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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** | |
| Title | **Representative Channel Performance for 802.16s** | |
| Date Submitted | **2017 Mar ~~15~~ 16** | |
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| Re: | IEEE 802.16s GRIDMAN Task Group | |
| Abstract | Performance for selected channel bandwidths from 0.100 MHz to 1.000 MHz with parameters based on draft 802.16s amendment to IEEE Std 802.16-20xx. | |
| Purpose | This is intended to provide channel details for inclusion in SDD GRIDMAN Document | |
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| **1** | **Parameter** | **Channel Bandwidth** | |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **2** | **Nominal Channel BW** | **1.00 MHz** | **0.75 MHz** | **0.50 MHz** | **0.25 MHz** | **0.10 MHz** |
| 3 | FFT | 128 | 128 | 128 | 128 | 128 |
| 4 | Permutation | AMC 2x3 | AMC 2x3 | AMC 1x6 | AMC 1x3 | AMC 1x3 |
| 5 | DC Subcarriers | 1 | 1 | 1 | 1 | 1 |
| 6 | Guard Subcarriers - Left | 10 | 10 | 10 | 10 | 10 |
| 7 | Guard Subcarriers - Right | 9 | 9 | 9 | 9 | 9 |
| 8 | % Subchannels Used | 100% | 100% | 50% | 33% | 25% |
| 9 | Used Subcarriers (Pilots+Data) | 108 | 108 | 54 | 36 | 27 |
| 10 | Pilot Subcarriers | 12 | 12 | 6 | 4 | 3 |
| 11 | Data Subcarriers | 96 | 96 | 48 | 32 | 24 |
| 12 | Number of Inband Subchannels | 6 | 6 | 6 | 4 | 3 |
| 13 | Data Subcarriers per Subchannel | 16 | 16 | 8 | 8 | 8 |
| 14 | Pilot Subcarriers per Subchannel | 2 | 2 | 1 | 1 | 1 |
| 15 | Sampling Factor | 28/25 | 28/25 | 11/5 | 82/25 | 109/25 |
| 16 | Sampling Frequency (Clock) | 1.120 MHz | 0.840 MHz | 1.10 MHz | 0.820 MHz | 0.436 MHz |
| 17 | Subcarrier Spacing | 8.750 kHz | 6.563 kHz | 8.594 kHz | 6.406 kHz | 3.406 kHz |
| 18 | Occupied BW (incl DC Subcarrier) | 0.954 MHz | 0.715 MHz | 0.473 MHz | 0.237 MHz | 0.095 MHz |
| 19 | Occupied BW % of Nominal BW | 95.38% | 95.38% | 94.53% | 94.81% | 95.38% |
| 20 | Subchannel BW (excludes DC SC) | 0.158 MHz | 0.118 MHz | 0.077 MHz | 0.058 MHz | 0.031 MHz |
| 21 | Symbol Time-microsec | 114.29 us | 152.38 us | 116.36 us | 156.10 us | 293.58 us |
| 22 | Cyclic Prefix | 1/16 | 1/16 | 1/16 | 1/16 | 1/16 |
| 23 | Guard Time-microsec | 7.14 us | 9.52 us | 5.95 us | 7.52 us | 8.93 us |
| 24 | Symbol Duration-microsec | 121.43 us | 161.90 us | 122.32 us | 163.62 us | 302.51 us |
| 25 | Frame Duration-millisec | 5.0 ms | 5.0 ms | 10.0 ms | 20.0 ms | 25.0 ms |
| 26 | Frames per Second | 200 | 200 | 100 | 50 | 40 |
| 27 | Samples per Frame | 5600 | 4200 | 11000 | 16400 | 10900 |
| 28 | Total OFDMA Symbols per Frame | 41 Symbols | 30 Symbols | 81 Symbols | 122 Symbols | 82 Symbols |
| 29 | Symbols for TR Gap | 1 Symbol | 1 Symbol | 1 Symbol | 1 Symbol | 1 Symbol |
| 30 | OFDMA Symbols per Frame (after TR Gap) | 40 Symbols | 29 Symbols | 80 Symbols | 121 Symbols | 81 Symbols |
| 31 | TTG+RTG Gap in microsec | 142.86 us | 304.76 us | 214.72 us | 202.42 us | 496.97 us |
| 32 | Range Limit for selected TR-Gap | 13.31 mi | 28.39 mi | 20.00 mi | 18.85 mi | 46.29 mi |
| 33 | TR-Gap Symbols for 40 mi range | 3 Symbols | 2 Symbols | 3 Symbols | 2 Symbols | 1 Symbols |
| 34 | N = # Bins | 2 Bins | 2 Bins | 1 Bins | 1 Bins | 1 Bins |
| 35 | M = # Symbols | 3 Symbols | 3 Symbols | 6 Symbols | 3 Symbols | 3 Symbols |
| 36 | Preamble Overhead | 1 Symbol | 1 Symbol | 1 Symbol | 1 Symbol | 1 Symbol |
| 37 | UL OH Symbols (CQICH\*, ACK\*,Ranging) | 1 Symbol | 1 Symbol | 1 Symbol | 1 Symbol | 1 Symbol |
| 38 | Net OFDMA Symbols per Frame | 38 Symbols | 27 Symbols | 78 Symbols | 119 Symbols | 79 Symbols |
| 39 | Slots per Sector/Frame for Reuse 1,3,3 | 24 Slots | 18 Slots | 26 Slots | 39 Slots | 26 Slots |
| 40 | DL-MAP (bits) | 60 Bits | 60 Bits | 60 Bits | 60 Bits | 60 Bits |
| 41 | DL-MAP (Bytes) | 8 Bytes | 8 Bytes | 8 Bytes | 8 Bytes | 8 Bytes |
| 42 | UL-MAP (bits | 139 bytes | 139 bytes | 139 Bits | 139 Bits | 139 Bits |
| 43 | UL-MAP (Bytes) | 18 bytes | 18 bytes | 18 Bytes | 18 Bytes | 18 Bytes |
| 44 | Frame Control Header (FCH) | 1 Slot | 1 Slot | 1 Slot | 2 Slot | 2 Slot |
| 45 | Bytes per Slot at QPSK-1/2 (1 rep) | 6 Bytes | 6 Bytes | 6 Bytes | 3 Bytes | 3 Bytes |
| 46 | Total # OH Slots for DL-MAP+UL-MAP+FCH | 6 Slots | 6 Slots | 6 Slots | 11 Slots | 11 Slots |
| 47 | UL+DL Data Slots/Sector for scheduling | 18 Slots | 12 Slots | 20 Slots | 28 Slots | 15 Slots |
| 48 | Desired UL/DL Data Ratio | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| 49 | UL Data Slots/Sector for scheduling | 9 Slots | 6 Slots | 14 Slots | 19 Slots | 10 Slots |
| 50 | DL Data Slots/Sector for scheduling | 9 Slots | 6 Slots | 6 Slots | 9 Slots | 5 Slots |
| 51 | Unused Symbols | 2 Symbols | 0 Symbols | 0 Symbols | 2 Symbols | 1 Symbols |
| 52 | Actual UL/DL Data Slot Ratio | 1.00 | 1.00 | 2.33 | 2.11 | 2.00 |
| 53 | Avg SE over Coverage Area | 2.0 bps/Hz | 2.0 bps/Hz | 2.0 bps/Hz | 2.0 bps/Hz | 2.0 bps/Hz |
| 54 | Peak Bytes/Slot (64QAM-5/6) | 30 Bytes | 30 Bytes | 30 Bytes | 15 Bytes | 15 Bytes |
| 55 | Cell Edge Bytes/Slot (QPSK-1/2) | 6 Bytes | 6 Bytes | 6 Bytes | 3 Bytes | 3 Bytes |
| 56 | Avg Bytes/Slot | 12.0 Bytes | 12.0 Bytes | 12.0 Bytes | 6.0 Bytes | 6.0 Bytes |
| 57 | **OTA Sector Rate for Reuse (1,3,3) & (SISO)** |  |  |  |  |  |
| 58 | Peak UL PHY Rate per Sector | 432.0 kbps | 288.0 kbps | 336.0 kbps | 114.0 kbps | 48.0 kbps |
| 59 | Avg UL PHY Rate per Sector | 172.8 kbps | 115.2 kbps | 134.4 kbps | 45.6 kbps | 19.2 kbps |
| 60 | Peak DL PHY Rate per Sector | 432.0 kbps | 288.0 kbps | 144.0 kbps | 54.0 kbps | 24.0 kbps |
| 61 | Avg DL PHY Rate per Sector | 172.8 kbps | 115.2 kbps | 57.6 kbps | 21.6 kbps | 9.6 kbps |
| 62 | OTA Cell Rate for Reuse (1,3,3) & (SISO) |  |  |  |  |  |
| 63 | Avg UL PHY Rate per Cell | 518.4 kbps | 345.6 kbps | 403.2 kbps | 182.4 kbps | 57.6 kbps |
| 64 | Avg DL PHY Rate per Cell | 518.4 kbps | 345.6 kbps | 172.8 kbps | 86.4 kbps | 28.8 kbps |
| 65 | Avg Cell Spectral Efficiency | 1.0 bps/Hz | 0.9 bps/Hz | 1.15 bps/Hz | 1.08 bps/Hz | 0.86 bps/Hz |
|  |  |  |  |  |  |  |
| 66 | Subchannels included in per-cell OTA rate but not in per-sector rate | 0 | 0 | 0 | 1 | 0 |
|  |  |  |  |  |  |  |
| 67 | Maximum UL:DL or DL:UL Data Slot Ratio | > 10:1 | > 10:1 | > 10:1 | > 10:1 | > 10:1 |
| 68 | Increased Latency Relative to 5 ms Frame | 0 ms | 0 ms | 10 ms | 30 ms | 40 ms |