

## Wavelength Grid

### CWDM Grid

The wavelength grid to support Coarse Wavelength Division Multiplexing (CWDM) applications is defined in G.694.2 (12/03) from ITU-T (the Telecommunication group of the International Telecom Union). This grid is designed to allow simultaneous transmission of several wavelengths with enough separation to permit the use of uncooled sources. Table 1 in this recommendation lists the 18 defined CWDM channels as the following channels (with 20 nm spacing per channel).

Channel	Frequency	Wavelength	Channel	Frequency	Wavelength
27	235.871 THz	1 271 nm	45	206.611 THz	1 451 nm
29	232.217 THz	1 291 nm	47	203.802 THz	1 471 nm
31	228.675 THz	1 311 nm	49	201.068 THz	1 491 nm
33	225.239 THz	1 331 nm	51	198.407 THz	1 511 nm
35	221.904 THz	1 351 nm	53	195.815 THz	1 531 nm
37	218.667 THz	1 371 nm	55	193.290 THz	1 551 nm
39	215.523 THz	1 391 nm	57	190.829 THz	1 571 nm
41	212.468 THz	1 411 nm	59	188.430 THz	1 591 nm
43	209.499 THz	1 431 nm	61	186.091 THz	1 611 nm

Selected MSAs are utilizing the first four CWDM channels (i.e. 271 nm/291 nm/311 nm/331 nm) for various transport like 40 Gbps, 100 Gbps, and 400 Gbps. Other MSAs – such as CWDM8 – are utilizing the first eight CWDM channels (i.e. 271 nm/291 nm/311 nm/331 nm/351 nm/371 nm/391 nm/411 nm).

### LAN-WDM Grid

For distances of 10 km and longer IEEE has in 802.3ba defined the LAN-WDM grid to be used for e.g. 100 Gbps transport (namely 100 GBase-LR4, 100 GBase-ER4 and 100 GBase-ZR4). This grid originally consisted of four channels (1309.14 nm/1304.58 nm/1300.05 nm/1295.56 nm) but has later been extended with additional four channels to honour e.g. 400 Gbps transport (namely 400 GBase-LR8, 400 GBase-ER8 and 400 GBase-ZR8).

Channel	Frequency	Wavelength	Channel	Frequency	Wavelength
1	229.000 THz	1 309.14 nm	5	233.000 THz	1 286.66 nm
2	229.800 THz	1 304.58 nm	6	233.800 THz	1 282.26 nm
3	230.600 THz	1 300.05 nm	7	234.600 THz	1 277.89 nm
4	231.400 THz	1 295.56 nm	8	235.400 THz	1 273.55 nm

## DWDM Grid

ITU-T has in recommendation G.694.1 (02/12) specified various variants of the DWDM grid in the C-and L-band<sup>i</sup>, all with the outset of the central frequency 191.100 THz.

The most frequently used DWDM grid is with 100 GHz spacing, as listed below. In addition, ITU-T has defined denser grids, with 12.5 GHz, 25 GHz and 50 GHz spacing, see G.694.1 Table 1. For the 50 GHz grid the channels/frequencies are many times nominated with an H, as in the below table.

G.694.1(02/12) §7 defines flex channels, which is a flexible channel definition where the width of the channel is defined after its content. The central frequency of the flexgrid is defined by  $193.1 + n \times 0.00625$  in THz, with a channel width of  $m \times 12.5$  in GHz. For examples of usage please refer to ITU-T G.694.1 (02/12), Appendix I.

## Naming convention

In the below table the various channels are named after the frequency, i.e. 193.300 THz are named channel 33. Channels in the 50 GHz grid are named with an 'H' for high.

Another normal convention is to denote the channels with three or four digits. E.g. channel 193.300 THz is named 933 (alternatively 9330), whereas 193.350 THz is named 9335.

Cisco in their nomenclature are naming their channels with frequency 191.350 THz being channel 1, 191.400 THz being channel 2 and so forth up to frequency 196.100 THz being channel 96.

Channel	Frequency	Wavelength	Channel	Frequency	Wavelength
10	191.000 THz	1 569.5940 nm	20	192.000 THz	1 561.4191 nm
10H	191.050 THz	1 569.1832 nm	20H	192.050 THz	1 561.0125 nm
11	191.100 THz	1 568.7727 nm	21	192.100 THz	1 560.6062 nm
11H	191.150 THz	1 568.3623 nm	21H	192.150 THz	1 560.2001 nm
12	191.200 THz	1 567.9522 nm	22	192.200 THz	1 559.7943 nm
12H	191.250 THz	1 567.5423 nm	22H	192.250 THz	1 559.3886 nm
13	191.300 THz	1 567.1326 nm	23	192.300 THz	1 558.9831 nm
13H	191.350 THz	1 566.7231 nm	23H	192.350 THz	1 558.5779 nm
14	191.400 THz	1 566.3138 nm	24	192.400 THz	1 558.1729 nm
14H	191.450 THz	1 565.9047 nm	24H	192.450 THz	1 557.7680 nm
15	191.500 THz	1 565.4959 nm	25	192.500 THz	1 557.3634 nm
15H	191.550 THz	1 565.0872 nm	25H	192.550 THz	1 556.9590 nm
16	191.600 THz	1 564.6788 nm	26	192.600 THz	1 556.5548 nm
16H	191.650 THz	1 564.2706 nm	26H	192.650 THz	1 556.1508 nm
17	191.700 THz	1 563.8626 nm	27	192.700 THz	1 555.7471 nm
17H	191.750 THz	1 563.4548 nm	27H	192.750 THz	1 555.3435 nm
18	191.800 THz	1 563.0472 nm	28	192.800 THz	1 554.9401 nm
18H	191.850 THz	1 562.6399 nm	28H	192.850 THz	1 554.5370 nm
19	191.900 THz	1 562.2327 nm	29	192.900 THz	1 554.1340 nm
19H	191.950 THz	1 561.8258 nm	29H	192.950 THz	1 553.7313 nm

Channel	Frequency	Wavelength	Channel	Frequency	Wavelength
30	193.000 THz	1 553.3288 nm	48	194.800 THz	1 538.9757 nm
30H	193.050 THz	1 552.9265 nm	48H	194.850 THz	1 538.5807 nm
31	193.100 THz	1 552.5244 nm	49	194.900 THz	1 538.1860 nm
31H	193.150 THz	1 552.1225 nm	49H	194.950 THz	1 537.7915 nm
32	193.200 THz	1 551.7208 nm	50	195.000 THz	1 537.3972 nm
32H	193.250 THz	1 551.3193 nm	50H	195.050 THz	1 537.0031 nm
33	193.300 THz	1 550.9180 nm	51	195.100 THz	1 536.6092 nm
33H	193.350 THz	1 550.5170 nm	51H	195.150 THz	1 536.2155 nm
34	193.400 THz	1 550.1161 nm	52	195.200 THz	1 535.8220 nm
34H	193.450 THz	1 549.7155 nm	52H	195.250 THz	1 535.4287 nm
35	193.500 THz	1 549.3150 nm	53	195.300 THz	1 535.0356 nm
35H	193.550 THz	1 548.9148 nm	53H	195.350 THz	1 534.6427 nm
36	193.600 THz	1 548.5148 nm	54	195.400 THz	1 534.2500 nm
36H	193.650 THz	1 548.1149 nm	54H	195.450 THz	1 533.8575 nm
37	193.700 THz	1 547.7153 nm	55	195.500 THz	1 533.4653 nm
37H	193.750 THz	1 547.3159 nm	55H	195.550 THz	1 533.0732 nm
38	193.800 THz	1 546.9167 nm	56	195.600 THz	1 532.6813 nm
38H	193.850 THz	1 546.5177 nm	56H	195.650 THz	1 532.2896 nm
39	193.900 THz	1 546.1189 nm	57	195.700 THz	1 531.8981 nm
39H	193.950 THz	1 545.7203 nm	57H	195.750 THz	1 531.5068 nm
40	194.000 THz	1 545.3219 nm	58	195.800 THz	1 531.1157 nm
40H	194.050 THz	1 544.9238 nm	58H	195.850 THz	1 530.7248 nm
41	194.100 THz	1 544.5258 nm	59	195.900 THz	1 530.3341 nm
41H	194.150 THz	1 544.1280 nm	59H	195.950 THz	1 529.9436 nm
42	194.200 THz	1 543.7305 nm	60	196.000 THz	1 529.5534 nm
42H	194.250 THz	1 543.3331 nm	60H	196.050 THz	1 529.1633 nm
43	194.300 THz	1 542.9360 nm	61	196.100 THz	1 528.7734 nm
43H	194.350 THz	1 542.5390 nm	61H	196.150 THz	1 528.3837 nm
44	194.400 THz	1 542.1423 nm	62	196.200 THz	1 527.9942 nm
44H	194.450 THz	1 541.7457 nm	62H	196.250 THz	1 527.6049 nm
45	194.500 THz	1 541.3494 nm	63	196.300 THz	1 527.2158 nm
45H	194.550 THz	1 540.9533 nm	63H	196.350 THz	1 526.8269 nm
46	194.600 THz	1 540.5573 nm	64	196.400 THz	1 526.4382 nm
46H	194.650 THz	1 540.1616 nm	64H	196.450 THz	1 526.0497 nm
47	194.700 THz	1 539.7661 nm	65	196.500 THz	1 525.6614 nm
47H	194.750 THz	1 539.3708 nm	65H	196.550 THz	1 525.2733 nm

†: The various band used by OFC are:

O-band (Original):	1260 – 1360 nm	237.931 – 220.436 THz
E-band (Extended):	1360 – 1460 nm	220.425 – 205.337 THz
S-band (Short wavelength):	1460 – 1530 nm	205.336 – 195.943 THz
C-band (Conventional):	1530 – 1565 nm	195.942 – 191.561 THz
L-band (Long wavelength):	1565 – 1625 nm	191.560 – 184.488 THz
U-band (Ultra-long wavelength):	1625 – 1675 nm	184.487 – 178.981 THz