

CLAIMS

1. A method (700) of transmitting device-generated synchronization signals from a wireless device (16) configured for operation in a wireless communication network (10), said method (700), said method (700) comprising:

generating (702) the device-generated synchronization signals using at least a subset of the same sequences used by base stations (20) in the network (10) for generating network synchronization signals; and

transmitting (704) the device-generated synchronization signals according to a relative positioning or mapping that characteristically differs from a relative positioning or mapping used for transmitting the network synchronization signals originating from any of the base stations (20) in the wireless communication network (10),

the method **characterized** by further comprising including or omitting one or more control fields in a Device-to-Device, D2D, broadcast control channel transmitted by the wireless device (16) in association with transmission of the device-generated synchronization signals, wherein the control field omissions or inclusions characteristically distinguish the D2D broadcast control channel from network broadcast control channel transmissions by any of the base stations (20) in association with their respective transmissions of the network synchronization signals.

2. The method (700) of claim 1, wherein transmitting the device-generated synchronization signals includes transmitting primary and secondary device-generated synchronization signals according to an ordering that characteristically differs from an ordering used by the network (10) for the transmission of the primary and secondary network synchronization signals.

3. The method (700) of claim 2, wherein transmitting the primary and secondary device-generated synchronization signals comprises transmitting the primary device-generated synchronization signal, followed by transmission of the secondary device-generated synchronization signal, whereas, with respect to the transmission of the primary and secondary network synchronization signals from any given base station (20), transmission of the primary

network synchronization signal follows transmission of the secondary network synchronization signal.

4. The method (700) of claim 1, wherein transmitting the device-generated synchronization signals include transmitting primary and secondary device-generated synchronization signals according to a spacing or distance that characteristically differs from a spacing or distance used by the network (10) for the transmission of primary and secondary network synchronization signals.

5. The method (700) of claim 1, wherein the network synchronization signals comprise primary and secondary network synchronization signals, with transmission of the secondary network synchronization signal characteristically mapped to a downlink carrier, and wherein transmitting the device-generated synchronization signals comprises transmitting primary and secondary device-generated synchronization signals, including mapping transmissions of the secondary device-generated synchronization signal to an uplink carrier.

6. The method (700) of any of claims 1–5, wherein the device-generated synchronization signals are transmitted in accordance with a relative positioning that characteristically differs from the relative positioning used for transmitting the network synchronization signals.

7. The method (700) of claim 6, wherein the device-generated synchronization signals are transmitted in accordance with additionally a relative mapping that characteristically differs from the relative mapping used for transmitting the network synchronization signals.

8. The method (700) of any of claims 1–7, wherein transmitting the device-generated synchronization signals includes transmitting secondary device-generated synchronization signals in accordance with a relative positioning or mapping that characteristically differs from the relative positioning or mapping used for transmitting the secondary network synchronization signals.

9. A wireless device (16) configured for operation in a Long Term Evolution wireless communication network (10) and comprising:

a communication interface (40) configured for transmitting signals to base stations (20) of the network (10) and for transmitting signals to other wireless devices (16); and

a processing circuit (46) that is operatively associated with the communication interface (40) and configured to:

- generate device-generated synchronization signals using at least a subset of the same sequences used by the base stations (20) in the network (10) for generating network synchronization signals; and
- transmit the device-generated synchronization signals according to a relative positioning or mapping that characteristically differs from a relative positioning or mapping used for transmitting the network synchronization signals originating from any of the base stations (20) in the wireless communication network (10),

the wireless device **characterized** in that the processing circuit (46) is further configured to include or omit one or more control fields in a Device-to-Device, D2D, broadcast control channel transmitted by the wireless device (16) in association with transmission of the device-generated synchronization signals, wherein the control field omissions or inclusions characteristically distinguish the D2D broadcast control channel from network broadcast control channel transmissions by any base stations (20) in association with their respective transmissions of the network synchronization signals.

10. The wireless device (16) of claim 9, wherein the processing circuit (46) is configured to transmit the device-generated synchronization signals by transmitting primary and secondary device-generated synchronization signals according to an ordering that characteristically differs from an ordering used by the network for the transmission of primary and secondary network synchronization signals.

11. The wireless device (16) of claim 10, wherein the processing circuit (46) is configured to transmit the primary and secondary device-generated synchronization signals by transmitting the primary device-generated synchronization signal, followed by transmission of the secondary device-generated synchronization signal, whereas, with respect to the transmission of the primary and secondary network synchronization signals from any given base station (20),

transmission of the primary network synchronization signal follows transmission of the secondary network synchronization signal.

12. The wireless device (16) of claim 9, wherein the processing circuit (46) is configured to transmit the device-generated synchronization signals by transmitting primary and secondary device-generated synchronization signals according to a spacing or distance that characteristically differs from a spacing or distance used by the network (10) for the transmission of primary and secondary network synchronization signals.

13. The wireless device (16) of claim 9, wherein the network synchronization signals comprise primary and secondary network synchronization signals, with transmission of the secondary network synchronization signal characteristically mapped to a downlink carrier, and wherein the processing circuit (46) is configured to transmit the device-generated synchronization signals by transmitting primary and secondary device-generated synchronization signals, including mapping transmissions of the secondary device-generated synchronization signal to an uplink carrier.

14. The wireless device (16) of any of claims 9-13, wherein the processing circuit (46) is configured to transmit the device-generated synchronization signals in accordance with a relative positioning that characteristically differs from the relative positioning used for transmitting the network synchronization signals.

15. The wireless device (16) of claim 14, wherein the processing circuit (46) is configured to transmit the device-generated synchronization signals in accordance with a relative mapping that characteristically differs from the relative mapping used for transmitting the network synchronization signals.

16. The wireless device (16) of any of claims 9-15, wherein the processing circuit (46) is configured to transmit secondary device-generated synchronization signals in accordance with a relative positioning or mapping that characteristically differs from the relative positioning or mapping used for transmitting the secondary network synchronization signals.