Передачи Downlink, uplink и sidelink распределяются по кадрам (*frame*), каждый из которых имеет фиксированную длительность T_f = 10 мс. Каждый кадр содержит в себе 10 подкадров равной длительности (*subframe)*, причём подкадры нумеруются от 0 до 9. Также введено понятие полукадра (*half-frame*). Первый полукадр содержит в себе подкадры от 0 до 4, второй – от 5 до 9. [4.3.1, TS 38.211].

Table 4.2-1: Supported transmission numerologies.

μ	$\Delta f = 2^{\mu} \cdot 15[\text{kHz}]$	**Cyclic prefix**
0	15	Normal
1	30	Normal
2	60	Normal, Extended
3	120	Normal
4	240	Normal
5	480	Normal
6	960	Normal

7.4.3.1.1 Mapping of PSS within an SS/PBCH block

The UE shall assume the sequence of symbols $d_{\text{PSS}}(0),\ldots,d_{\text{PSS}}(126)$ constituting the primary synchronization signal to be scaled by a factor β_{PSS} to conform to the PSS power allocation specified in [5, TS 38.213] and mapped to resource elements $(k,l)_{p,\mu}$ in increasing order of k where k and l are given by Table 7.4.3.1-1 and represent the frequency and time indices, respectively, within one SS/PBCH block.

7.4.3.1.2 Mapping of SSS within an SS/PBCH block

The UE shall assume the sequence of symbols $d_{\text{SSS}}(0),\ldots,d_{\text{SSS}}(126)$ constituting the secondary synchronization signal to be scaled by a factor β_{SSS} and mapped to resource elements $(k,l)_{p,\mu}$ in increasing order of k where k and l are given by Table 7.4.3.1-1 and represent the frequency and time indices, respectively, within one SS/PBCH block.

7.4.3.1.3 Mapping of PBCH and DM-RS within an SS/PBCH block

The UE shall assume the sequence of complex-valued symbols $d_{\text{PBCH}}(0),\ldots,d_{\text{PBCH}}(M_{\text{symb}}-1)$ constituting the physical broadcast channel to be scaled by a factor β_{PBCH} to conform to the PBCH power allocation specified in [5, TS 38.213] and mapped in sequence starting with $d_{\text{PBCH}}(0)$ to resource elements $(k,l)_{p,\mu}$ which meet all the following criteria:

- they are not used for PBCH demodulation reference signals

The mapping to resource elements $(k,l)_{p,\mu}$ not reserved for PBCH DM-RS shall be in increasing order of first the index k and then the index l, where k and l represent the frequency and time indices, respectively, within one SS/PBCH block and are given by Table 7.4.3.1-1.

The UE shall assume the sequence of complex-valued symbols $r(0),\ldots,r(143)$ constituting the demodulation reference signals for the SS/PBCH block to be scaled by a factor of $\beta_{\text{PBCH}}^{\text{DM-RS}}$ to conform to the PBCH power allocation specified in

[5, TS 38.213] and to be mapped to resource elements $(k,l)_{p,\mu}$ in increasing order of first k and then l where k and l are given by Table 7.4.3.1-1 and represent the frequency and time indices, respectively, within one SS/PBCH block.

Clause 4.1, 38.213. !!!!!!!!!!!!!!!! SCS – Subcarrier Spacing

4.1 Cell search

Cell search is the procedure for a UE to acquire time and frequency synchronization with a cell and to detect the physical layer Cell ID of the cell.

A UE receives the following synchronization signals (SS) in order to perform cell search: the primary synchronization signal (PSS) and secondary synchronization signal (SSS) as defined in [4, TS 38.211].

A UE assumes that reception occasions of a physical broadcast channel (PBCH), PSS, and SSS are in consecutive symbols, as defined in [4, TS 38.211], and form a SS/PBCH block. The UE assumes that SSS, PBCH DM-RS, and PBCH data have same EPRE. The UE may assume that the ratio of PSS EPRE to SSS EPRE in a SS/PBCH block is either 0 dB or 3 dB. If the UE has not been provided dedicated higher layer parameters, the UE may assume that the ratio of PDCCH DMRS EPRE to SSS EPRE is within -8 dB and 8 dB when the UE monitors PDCCHs for a DCI format 1_0 with CRC scrambled by SI-RNTI, P-RNTI, or RA-RNTI, or for a DCI format 2_7, or for a DCI format 4_0.

For a half frame with SS/PBCH blocks, the first symbol indexes for candidate SS/PBCH blocks are determined according to the SCS of SS/PBCH blocks as follows, where index 0 corresponds to the first symbol of the first slot in a half-frame.

- Case A - 15 kHz SCS: the first symbols of the candidate SS/PBCH blocks have indexes of $\{2,8\} + 14 \cdot n$.
  - For operation without shared spectrum channel access:
    - For carrier frequencies smaller than or equal to 3 GHz, $n = 0,1$.
    - For carrier frequencies within FR1 larger than 3 GHz, $n = 0,1,2,3$.
  - For operation with shared spectrum channel access, as described in [15, TS 37.213], $n = 0, 1, 2, 3, 4$.
- Case B - 30 kHz SCS: the first symbols of the candidate SS/PBCH blocks have indexes $\{4,8,16,20\} + 28 \cdot n$. For carrier frequencies smaller than or equal to 3 GHz, $n = 0$. For carrier frequencies within FR1 larger than 3 GHz, $n = 0,1$.
- Case C - 30 kHz SCS: the first symbols of the candidate SS/PBCH blocks have indexes $\{2,8\} + 14 \cdot n$.
  - For operation without shared spectrum channel access
    - For paired spectrum operation
      - For carrier frequencies smaller than or equal to 3 GHz, $n = 0,1$. For carrier frequencies within FR1 larger than 3 GHz, $n = 0,1,2,3$.
    - For unpaired spectrum operation
      - For carrier frequencies smaller than 1.88 GHz, $n = 0,1$. For carrier frequencies within FR1 equal to or larger than 1.88 GHz, $n = 0,1,2,3$.
  - For operation with shared spectrum channel access, $n = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9$.
- Case D - 120 kHz SCS: the first symbols of the candidate SS/PBCH blocks have indexes $\{4,8,16,20\} + 28 \cdot n$. For carrier frequencies within FR2, $n = 0, 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 13, 15, 16, 17, 18$.
- Case E - 240 kHz SCS: the first symbols of the candidate SS/PBCH blocks have indexes $\{8,12,16,20,32,36,40,44\} + 56 \cdot n$. For carrier frequencies within FR2-1, $n = 0, 1, 2, 3, 5, 6, 7, 8$.
- Case F – 480 kHz SCS: the first symbols of the candidate SS/PBCH blocks have indexes $\{2, 9\} + 14 \cdot n$. For carrier frequencies within FR2-2, $n =$ $0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31$.
- Case G – 960 kHz SCS: the first symbols of the candidate SS/PBCH blocks have indexes $\{2, 9\} + 14 \cdot n$. For carrier frequencies within FR2-2, $n =$ $0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31$.