHz, and 16 MHz) from its Supported S1G-MCS and NSS Set field and Extended Supported S1G-MCS and NSS set field as follows:

— If the Extended Supported S1G-MCS and NSS Set field is present then if the Ext Max S1G-MCS for n SS subfield (n = NSS) in the Ext Tx S1G-MCS Map subfield indicates support then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on transmit.

— Otherwise, i~~I~~f support for the <S1G-MCS, NSS> tuple at that bandwidth is mandatory (see 23.5 (Parameters for S1G-MCSs)), then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on transmit.

— Otherwise if the Max S1G-MCS for n SS subfield (n = NSS) in the Tx S1G-MCS Map subfield indicates support and the Tx Highest Supported Long GI Data Rate subfield is equal to 0, then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on transmit.

— Otherwise if the Max S1G-MCS for n SS subfield (n = NSS) in the Tx S1G-MCS Map subfield indicates support and the data rate (expressed in megabits per second) for long GI of the <S1G-MCS, NSS> tuple at that bandwidth (if the data rate is not an integer, the data rate value is rounded down to the next integer) is less than or equal to the rate represented by the Tx Highest Supported Long GI Data Rate subfield, then the <S1G-MCS, NSS> tuple at that bandwidth is supported by the STA on transmit.

— Otherwise the <S1G-MCS, NSS> tuple at that bandwidth is not supported by the STA on transmit.

*Proposed change for clause 23.1.1 Introduction to the S1G PHY:*

The S1G PHY data subcarriers are modulated using binary phase shift keying (BPSK), quadrature phase shift keying (QPSK), 16-quadrature amplitude modulation (16-QAM), 64-QAM ~~and~~, 256-QAM and 1024 QAM. Forward error correction (FEC) coding (convolutional or LDPC coding) is used with coding rates of 1/2, 2/3, 3/4, and 5/6.

*Proposed change for clause 23.2.2 TXVECTOR and RXVECTOR parameters, Table 23-1:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Condition | Value | **TXVECTOR** | **RXVECTOR** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MCS | FORMAT is S1Gand(CH\_BANDWIDTH is CBW2 or CBW4 or CBW8 or CBW16) | Indicates the modulation and coding scheme used in the transmission of the PPDU.Integer: range 0 to 9, 11 and 12 | MU | Y |
| FORMAT is S1G\_DUP\_2M | Indicates the modulation and coding scheme used in the transmission of the PPDU.Integer: range 0 to 9, 11 and 12 | Y | Y |
| Otherwise | Indicates the modulation and coding scheme used in the transmission of the PPDU.Integer: range 0 to 1~~0~~2 | Y | Y |
| REC\_MCS | FORMAT is [S1G with (CH\_BANDWIDTH is CBW2 or CBW4 or CBW8 or CBW16)] or S1G\_DUP\_2M | Indicates the MCS that the STA’s receiver recommends.Integer: range 0 to 9, 11 and 12 | N | O |
| Otherwise | Indicates the MCS that the STA’s receiver recommends.Integer: range 0 to 1~~0~~2 | N | O |

*Note : The following are changes under 23.3.4.6 “Construction of Data field in S1G SU PPDUs for all cases except 1 MHz MCS 10”*

*Proposed change for clause 23.3.4.6.1 Using BCC:*

h) Constellation mapper: Map to BPSK, QPSK, 16-QAM, 64-QAM, ~~or~~ 256-QAM, or 1024-QAM constellation points as described in 23.3.9.9 (Constellation mapping).

*Proposed change for clause 23.3.4.6.2 Using LDPC:*

g) Constellation mapper: Map to BPSK, QPSK, 16-QAM, 64-QAM, ~~or~~ 256-QAM, or 1024-QAM constellation points as described in 23.3.9.9 (Constellation mapping).

*Proposed change for clause 23.3.9.9.1:*

The constellation mappings for S1G PPDUs modulated using MCS 0 to MCS 9 are the same as those specified in 21.3.10.9.1 (General) with the same MCS indices. The constellation mappings for S1G PPDUs modulated using MCS 11 and MCS 12 are the same as those specified in 27.3.12.9 for 1024-QAM.

The constellation mapping for 1 MHz MCS 10 is identical to the BPSK constellation mapping that is applied in MCS 0.

*Proposed change for clause 23.3.12.2.3.1:*

The Preferred MCS field indicates the preferred MCS level for a 2 MHz channel width of the STA for downlink transmission. Mapping between Preferred MCS value and corresponding MCS index is shown in Table 23-32 (Preferred MCS subfield values for NDP\_2M PS-Poll frame).

|  |
| --- |
|  Table 23-32—Preferred MCS subfield values for NDP\_2M PS-Poll frame |
| Preferred MCS value | MCS Index | Description |
| 0–9 | 0–9 | The value represents the MCS index for the STA’s preferred MCS level. |
| 10 | No Preference |   |
| 11–1~~5~~2 | ~~Reserved~~11-12 | The value represents the MCS index for the STA’s preferred MCS level. |
| 13-15 | Reserved |  |

*Proposed change for clause 23.3.17.4.3 Transmitter constellation error:*

|  |
| --- |
|  Table 23-34—Allowed relative constellation error versus constellation size and coding rate  |
| Modulation | Coding rate | Relative constellation error (dB) |
| BPSK | 1/2 with 2× repetition | –4 |
| BPSK | 1/2 | –5 |
| QPSK | 1/2 | –10 |
| QPSK | 3/4 | –13 |
| 16-QAM | 1/2 | –16 |
| 16-QAM | 3/4 | –19 |
| 64-QAM | 2/3 | –22 |
| 64-QAM | 3/4 | –25 |
| 64-QAM | 5/6 | –27 |
| 256-QAM | 3/4 | –30 |
| 256-QAM | 5/6 | –32 |
| 1024-QAM | 3/4 | -35/-32 |
| 1024-QAM | 5/6 | -35/-32 |

For 1024-QAM, the relative constellation error shall meet the following requirements:

— The relative constellation error shall be less than or equal to –35 dB with amplitude drift compensation enabled in the test equipment, and the relative constellation error shall be less than or equal to –32 dB with amplitude drift compensation disabled in the test equipment.

For all other constellations, the relative constellation error shall be less than or equal to the values in Table 23-34 (Allowed relative constellation error versus constellation size and coding rate) regardless of whether amplitude drift compensation is enabled in the test equipment.

*Proposed change for clause 23.3.18.1 Receiver minimum input level sensitivity:*

|  |
| --- |
|  Table 23-35—Receiver minimum input level sensitivity  |
| **Modulation** | **Rate (R)** | **Minimum sensitivity****(1 MHz PPDU)****(dBm)** | **Minimum sensitivity****(2 MHz PPDU)****(dBm)** | **Minimum sensitivity****(4 MHz PPDU)****(dBm)** | **Minimum sensitivity****(8 MHz PPDU)****(dBm)** | **Minimum sensitivity****(16 MHz PPDU)****(dBm)** |
| BPSK | 1/2 with 2× repetition | –98 | N/A | N/A | N/A | N/A |
| BPSK | 1/2 | –95 | –92 | –89 | –86 | –83 |
| QPSK | 1/2 | –92 | –89 | –86 | –83 | –80 |
| QPSK | 3/4 | –90 | –87 | –84 | –81 | –78 |
| 16-QAM | 1/2 | –87 | –84 | –81 | –78 | –75 |
| 16-QAM | 3/4 | –83 | –80 | –77 | –74 | –71 |
| 64-QAM | 2/3 | –79 | –76 | –73 | –70 | –67 |
| 64-QAM | 3/4 | –78 | –75 | –72 | –69 | –66 |
| 64-QAM | 5/6 | –77 | –74 | –71 | –68 | –65 |
| 256-QAM | 3/4 | –72 | –69 | –66 | –63 | –60 |
| 256-QAM | 5/6 | –70 | –67 | –64 | –61 | –58 |
| 1024-QAM | 3/4 | -67 | -64 | -61 | -58 | -55 |
| 1024-QAM | 5/6 | -65 | -62 | -59 | -56 | -53 |

*Proposed change for clause 23.3.18.2 Adjacent channel rejection:*

|  |
| --- |
|  Table 23-36—Minimum required adjacent and nonadjacent channel rejection levels  |
| Modulation | Rate, R | Adjacent Channel Rejection(dB) | Nonadjacent Channel Rejection(dB) |
| 1 MHz Channel | 2/4/8/16 MHz Channel | 1 MHzChannel | 2/4/8/16 MHz Channel |
| BPSK | 1/2 with2× repetition | 19 |  N/A | 35 | N/A |
| BPSK |  1/2 | 16 | 16 | 32 | 32 |
| QPSK |  1/2 | 13 | 13 | 29 | 29 |
| QPSK |  3/4 | 11 | 11 | 27 | 27 |
| 16-QAM |  1/2 | 8 | 8 | 24 | 24 |
| 16-QAM |  3/4 | 4 | 4 | 20 | 20 |
| 64-QAM |  2/3 | 0 | 0 | 16 | 16 |
| 64-QAM |  3/4 | –1 | –1 | 15 | 15 |
| 64-QAM |  5/6 | –2 | –2 | 14 | 14 |
| 256-QAM |  3/4 | –7 | –7 | 9 | 9 |
| 256-QAM |  5/6 | –9 | –9 | 7 | 7 |
| 1024-QAM | 3/4 | -12 | -12 | 4 | 4 |
| 1024-QAM | 5/6 | -14 | -14 | 2 | 2 |

*Proposed change for clause 23.5:*

* **Parameters for S1G-MCSs**

The rate-dependent parameters for 1 MHz, 2 MHz, 4 MHz, 8 MHz, and 16 MHz, *Nss* = 1,...,4 are given in Table 23-42 (S1G-MCSs for 1 MHz, Nss = 1) to Table 23-61 (S1G-MCSs for 16 MHz, Nss = 4). Support for 4 μs GI is optional in all cases. Support for MCS 8 and 9 (when valid) is optional in all cases. Support for MCS 11 and 12 (when valid) is optional in all cases. An S1G AP-STA shall support single spatial stream MCSs within the range MCS 0 to MCS 7 for all channel widths for which it has indicated support regardless of the Tx or Rx Highest Supported Data Rate subfield values in the ~~VHT Supported MCS Set field~~Supported S1G-MCS and NSS Set and Extended Supported S1G-MCS and NSS Set fields. (#306)A non-AP S1G STA shall support single spatial stream MCSs within the range MCS 0 to MCS 2 for 1 and 2 MHz channel widths. When more than one spatial stream is supported, the Tx or Rx Highest Supported Data Rate subfield values in the ~~VHT Supported MCS Set field~~Supported S1G-MCS and NSS Set and Extended Supported S1G-MCS and NSS Set fields may result in a reduced MCS range (cut-off) for greater than one spatial stream. Support for 1 MHz and 2 MHz with *Nss* = 1 is mandatory. Support for 1 and 2 MHz with *Nss* = 2,3,4 is optional. Support for 4 MHz, 8 MHz, and 16 MHz with *Nss* = 1,...,4 is optional.

NOTE—When LDPC is used with MCS 10, the resulting *NCBPS* is 12 because the 2× repetition is applied after the LDPC encoding procedure.

|  |
| --- |
| * **S1G-MCSs for 1 MHz, *Nss* = 1**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 24 | 2 | 24 | 12 | 1 | 300.0 | 333.3 |
| 1 | QPSK |  1/2 | 2 | 24 | 2 | 48 | 24 | 1 | 600.0 | 666.7 |
| 2 | QPSK |  3/4 | 2 | 24 | 2 | 48 | 36 | 1 | 900.0 | 1000.0 |
| 3 | 16-QAM |  1/2 | 4 | 24 | 2 | 96 | 48 | 1 | 1200.0 | 1333.3 |
| 4 | 16-QAM |  3/4 | 4 | 24 | 2 | 96 | 72 | 1 | 1800.0 | 2000.0 |
| 5 | 64-QAM |  2/3 | 6 | 24 | 2 | 144 | 96 | 1 | 2400.0 | 2666.7 |
| 6 | 64-QAM |  3/4 | 6 | 24 | 2 | 144 | 108 | 1 | 2700.0 | 3000.0 |
| 7 | 64-QAM |  5/6 | 6 | 24 | 2 | 144 | 120 | 1 | 3000.0 | 3333.3 |
| 8 | 256-QAM |  3/4 | 8 | 24 | 2 | 192 | 144 | 1 | 3600.0 | 4000.0 |
| 9 | 256-QAM |  5/6 | 8 | 24 | 2 | 192 | 160 | 1 | 4000.0 | 4444.4 |
| 10 | BPSK | 1/2 with2× repetition  | 1 | 24 | 2 | 24 | 6 | 1 | 150.0 | 166.7 |
| 11 | 1024-QAM | 3/4 | 10 | 24 | 2 | 240 | 180 | 1 | 4500 | 5000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 24 | 2 | 240 | 200 | 1 | 5000 | 5555.6 |

|  |
| --- |
| * **S1G-MCSs for 1 MHz, *Nss* = 2**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 24 | 2 | 48 | 24  | 1 | 600.0 | 666.7 |
| 1 | QPSK |  1/2 | 2 | 24 | 2 | 96 | 48  | 1 | 1200.0 | 1333.3 |
| 2 | QPSK |  3/4 | 2 | 24 | 2 | 96 | 72  | 1 | 1800.0 | 2000.0 |
| 3 | 16-QAM |  1/2 | 4 | 24 | 2 | 192 | 96  | 1 | 2400.0 | 2666.7 |
| 4 | 16-QAM |  3/4 | 4 | 24 | 2 | 192 | 144  | 1 | 3600.0 | 4000.0 |
| 5 | 64-QAM |  2/3 | 6 | 24 | 2 | 288 | 192  | 1 | 4800.0 | 5333.3 |
| 6 | 64-QAM |  3/4 | 6 | 24 | 2 | 288 | 216  | 1 | 5400.0 | 6000.0 |
| 7 | 64-QAM |  5/6 | 6 | 24 | 2 | 288 | 240  | 1 | 6000.0 | 6666.7 |
| 8 | 256-QAM |  3/4 | 8 | 24 | 2 | 384 | 288  | 1 | 7200.0 | 8000.0 |
| 9 | 256-QAM |  5/6 | 8 | 24 | 2 | 384 | 320  | 1 | 8000.0 | 8888.9 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 24 | 2 | 480 | 360 | 1 | 9000 | 10000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 24 | 2 | 480 | 400 | 1 | 10000 | 11111.1 |

|  |
| --- |
| * **S1G-MCSs for 1 MHz, *Nss* = 3**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 24 | 2 | 72 | 36  | 1 | 900.0 | 1000.0 |
| 1 | QPSK |  1/2 | 2 | 24 | 2 | 144 | 72  | 1 | 1800.0 | 2000.0 |
| 2 | QPSK |  3/4 | 2 | 24 | 2 | 144 | 108  | 1 | 2700.0 | 3000.0 |
| 3 | 16-QAM |  1/2 | 4 | 24 | 2 | 288 | 144  | 1 | 3600.0 | 4000.0 |
| 4 | 16-QAM |  3/4 | 4 | 24 | 2 | 288 | 216  | 1 | 5400.0 | 6000.0 |
| 5 | 64-QAM |  2/3 | 6 | 24 | 2 | 432 | 288  | 1 | 7200.0 | 8000.0 |
| 6 | 64-QAM |  3/4 | 6 | 24 | 2 | 432 | 324  | 1 | 8100.0 | 9000.0 |
| 7 | 64-QAM |  5/6 | 6 | 24 | 2 | 432 | 360  | 1 | 9000.0 | 10 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 24 | 2 | 576 | 432  | 1 | 10800.0 | 12000.0 |
| 9 | 256-QAM |  5/6 | 8 | 24 | 2 | 576 | 480  | 1 | 12000.0 | 13333.3 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 24 | 2 | 720 | 540 | 1 | 13500 | 15000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 24 | 2 | 720 | 600 | 1 | 15000 | 16666.7 |

|  |
| --- |
| * **S1G-MCSs for 1 MHz, *Nss* = 4**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 24 | 2 | 96 | 48  | 1 | 1200.0 | 1333.3 |
| 1 | QPSK |  1/2 | 2 | 24 | 2 | 192 | 96  | 1 | 2400.0 | 2666.7 |
| 2 | QPSK |  3/4 | 2 | 24 | 2 | 192 | 144  | 1 | 3600.0 | 4000.0 |
| 3 | 16-QAM |  1/2 | 4 | 24 | 2 | 384 | 192  | 1 | 4800.0 | 5333.3 |
| 4 | 16-QAM |  3/4 | 4 | 24 | 2 | 384 | 288  | 1 | 7200.0 | 8000.0 |
| 5 | 64-QAM |  2/3 | 6 | 24 | 2 | 576 | 384  | 1 | 9600.0 | 10 666.7 |
| 6 | 64-QAM |  3/4 | 6 | 24 | 2 | 576 | 432  | 1 | 10 800.0 | 12 000.0 |
| 7 | 64-QAM |  5/6 | 6 | 24 | 2 | 576 | 480  | 1 | 12 000.0 | 13 333.3 |
| 8 | 256-QAM |  3/4 | 8 | 24 | 2 | 768 | 576  | 1 | 14 400.0 | 16 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 24 | 2 | 768 | 640  | 1 | 16 000.0 | 17 777.8 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 24 | 2 | 960 | 720 | 1 | 18000 | 20000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 24 | 2 | 960 | 800 | 1 | 20000 | 22222.2 |
| * **S1G-MCSs for 2 MHz, *Nss* = 1**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 52 | 4 | 52 | 26  | 1 | 650.0 | 722.2 |
| 1 | QPSK |  1/2 | 2 | 52 | 4 | 104 | 52  | 1 | 1300.0 | 1444.4 |
| 2 | QPSK |  3/4 | 2 | 52 | 4 | 104 | 78  | 1 | 1950.0 | 2166.7 |
| 3 | 16-QAM |  1/2 | 4 | 52 | 4 | 208 | 104  | 1 | 2600.0 | 2888.9 |
| 4 | 16-QAM |  3/4 | 4 | 52 | 4 | 208 | 156  | 1 | 3900.0 | 4333.3 |
| 5 | 64-QAM |  2/3 | 6 | 52 | 4 | 312 | 208  | 1 | 5200.0 | 5777.8 |
| 6 | 64-QAM |  3/4 | 6 | 52 | 4 | 312 | 234  | 1 | 5850.0 | 6500.0 |
| 7 | 64-QAM |  5/6 | 6 | 52 | 4 | 312 | 260  | 1 | 6500.0 | 7222.2 |
| 8 | 256-QAM |  3/4 | 8 | 52 | 4 | 416 | 312  | 1 | 7800.0 | 8666.7 |
| 9 | Not valid |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 52 | 4 | 520 | 390 | 1 | 9750 | 10833.3 |
| 12 | Not Valid |

|  |
| --- |
| * **S1G-MCSs for 2 MHz, *Nss* = 2**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 52 | 4 | 104 | 52  | 1 | 1300.0 | 1444.4 |
| 1 | QPSK |  1/2 | 2 | 52 | 4 | 208 | 104  | 1 | 2600.0 | 2888.9 |
| 2 | QPSK |  3/4 | 2 | 52 | 4 | 208 | 156  | 1 | 3900.0 | 4333.3 |
| 3 | 16-QAM |  1/2 | 4 | 52 | 4 | 416 | 208  | 1 | 5200.0 | 5777.8 |
| 4 | 16-QAM |  3/4 | 4 | 52 | 4 | 416 | 312  | 1 | 7800.0 | 8666.7 |
| 5 | 64-QAM |  2/3 | 6 | 52 | 4 | 624 | 416  | 1 | 10 400.0 | 11 555.6 |
| 6 | 64-QAM |  3/4 | 6 | 52 | 4 | 624 | 468  | 1 | 11 700.0 | 13 000.0 |
| 7 | 64-QAM |  5/6 | 6 | 52 | 4 | 624 | 520  | 1 | 13 000.0 | 14 444.4 |
| 8 | 256-QAM |  3/4 | 8 | 52 | 4 | 832 | 624  | 1 | 15 600.0 | 17 333.3 |
| 9 | Not valid |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 52 | 4 | 1024 | 780 | 1 | 19500 | 21666.7 |
| 12 | Not valid |
| * **S1G-MCSs for 2 MHz, *Nss* = 3**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 52 | 4 | 156 | 78  | 1 | 1950.0 | 2166.7 |
| 1 | QPSK |  1/2 | 2 | 52 | 4 | 312 | 156  | 1 | 3900.0 | 4333.3 |
| 2 | QPSK |  3/4 | 2 | 52 | 4 | 312 | 234  | 1 | 5850.0 | 6500.0 |
| 3 | 16-QAM |  1/2 | 4 | 52 | 4 | 624 | 312  | 1 | 7800.0 | 8666.7 |
| 4 | 16-QAM |  3/4 | 4 | 52 | 4 | 624 | 468  | 1 | 11 700.0 | 13 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 52 | 4 | 936 | 624  | 1 | 15 600.0 | 17 333.3 |
| 6 | 64-QAM |  3/4 | 6 | 52 | 4 | 936 | 702  | 1 | 17 550.0 | 19 500.0 |
| 7 | 64-QAM |  5/6 | 6 | 52 | 4 | 936 | 780  | 1 | 19 500.0 | 21 666.7 |
| 8 | 256-QAM |  3/4 | 8 | 52 | 4 | 1248 | 936  | 1 | 23 400.0 | 26 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 52 | 4 | 1248 | 1040  | 1 | 26 000.0 | 28 888.9 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 52 | 4 | 1560 | 1170 | 1 | 29250 | 32500.0 |
| 12 | 1024-QAM | 5/6 | 10 | 52 | 4 | 1560 | 1300 | 1 | 32500 | 36111.1 |

|  |
| --- |
| * **S1G-MCSs for 2 MHz, *Nss* = 4**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 52 | 4 | 208 | 104  | 1 | 2600.0 | 2888.9 |
| 1 | QPSK |  1/2 | 2 | 52 | 4 | 416 | 208  | 1 | 5200.0 | 5777.8 |
| 2 | QPSK |  3/4 | 2 | 52 | 4 | 416 | 312  | 1 | 7800.0 | 8666.7 |
| 3 | 16-QAM |  1/2 | 4 | 52 | 4 | 832 | 416  | 1 | 10 400.0 | 11 555.6 |
| 4 | 16-QAM |  3/4 | 4 | 52 | 4 | 832 | 624  | 1 | 15 600.0 | 17 333.3 |
| 5 | 64-QAM |  2/3 | 6 | 52 | 4 | 1248 | 832  | 1 | 20 800.0 | 23 111.1 |
| 6 | 64-QAM |  3/4 | 6 | 52 | 4 | 1248 | 936  | 1 | 23 400.0 | 26 000.0 |
| 7 | 64-QAM |  5/6 | 6 | 52 | 4 | 1248 | 1040  | 1 | 26 000.0 | 28 888.9 |
| 8 | 256-QAM |  3/4 | 8 | 52 | 4 | 1664 | 1248  | 1 | 31 200.0 | 34 666.7 |
| 9 | Not valid |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 52 | 4 | 2080 | 1560 | 1 | 39000 | 43333.3 |
| 12 | Not valid |
| * **S1G-MCSs for 4 MHz, *Nss* = 1**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 108 | 6 | 108 | 54  | 1 | 1350.0 | 1500.0 |
| 1 | QPSK |  1/2 | 2 | 108 | 6 | 216 | 108  | 1 | 2700.0 | 3000.0 |
| 2 | QPSK |  3/4 | 2 | 108 | 6 | 216 | 162  | 1 | 4050.0 | 4500.0 |
| 3 | 16-QAM |  1/2 | 4 | 108 | 6 | 432 | 216  | 1 | 5400.0 | 6000.0 |
| 4 | 16-QAM |  3/4 | 4 | 108 | 6 | 432 | 324  | 1 | 8100.0 | 9000.0 |
| 5 | 64-QAM |  2/3 | 6 | 108 | 6 | 648 | 432  | 1 | 10 800.0 | 12 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 108 | 6 | 648 | 486  | 1 | 12 150.0 | 13 500.0 |
| 7 | 64-QAM |  5/6 | 6 | 108 | 6 | 648 | 540  | 1 | 13 500.0 | 15 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 108 | 6 | 864 | 648  | 1 | 16 200.0 | 18 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 108 | 6 | 864 | 720  | 1 | 18 000.0 | 20 000.0 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 108 | 6 | 1080 | 810 | 1 | 20250 | 22500.0 |
| 12 | 1024-QAM | 5/6 | 10 | 108 | 6 | 1080 | 900 | 1 | 22500 | 25000.0 |

|  |
| --- |
| * **S1G-MCSs for 4 MHz, *Nss* = 2**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 108 | 6 | 216 | 108  | 1 | 2700.0 | 3000.0 |
| 1 | QPSK |  1/2 | 2 | 108 | 6 | 432 | 216  | 1 | 5400.0 | 6000.0 |
| 2 | QPSK |  3/4 | 2 | 108 | 6 | 432 | 324  | 1 | 8100.0 | 9000.0 |
| 3 | 16-QAM |  1/2 | 4 | 108 | 6 | 864 | 432  | 1 | 10 800.0 | 12 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 108 | 6 | 864 | 648  | 1 | 16 200.0 | 18 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 108 | 6 | 1296 | 864  | 1 | 21 600.0 | 24 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 108 | 6 | 1296 | 972  | 1 | 24 300.0 | 27 000.0 |
| 7 | 64-QAM |  5/6 | 6 | 108 | 6 | 1296 | 1080  | 1 | 27 000.0 | 30 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 108 | 6 | 1728 | 1296  | 1 | 32 400.0 | 36 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 108 | 6 | 1728 | 1440  | 1 | 36 000.0 | 40 000.0 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 108 | 6 | 2160 | 1620 | 1 | 40500 | 45000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 108 | 6 | 2160 | 1800 | 1 | 45000 | 50000.0 |
| * **S1G-MCSs for 4 MHz, *Nss* = 3**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 108 | 6 | 324 | 162  | 1 | 4050.0 | 4500.0 |
| 1 | QPSK |  1/2 | 2 | 108 | 6 | 648 | 324  | 1 | 8100.0 | 9000.0 |
| 2 | QPSK |  3/4 | 2 | 108 | 6 | 648 | 486  | 1 | 12 150.0 | 13 500.0 |
| 3 | 16-QAM |  1/2 | 4 | 108 | 6 | 1296 | 648  | 1 | 16 200.0 | 18 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 108 | 6 | 1296 | 972  | 1 | 24 300.0 | 27 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 108 | 6 | 1944 | 1296  | 1 | 32 400.0 | 36 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 108 | 6 | 1944 | 1458  | 1 | 36 450.0 | 40 500.0 |
| 7 | 64-QAM |  5/6 | 6 | 108 | 6 | 1944 | 1620  | 1 | 40 500.0 | 45 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 108 | 6 | 2592 | 1944  | 1 | 48 600.0 | 54 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 108 | 6 | 2592 | 2160  | 1 | 54 000.0 | 60 000.0 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 108 | 6 | 3240 | 2430 | 1 | 60750 | 67500.0 |
| 12 | 1024-QAM | 5/6 | 10 | 108 | 6 | 3240 | 2700 | 1 | 67500 | 75000.0 |

|  |
| --- |
| * **S1G-MCSs for 4 MHz, *Nss* = 4**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 108 | 6 | 432 | 216  | 1 | 5400.0 | 6000.0 |
| 1 | QPSK |  1/2 | 2 | 108 | 6 | 864 | 432  | 1 | 10 800.0 | 12 000.0 |
| 2 | QPSK |  3/4 | 2 | 108 | 6 | 864 | 648  | 1 | 16 200.0 | 18 000.0 |
| 3 | 16-QAM |  1/2 | 4 | 108 | 6 | 1728 | 864  | 1 | 21 600.0 | 24 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 108 | 6 | 1728 | 1296  | 1 | 32 400.0 | 36 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 108 | 6 | 2592 | 1728  | 1 | 43 200.0 | 48 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 108 | 6 | 2592 | 1944  | 1 | 48 600.0 | 54 000.0 |
| 7 | 64-QAM |  5/6 | 6 | 108 | 6 | 2592 | 2160  | 1 | 54 000.0 | 60 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 108 | 6 | 3456 | 2592  | 1 | 64 800.0 | 72 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 108 | 6 | 3456 | 2880  | 1 | 72 000.0 | 80 000.0 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 108 | 6 | 4320 | 3240 | 1 | 81000 | 90000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 108 | 6 | 4320 | 3600 | 1 | 90000 | 100000.0 |
| * **S1G-MCSs for 8 MHz, *Nss* = 1**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 234 | 8 | 234 | 117  | 1 | 2925.0 | 3250.0 |
| 1 | QPSK |  1/2 | 2 | 234 | 8 | 468 | 234  | 1 | 5850.0 | 6500.0 |
| 2 | QPSK |  3/4 | 2 | 234 | 8 | 468 | 351  | 1 | 8775.0 | 9750.0 |
| 3 | 16-QAM |  1/2 | 4 | 234 | 8 | 936 | 468  | 1 | 11 700.0 | 13 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 234 | 8 | 936 | 702  | 1 | 17 550.0 | 19 500.0 |
| 5 | 64-QAM |  2/3 | 6 | 234 | 8 | 1404 | 936  | 1 | 23 400.0 | 26 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 234 | 8 | 1404 | 1053  | 1 | 26 325.0 | 29 250.0 |
| 7 | 64-QAM |  5/6 | 6 | 234 | 8 | 1404 | 1170  | 1 | 29 250.0 | 32 500.0 |
| 8 | 256-QAM |  3/4 | 8 | 234 | 8 | 1872 | 1404  | 1 | 35 100.0 | 39 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 234 | 8 | 1872 | 1560  | 1 | 39 000.0 | 43 333.3 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 234 | 8 | 2340 | 1755 | 1 | 43875 | 48750.0 |
| 12 | 1024-QAM | 5/6 | 10 | 234 | 8 | 2340 | 1950 | 1 | 48750 | 54166.7 |

|  |
| --- |
| * **S1G-MCSs for 8 MHz, *Nss* = 2**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 234 | 8 | 468 | 234  | 1 | 5850.0 | 6500.0 |
| 1 | QPSK |  1/2 | 2 | 234 | 8 | 936 | 468  | 1 | 11 700.0 | 13 000.0 |
| 2 | QPSK |  3/4 | 2 | 234 | 8 | 936 | 702  | 1 | 17 550.0 | 19 500.0 |
| 3 | 16-QAM |  1/2 | 4 | 234 | 8 | 1872 | 936  | 1 | 23 400.0 | 26 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 234 | 8 | 1872 | 1404  | 1 | 35 100.0 | 39 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 234 | 8 | 2808 | 1872  | 1 | 46 800.0 | 52 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 234 | 8 | 2808 | 2106  | 1 | 52 650.0 | 58 500.0 |
| 7 | 64-QAM |  5/6 | 6 | 234 | 8 | 2808 | 2340  | 1 | 58 500.0 | 65 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 234 | 8 | 3744 | 2808  | 1 | 70 200.0 | 78 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 234 | 8 | 3744 | 3120  | 1 | 78 000.0 | 86 666.7 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 234 | 8 | 4680 | 3510 | 1 | 87750 | 97500.0 |
| 12 | 1024-QAM | 5/6 | 10 | 234 | 8 | 4680 | 3900 | 1 | 97500 | 108333.3 |
| * **S1G-MCSs for 8 MHz, *Nss* = 3**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 234 | 8 | 702 | 351  | 1 | 8775.0 | 9750.0 |
| 1 | QPSK |  1/2 | 2 | 234 | 8 | 1404 | 702  | 1 | 17 550.0 | 19 500.0 |
| 2 | QPSK |  3/4 | 2 | 234 | 8 | 1404 | 1053  | 1 | 26 325.0 | 29 250.0 |
| 3 | 16-QAM |  1/2 | 4 | 234 | 8 | 2808 | 1404  | 1 | 35 100.0 | 39 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 234 | 8 | 2808 | 2106  | 1 | 52 650.0 | 58 500.0 |
| 5 | 64-QAM |  2/3 | 6 | 234 | 8 | 4212 | 2808  | 1 | 70 200.0 | 78 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 234 | 8 | 4212 | 3159 | 1 | 78 975.0 | 87 750.0 |
| 7 | 64-QAM |  5/6 | 6 | 234 | 8 | 4212 | 3510  | 1 | 87 750.0 | 97 500.0 |
| 8 | 256-QAM |  3/4 | 8 | 234 | 8 | 5616 | 4212  | 1 | 105 300.0 | 117 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 234 | 8 | 5616 | 4680  | 1 | 117 000.0 | 130 000.0 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 234 | 8 | 7020 | 5265 | 1 | 131625 | 146250.0 |
| 12 | 1024-QAM | 5/6 | 10 | 234 | 8 | 7020 | 5850 | 1 | 146250 | 162500.0 |

|  |
| --- |
| * **S1G-MCSs for 8 MHz, *Nss* = 4**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 234 | 8 | 936 | 468  | 1 | 11 700.0 | 13 000.0 |
| 1 | QPSK |  1/2 | 2 | 234 | 8 | 1872 | 936  | 1 | 23 400.0 | 26 000.0 |
| 2 | QPSK |  3/4 | 2 | 234 | 8 | 1872 | 1404  | 1 | 35 100.0 | 39 000.0 |
| 3 | 16-QAM |  1/2 | 4 | 234 | 8 | 3744 | 1872  | 1 | 46 800.0 | 52 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 234 | 8 | 3744 | 2808  | 1 | 70 200.0 | 78 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 234 | 8 | 5616 | 3744  | 1 | 93 600.0 | 104 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 234 | 8 | 5616 | 4212  | 1 | 105 300.0 | 117 000.0 |
| 7 | 64-QAM |  5/6 | 6 | 234 | 8 | 5616 | 4680  | 1 | 117 000.0 | 130 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 234 | 8 | 7488 | 5616  | 1 | 140 400.0 | 156 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 234 | 8 | 7488 | 6240  | 1 | 156 000.0 | 173 333.3 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 234 | 8 | 9360 | 7020 | 1 | 175500 | 195000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 234 | 8 | 9360 | 7800 | 1 | 195000 | 216666.7 |
| * **S1G-MCSs for 16 MHz, *Nss* = 1**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 468 | 16 | 468 | 234  | 1 | 5850.0 | 6500.0 |
| 1 | QPSK |  1/2 | 2 | 468 | 16 | 936 | 468  | 1 | 11 700.0 | 13 000.0 |
| 2 | QPSK |  3/4 | 2 | 468 | 16 | 936 | 702  | 1 | 17 550.0 | 19 500.0 |
| 3 | 16-QAM |  1/2 | 4 | 468 | 16 | 1872 | 936  | 1 | 23 400.0 | 26 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 468 | 16 | 1872 | 1404  | 1 | 35 100.0 | 39 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 468 | 16 | 2808 | 1872  | 1 | 46 800.0 | 52 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 468 | 16 | 2808 | 2106  | 1 | 52 650.0 | 58 500.0 |
| 7 | 64-QAM |  5/6 | 6 | 468 | 16 | 2808 | 2340  | 1 | 58 500.0 | 65 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 468 | 16 | 3744 | 2808  | 1 | 70 200.0 | 78 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 468 | 16 | 3744 | 3120  | 1 | 78 000.0 | 86 666.7 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 468 | 16 | 4680 | 3510 | 1 | 87750 | 97500.0 |
| 12 | 1024-QAM | 5/6 | 10 | 468 | 16 | 4680 | 3900 | 1 | 97500 | 108333.3 |

|  |
| --- |
| * **S1G-MCSs for 16 MHz, *Nss* = 2**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 468 | 16 | 936 | 468  | 1 | 11 700.0 | 13 000.0 |
| 1 | QPSK |  1/2 | 2 | 468 | 16 | 1872 | 936  | 1 | 23 400.0 | 26 000.0 |
| 2 | QPSK |  3/4 | 2 | 468 | 16 | 1872 | 1404  | 1 | 35 100.0 | 39 000.0 |
| 3 | 16-QAM |  1/2 | 4 | 468 | 16 | 3744 | 1872  | 1 | 46 800.0 | 52 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 468 | 16 | 3744 | 2808  | 1 | 70 200.0 | 78 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 468 | 16 | 5616 | 3744  | 1 | 93 600.0 | 104 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 468 | 16 | 5616 | 4212  | 1 | 105 300.0 | 117 000.0 |
| 7 | 64-QAM |  5/6 | 6 | 468 | 16 | 5616 | 4680  | 1 | 117 000.0 | 130 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 468 | 16 | 7488 | 5616  | 1 | 140 400.0 | 156 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 468 | 16 | 7488 | 6240  | 1 | 156 000.0 | 173 333.3 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 468 | 16 | 9360 | 7020 | 1 | 175500 | 195000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 468 | 16 | 9360 | 7800 | 1 | 195000 | 216666.7 |
| * **S1G-MCSs for 16 MHz, *Nss* = 3**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 468 | 16 | 1404 | 702  | 1 | 17 550.0 | 19 500.0 |
| 1 | QPSK |  1/2 | 2 | 468 | 16 | 2808 | 1404  | 1 | 35 100.0 | 39 000.0 |
| 2 | QPSK |  3/4 | 2 | 468 | 16 | 2808 | 2106  | 1 | 52 650.0 | 58 500.0 |
| 3 | 16-QAM |  1/2 | 4 | 468 | 16 | 5616 | 2808  | 1 | 70 200.0 | 78 000.0 |
| 4 | 16-QAM |  3/4 | 4 | 468 | 16 | 5616 | 4212  | 1 | 105 300.0 | 117 000.0 |
| 5 | 64-QAM |  2/3 | 6 | 468 | 16 | 8424 | 5616  | 1 | 140 400.0 | 156 000.0 |
| 6 | 64-QAM |  3/4 | 6 | 468 | 16 | 8424 | 6318  | 1 | 157 950.0 | 175 500.0 |
| 7 | 64-QAM |  5/6 | 6 | 468 | 16 | 8424 | 7020  | 1 | 175 500.0 | 195 000.0 |
| 8 | 256-QAM |  3/4 | 8 | 468 | 16 | 11 232 | 8424  | 1 | 210 600.0 | 234 000.0 |
| 9 | 256-QAM |  5/6 | 8 | 468 | 16 | 11 232 | 9360  | 1 | 234 000.0 | 260 000.0 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 468 | 16 | 14040 | 10530 | 1 | 263250 | 292500.0 |
| 12 | 1024-QAM | 5/6 | 10 | 468 | 16 | 14040 | 11700 | 1 | 292500 | 325000.0 |

|  |
| --- |
| * **S1G-MCSs for 16 MHz, *Nss* = 4**
 |
| **MCS Idx** | **Mod** | **R** | ***NBPSCS*** | ***NSD*** | ***NSP*** | ***NCBPS*** | ***NDBPS*** | ***NES*** | **Data\_rate (kb/s)** |
| **8** μ**s GI** | **4** μ**s GI** |
| 0 | BPSK |  1/2 | 1 | 468 | 16 | 1872 | 936  | 1 | 23400.0 | 26000.0 |
| 1 | QPSK |  1/2 | 2 | 468 | 16 | 3744 | 1872  | 1 | 46800.0 | 52000.0 |
| 2 | QPSK |  3/4 | 2 | 468 | 16 | 3744 | 2808  | 1 | 70200.0 | 78000.0 |
| 3 | 16-QAM |  1/2 | 4 | 468 | 16 | 7488 | 3744  | 1 | 93600.0 | 104000.0 |
| 4 | 16-QAM |  3/4 | 4 | 468 | 16 | 7488 | 5616  | 1 | 140400.0 | 156000.0 |
| 5 | 64-QAM |  2/3 | 6 | 468 | 16 | 11 232 | 7488  | 1 | 187200.0 | 208000.0 |
| 6 | 64-QAM |  3/4 | 6 | 468 | 16 | 11 232 | 8424  | 1 | 210600.0 | 234000.0 |
| 7 | 64-QAM |  5/6 | 6 | 468 | 16 | 11 232 | 9360  | 1 | 234000.0 | 260000.0 |
| 8 | 256-QAM |  3/4 | 8 | 468 | 16 | 14 976 | 11 232  | 1 | 280800.0 | 312000.0 |
| 9 | 256-QAM |  5/6 | 8 | 468 | 16 | 14 976 | 12 480  | 1 | 312000.0 | 346666.7 |
| 10 | Not valid |
| 11 | 1024-QAM | 3/4 | 10 | 468 | 16 | 18720 | 14040 | 1 | 351000 | 390000.0 |
| 12 | 1024-QAM | 5/6 | 10 | 468 | 16 | 18720 | 15600 | 1 | 390000 | 433333.3 |

*Proposed changes for Annex B Protocol Implementation Conformance Statement (PICS) - proforma:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

*Proposed changes for B.4.28.2 S1G PHY features. Add the following after S1GP7.41 :*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Protocol capability | References | Status | Support |

| S1GP7.42 | MCS 11, Nss = 1 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |
| --- | --- | --- | --- | --- |
| S1GP7.43 | MCS 11, Nss = 2 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |
| S1GP7.44 | MCS 11, Nss = 3 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |
| S1GP7.45 | MCS 11, Nss = 4 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |

*Proposed changes for B.4.28.2 S1G PHY features. Add the following after S1GP7.45 :*

| S1GP7.46 | MCS 12, Nss = 1 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |
| --- | --- | --- | --- | --- |
| S1GP7.47 | MCS 12, Nss = 2 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |
| S1GP7.48 | MCS 12, Nss = 3 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |
| S1GP7.49 | MCS 12, Nss = 4 | 23.1.1 (Introduction to the S1G PHY),23.5 (Parameters for S1G-MCSs) | CFS1G: O | Yes o No o N/A o |

*Proposed changes for Annex C :*

dot11S1GRxS1GMCSMap OBJECT-TYPE

 SYNTAX OCTET STRING (SIZE(4))

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

Each octet represents the highest S1G-MCS supported (for Rx) on the number of streams represented by the octet position (e.g., first octet represents 1 stream, second octet represents 2 streams). A value 0 indicates that S1G-MCSs 0-2 are supported. A value 1 indicates that S1G-MCSs 0-7 are supported. A value 2 indicates that S1G-MCSs 0-9 are supported. A value 3 indicates no support for that number of spatial streams. A value of 4 indicates that S1G-MCSs 0-9, 11 and 12 are supported for 2 MHz wide and greater. For 1 MHz, MCS 10 is always supported."

 ::= { dot11S1GStationConfigEntry 4 }

dot11S1GTxS1GMCSMap OBJECT-TYPE

 SYNTAX OCTET STRING (SIZE(4))

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

Each octet represents the highest S1G-MCS supported (for Tx) on the number of streams represented by the octet position (e.g., first octet represents 1 stream, second octet represents 2 streams). A value 0 indicates that S1G-MCSs 0-2 are supported. A value 1 indicates that S1G-MCSs 0-7 are supported. A value 2 indicates that S1G-MCSs 0-9 are supported. A value 3 indicates no support for that number of spatial streams. A value of 4 indicates that S1G-MCSs 0-9, 11 and 12 are supported for 2 MHz wide and greater. For 1 MHz, MCS 10 is always supported."

 ::= { dot11S1GStationConfigEntry 5 }

**References:**