CLAIMS

1. A method for demodulating a New Radio (NR) Physical Broadcast Channel (PBCH) (NR-PBCH) by a wireless transmit / receive unit (WTRU), the method comprising:

using a demodulation reference signal (DMRS) to demodulate the NR-PBCH in at least a second, in time, OFDM symbol, and a fourth, in time, OFDM symbol of a synchronization signal block (SSB), wherein the DMRS is located in same subcarriers in the second, in time, OFDM symbol and the fourth, in time, OFDM symbol along NR-PBCH payload;

wherein the SSB includes a primary synchronization signal (PSS) in a first, in time, OFDM symbol of the SSB and a secondary synchronization signal (SSS) in a third, in time, OFDM symbol of the SSB, wherein the SSB includes only the first OFDM symbol, second OFDM symbol, third OFDM symbol and fourth OFDM symbol.

2. The method of claim 1 further comprising demodulating the NR-PBCH payload using the PSS and/or SSS and the DMRS.

3. The method of claim 1, wherein the subcarriers in which the DMRS are placed are based on a cell identification (ID).

4. The method of claim, 3 wherein the DMRS is derived from a scrambling sequence based on the cell ID and an SSB index.

5. The method of claim 1, wherein the DMRS is based on a gold sequence used by the WTRU for more than one purpose selected from the group comprising: RS for NR-PBCH demodulation, SSB time index detection.

6. The method of claim 4, wherein 2 bits are used as an SSB index.

7. The method of claim 4, wherein 3 bits are used as an SSB index.

8 The method of claim 1, wherein the PSS and SSS occupy a same frequency spectrum and NR-PBCH occupies a larger frequency spectrum than the PSS and SSS.

9. The method of claim 1, wherein the PSS is transmitted before the NR-PBCH.

10. The method of claim 1, wherein the SSS is transmitted after the NR-PBCH.

11. A wireless transmit / receive unit (WTRU) configured to demodulate a New Radio (NR) Physical Broadcast Channel (PBCH) (NR-PBCH), the WTRU comprising:

circuitry configured to use a demodulation reference signal (DMRS) to demodulate the NR-PBCH in at least a second, in time, OFDM symbol and a fourth, in time, OFDM symbol of a synchronization signal block (SSB), wherein the DMRS is located in same subcarriers in the second, in time, OFDM symbol and the fourth, in time, OFDM symbol along NR-PBCH payload;

wherein the SSB includes a primary synchronization signal (PSS) in a first, in time, OFDM symbol of the SSB and a secondary synchronization signal (SSS) in a third, in time, OFDM symbol of

the SSB, wherein the SSB includes only the first OFDM symbol, second OFDM symbol, third OFDM symbol and fourth OFDM symbol.

12. The WTRU of claim 11 further comprising a demodulator configured to demodulate the NR-PBCH payload using the PSS and/or SSS and the DMRS.

13. The WTRU of claim 11, wherein the subcarriers in which the DMRS are placed are based on a cell identification (ID).

14. The WTRU of claim 13, wherein the DMRS is derived from a scrambling sequence based on the cell ID and an SSB index.

15. The WTRU of claim 11, wherein the DMRS is based on a gold sequence used by the WTRU for more than one purpose selected from the group comprising: RS for NR-PBCH demodulation, SSB time index detection.

16. The WTRU of claim 14, wherein 2 bits are used as an SSB index.

17. The WTRU of claim 14, wherein 3 bits are used as an SSB index.

18 The WTRU of claim 11, wherein the PSS and SSS occupy a same frequency spectrum and NR-PBCH occupies a larger frequency spectrum than the PSS and SSS.

19. The WTRU of claim 11, wherein the PSS is transmitted before the NR-PBCH.

20. The WTRU of claim 11, wherein the SSS is transmitted after the NR-PBCH.