Claims

1. A controller of a SUDA system, the SUDA system comprising a first base station network group and a second base station network group, at least a first SUDAC as well as a first user equipment assigned to the first base station network group and a second user equipment assigned to the first base station network group;

wherein each SUDAC is configured to use ultra-high frequency in order to transmit at least one backend communication signal to the first and/or the second base station network group and to use extremely-high frequency in order to transmit at least one frontend communication signal to the first and/or the second user equipment and to forward a payload signal received via the backend communication signal and to be transmitted via the frontend communication signal while frequency converting the ultra-high frequency to the extremely-high frequency and to forward the payload signal received via the frontend communication signal and to be transmitted via the backend communication signal while frequency converting the extremely-high frequency to the ultra-high frequency;

wherein the first user equipment is configured to communicate via a first frontend communication signal with the first SUDAC and via a second frontend communication signal with a second SUDAC or via a direct communication signal directly with the first base station network group, wherein the first frontend communication signal is converted to a first backend communication signal used for communication with the first base station network group by the first SUDAC and wherein the second frontend communication signal is converted to a second backend communication signal used for communication with the first base station network group by the second SUDAC;

wherein the second user equipment is configured to communicate via a first frontend communication signal with the first SUDAC and via an second frontend communication signal with the second SUDAC or via a direct communication signal directly with the second base station network group, wherein the first frontend communication signal is converted to a first backend communication signal used for communication with the second base station network group by the second SUDAC and wherein the second frontend communication signal is converted to a second backend communication signal used for communication with the second base station network group by the first SUDAC;

wherein the first and the second user equipment are configured to aggregate the first and the second frontend communication signals or the fist frontend communication signal and the direct communication signal in order to increase an available data rate;

wherein the controller is configured to select first resources, wherein a first portion of the first resources characterizes settings of the first frontend communication signal and of the corresponding first backend communication signal and wherein a second portion of the first resources characterizes settings of the second frontend communication signal and of the corresponding second backend communication signal, for the first user equipment and to select second resources, wherein a first portion of the second resources characterizes settings of the first frontend communication signal and of the corresponding first backend communication signal and wherein a second portion of the second resources characterizes settings of the second frontend communication signal and of the corresponding second backend communication signal, for the second user equipment, taking into account data rate requirements and/or data rate capabilities of the first and/or second user equipment and/or of the first and/or second base station network group and/or such that the first frontend communication signals of the first and the second user equipment as well as the second frontend communication signals of the first and the second user equipment are distinguishable from each other and/or such that transmission losses caused by interferences within the first frontend communication signal and the second frontend communication signal of the first and second user equipment are reduced.

2. The controller according to claim 1, wherein the first and the second resources comprise resources out of a group comprising a time-resources, frequency-resources, code-resources and/or space-resources.

3. The controller according to claim 2, wherein the controller is configured to control via a control signal the time-resources of the first and the second user equipment and of the first and the second SUDAC comprising a memory by assigning respective time slots to the first and the second frontend communication signals and/or to the first and the second backend communication signal, in order to perform TDM/TDMA modulation; and/or

wherein the controller is configured to control via the control signal the frequency-resources of the first and the second user equipment and of the first and the second SUDAC comprising a frequency and multiplexing converter by assigning respective

carrier frequencies to the first and the second frontend communication signals and/or to the first and the second backend communication signal, in order to perform FDM/FDMA modulation; and/or

wherein the controller is configured to control via the control signal the code-resources of the first and the second user equipment and of the first and the second SUDAC comprising a processor by assigning respective special coding schemes to the first and the second frontend communication signals and/or to the first and the second backend communication signal, in order to perform TDM/TDMA modulation, in order to perform CDM/CDMA modulation; and/or

wherein the controller is configured to control via the control signal the space-resources of the first and the second user equipment using the first and the second SUDAC as virtual antennas by transmitting the respective first communication signals and/or the second frontend communication signals to the respective SUDACs, in order to perform SDM/SDMA modulation; and/or

wherein the controller is configured to control via the control signal the further resources comprising variable factors out of a group comprising carrier frequency, carrier spacing, signal power, polarization type, indices of the antenna element, beamforming parameters and/or DSSS-spreading parameters.

4. The controller according to claim 3, wherein the frequency and multiplexing converter is configured to forward the payload signal without decoding.

5. The controller according to one of claims 1 to 4, wherein the controller is configured to select first and second resources based on an evaluation of first grade CSI-data indicating a signal strength at a third user equipment being connected the controller via at least a third SUDAC or based on an evaluation of second grade CSI-data indicating a signal strength at a fourth user equipment being connected the controller via at least a third user equipment and third and fourth SUDAC.

6. The controller according to one of claims 1 to 5, wherein a distance between antennas of the first SUDAC and the second SUDAC are at least 0.5 or 10 times a wavelength of the ultra-high frequency in order to enable beam forming.

7. The controller according to one of claims 1 to 6, wherein the first SUDAC and/or the second SUDAC are integrated in an electricity wall outlet socket, electrical light switches, electrical light outlet, a plug socket device that plugs into a wall socket on its one side and offers a free socket on its other side, a street lamp, or a car or in the first, second or a further user equipment.

8. The controller according to one of claims 1 to 7, wherein the first and second SUDAC are configured to transmit the first and the second frontend communication signals and the first and second backend communication signals between the first user equipment and the first base station group and between the second user equipment and second base station group in parallel.

9. The controller according to claim 8, wherein the controller controls the first and the second SUDAC such that the no payload signals are exchanged between the first user equipment and the second base station group and between the second user equipment and the first base station group.

10. The controller according to one of claims 1 to 9, wherein the first and the second backend communication signal of the first or the second user equipment represents a superposition of ultra-high frequency signals transmitted via the first carrier and the second carrier by using at least two antennas of the respective base station group.

11. The controller according to one of claims 1 to 10, wherein the SUDA system comprises a further SUDAC being configured to use ultra-high frequency in order to transmit a further backend communication signal to the first and/or the second base station network group and to use extremely-high frequency in order to transmit a further frontend communication signal to the first and/or the second user equipment,

wherein the controller is configured to use the frontend communication signal and/or the backend communication signal of the further SUDAC instead of the frontend communication signal and/or the backend communication signal of the first or second SUDAC, if a link quality of the frontend communication signal and/or the backend communication signal of the further SUDAC in view of the first and/or the second user equipment is higher when compared to a link quality of the frontend communication signal and/or the backend communication signal of the first or second SUDAC in view of the respective first and/or the second user equipment.

12. The controller according to one of claims 1 to 11, wherein the controller is a joint controller and/or shared controller integrated into first and/or the second user equipment and/or into the first and/or the second SUDAC or wherein the controller is realized as a protocol or algorithm being executed via a control channel connecting the first and the second user equipment and the first and the second SUDAC.

13. The controller according to one of claims 1 to 12, wherein the controller is configured to provide information regarding available SUDACs to the first and/or second base station group such that the first and/or second base station group performs the resource allocation of the backend communication signal based on the information.

14. The controller according to one of claims 1 to 13, wherein the controller is configured to select or to initiate the selection of time-frequency-code resources used for the backend communication signal and to select the first and/or second resources enabling an assignment of the SUDACs to the respective user equipments in order to allow use of multi user MIMO and/or such that the respective SUDAC is used either by one of the user equipments at any one time or by a plurality of the user equipments simultaneously.

15. The controller according to claim 14, wherein the controller select the resources such that multiple simultaneous spreading codes are assigned to one of the user equipments in order to allow rate splitting in a MU-MIMO transmission.

16. A first user equipment, comprising a controller according to one of claims 1 to 15.

17. A SUDAC which is controllable by a controller according to one of claims 1 to 15.

18. A SUDA system comprising a first base station network group and a second base station network group, a first and a second SUDAC as well as a first user equipment assigned to the first base station network group and a second user equipment assigned to the first base station network group and a controller according to one of claims 1 to 15.

19. A method for controlling a SUDA system, the SUDA system comprising a first base station network group and a second base station network group, at least a first SUDAC as well as a first user equipment assigned to the first base station network group and a second user equipment assigned to the first base station network group,

wherein each SUDAC is configured to use ultra-high frequency in order to transmit at least one backend communication signal to the first and/or the second base station network group and to use extremely-high frequency in order to transmit at least one frontend communication signal to the first and/or the second user equipment and to forward a payload signal received via the backend communication signal and to be transmitted via the frontend communication signal while frequency converting the ultra-high frequency to the extremely-high frequency and to forward the payload signal received via the frontend communication signal and to be transmitted via the backend communication signal while frequency converting the extremely-high frequency to the ultra-high frequency,

wherein the first user equipment is configured to communicate via a first frontend communication signal with the first SUDAC and via a second frontend communication signal with a second SUDAC or via a direct communication signal directly with the first base station network group, wherein the first frontend communication signal is converted to a first backend communication signal used for communication with the first base station network group by the first SUDAC and wherein the second frontend communication signal is converted to a second backend communication signal used for communication with the first base station network group by the second SUDAC;

wherein the second user equipment is configured to communicate via a first frontend communication signal with the first SUDAC and via a second frontend communication signal with the second SUDAC or via a direct communication signal directly with the second base station network group, wherein the first frontend communication signal is converted to a first backend communication signal used for communication with the second base station network group by the second SUDAC and wherein the second frontend communication signal is converted to a second backend communication signal used for communication with the second base station network group by the first SUDAC;

wherein the first and the second user equipment are configured to aggregate the first and the second frontend communication signal or the fist frontend communication signal and the direct communication signal in order to increase an available data rate;

the method comprising:

selecting first resources, wherein a first portion of the first resources characterizes settings of the first frontend communication signal and of the corresponding first backend communication signal and wherein a second portion of the first resources characterizes settings of the second frontend communication signal and of the corresponding second backend communication signal, for the first user equipment; and

selecting second resources, wherein a first portion of the second resources characterizes settings of the first frontend communication signal and of the corresponding first backend communication signal and wherein a second portion of the second resources characterizes settings of the second frontend communication signal and of the corresponding second backend communication signal, for the second user equipment,

taking into account requirements of the first and/or second user equipment and/or of the first and/or second base station network group and/or such that the first frontend communication signals of the first and the second user equipment as well as the second frontend communication signals of the first and the second user equipment are distinguishable from each other and/or such that transmission losses caused by interferences within the first frontend communication signal and the second frontend communication signal of the first and second user equipment are reduced.

20. Computer readable digital storage medium having stored thereon a computer program having a program code for performing, when running on a computer, the method according to claim 19.

21. A controller of a SUDA system, the SUDA system comprising a first base station network group, at least a first SUDAC and at least a first BS-SUDAC as well as a first user equipment,

wherein each SUDAC is configured to use ultra-high frequency in order to transmit at least one backend communication signal to the first base station network group or at least one inter-backend communication signal to the BS-SUDAC and to use extremely-high frequency in order to transmit at least one frontend communication signal to the first user equipment and to forward a payload signal received via the backend communication signal or received via the inter-backend communication signal and to be transmitted via the frontend communication signal while frequency

converting the ultra-high frequency to the extremely-high frequency and to forward the payload signal received via the frontend communication signal and to be transmitted via the backend communication signal or to be transmitted via the inter-backend communication signal while frequency converting the extremely-high frequency to the ultra-high frequency;

wherein each BS-SUDAC is configured to use extremely-high frequency in order to transmit at least one frontend communication signal to the first base station network group and to use ultra-high frequency in order to transmit at least one inter-backend communication signal to the first SUDAC or in order to transmit at least one backend communication signal to the first user equipment and to forward a payload signal received via the frontend communication signal and to be transmitted via the inter-backend communication signal or via the backend communication signal while frequency converting the extremely-high frequency to the ultra-high frequency and to forward the payload signal received via the inter-backend communication signal or received via the backend communication signal and to be transmitted via the frontend communication signal while frequency converting the ultra-high frequency to the extremely-high frequency;

wherein the first user equipment is configured to communicate via a first direct communication signal with the first base station group directly or via a first frontend communication signal with the first SUDAC, wherein the first frontend communication signal is converted to a first backend communication signal used for communication with the first base station network group by the first SUDAC; and/or wherein the first frontend communication signal is converted to a first inter-backend communication signal used for communication with the first base station network group via the BS-SUDAC by the first SUDAC;

wherein the controller is configured to select first resources, wherein a first portion of the first resources characterizes settings of the first frontend communication signal and of the corresponding first backend communication signal or of the inter-backend communication signal, taking into account data rate requirements and/or data rate capabilities of the first and user equipment and/or of the first base station network group, and/or such that the first frontend communication signals of the first user equipment are distinguishable from other signals and/or such that transmission losses caused by interferences within the first frontend communication signal of the first user equipment are reduced.

22. The controller according to claim 21, wherein the SUDAC and/or the BS-SUDAC are formed by an user equipment.

23. The controller according to claim 21 or 22, wherein the controller is configured to select the first resources such that the first user equipment communicates via the first frontend communication signal with a further user equipment forming the first SUDAC in order to operate in a device-to-device operation mode.

Claims

1. A controller (50) of a shared user equipment-side distributed antenna system (200), wherein the controller (50) is implemented into a first or second user equipment (20a, 20b) or into a first or second shared user equipment-side distributed antenna component (210, 220), the shared user equipment-side distributed antenna system (200) comprising a first base station network group (100a) and a second base station network group (100b), the first and the second shared user equipment-side distributed antenna component (210, 220) as well as the first user equipment (20a) assigned to the first base station network group (100a) and a second user equipment (20b) assigned to the second base station network group (100b);

wherein the first and the second shared user equipment-side distributed antenna component (210, 220) are configured to use ultra-high frequency in order to transmit at least one backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) to the first and/or the second base station network group (100a, 100b) and to use extremely-high frequency in order to transmit at least one frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) to the first and/or the second user equipment (20a, 20b) and to forward a payload signal received via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) and to be transmitted via the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) while frequency converting the ultra-high frequency to the extremely-high frequency and to forward the payload signal received via the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) and to be transmitted via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) while frequency converting the extremely-high frequency to the ultra-high frequency;

wherein the first user equipment (20a) is configured to communicate via a first frontend communication signal (21a_1) with the first shared user equipment-side distributed antenna component (210) and via a second frontend communication signal (21a_2) with a second shared user equipment-side distributed antenna component (220) or via the first frontend communication signal (21a_1) with the first shared user equipment-side distributed antenna component (210) and via a direct communication signal (102) directly with the first base station network group

(100a), wherein the first frontend communication signal (21a_1) is converted to a first backend communication signal (101a_1) used for communication with the first base station network group (100a) by the first shared user equipment-side distributed antenna component (210) and wherein the second frontend communication signal (21a_2) is converted to a second backend communication signal (101a_2) used for communication with the first base station network group (100a) by the second shared user equipment-side distributed antenna component (220);

wherein the second user equipment (20b) is configured to communicate via a first frontend communication signal (21b_1) with the first shared user equipment-side distributed antenna component (210) and via an second frontend communication signal (21b_2) with the second shared user equipment-side distributed antenna component (220) or via a first frontend communication signal (21b_1) with the first shared user equipment-side distributed antenna component (210) and via a direct communication signal (102) directly with the second base station network group (100b), wherein the first frontend communication signal (21b_1) is converted to a first backend communication signal (101b_1) used for communication with the second base station network group (100b) by the first shared user equipment-side distributed antenna component (210) and wherein the second frontend communication signal (21b_2) is converted to a second backend communication signal (101b_2) used for communication with the second base station network group (100b) by the second shared user equipment-side distributed antenna component (220);

wherein the first and the second user equipment (20a, 20b) are configured to aggregate the first and the second frontend communication signals (21a_1, 21a_2, 21b_1, 21b_2,) or the first frontend communication signal (21a_1, 21b_1,) and the direct communication signal (102) in order to increase an available data rate;

wherein the controller (50) is configured to select first resources, wherein a first portion of the first resources characterizes settings of the first frontend communication signal (21a_1) and of the corresponding first backend communication signal (101a_1) and wherein a second portion of the first resources characterizes settings of the second frontend communication signal (21a_2) and of the corresponding second backend communication signal (101a_2), for the first

user equipment (20a) and to select second resources, wherein a first portion of the second resources characterizes settings of the first frontend communication signal (21b_1) and of the corresponding first backend communication signal (101b_1) and wherein a second portion of the second resources characterizes settings of the second frontend communication signal (21b_2) and of the corresponding second backend communication signal (101b_2), for the second user equipment (20b), taking into account data rate requirements and/or data rate capabilities of the first and/or second user equipment (20a, 20b) and/or of the first and/or second base station network group (100a, 100b) and/or such that the first frontend communication signals (21a_1, 21b_1) of the first and the second user equipment (20a, 20b) as well as the second frontend communication signals (21a_2, 21b_2) of the first and the second user equipment (20a, 20b) are distinguishable from each other and/or such that transmission losses caused by interferences within the first frontend communication signal (21a_1, 21b_1) and the second frontend communication signal (21a_2, 21b_2) of the first and second user equipment (20a, 20b) are reduced,

wherein the controller (50) is configured to control via the control signal the first and/or the second user equipment (20a, 20b) and/or the first and/or the second user equipment-side distributed antenna component (210, 220),

and the controller (50) has access to all relevant information provided by the devices of the system or being available at the control channel.

2. The controller (50) according to claim 1, wherein the first and the second resources comprise resources out of a group comprising a time-resources, frequency-resources, code-resources and/or space-resources.

3. The controller (50) according to claim 2, wherein the controller (50) is configured to control via a control signal the time-resources of the first and the second user equipment (20a, 20b) and of the first and the second shared user equipment-side distributed antenna component (210, 220) comprising a memory by assigning respective time slots to the first and the second frontend communication signals (21a_1, 21a_2, 21b_1, 21b_2) and/or to the first and the second backend communication signal (101a_1, 101a_2, 101b_1, 101b_2), in order to perform TDM/TDMA modulation; and/or

wherein the controller (50) is configured to control via the control signal the frequency-resources of the first and the second user equipment (20a, 20b) and of the first and the second shared user equipment-side distributed antenna component (210, 220) comprising a frequency and multiplexing converter (212, 222) by assigning respective carrier frequencies to the first and the second frontend communication signals (21a_1, 21a_2, 21b_1, 21b_2) and/or to the first and the second backend communication signal (101a_1, 101a_2, 101b_1, 101b_2), in order to perform FDM/FDMA modulation; and/or

wherein the controller (50) is configured to control via the control signal the code-resources of the first and the second user equipment (20a, 20b) and of the first and the second shared user equipment-side distributed antenna component (210, 220) comprising a processor by assigning respective special coding schemes to the first and the second frontend communication signals (21a_1, 21a_2, 21b_1, 21b_2) and/or to the first and the second backend communication signal (101a_1, 101a_2, 101b_1, 101b_2), in order to perform TDM/TDMA modulation, in order to perform CDM/CDMA modulation; and/or

wherein the controller (50) is configured to control via the control signal the space-resources of the first and the second user equipment (20a, 20b) using the first and the second shared user equipment-side distributed antenna component (210, 220) as virtual antennas by transmitting the respective first communication signals and/or the second frontend communication signals (21a_1, 21a_2, 21b_1, 21b_2) to the respective shared user equipment-side distributed antenna components (210, 220), in order to perform SDM/SDMA modulation; and/or

wherein the controller (50) is configured to control via the control signal the further resources comprising variable factors out of a group comprising carrier frequency, carrier spacing, signal power, polarization type, indices of the antenna element, beamforming parameters and/or DSSS-spreading parameters.

4. The controller (50) according to claim 3, wherein the frequency and multiplexing converter (212, 222) is configured to forward the payload signal without decoding.

5. The controller (50) according to one of claims 1 to 4, wherein the controller is configured to select first and second resources based on an evaluation of first grade CSI-data indicating a signal strength at a third user equipment being connected the controller via at least a third shared user equipment-side distributed antenna component (230) or based on an evaluation of second grade CSI-data indicating a signal strength at a fourth user equipment being connected the controller via at least a third user equipment and third and fourth shared user equipment-side distributed antenna component (230, 240).

6. The controller (50) according to one of claims 1 to 5, wherein a distance between antennas of the first shared user equipment-side distributed antenna component (210, 220) and the second shared user equipment-side distributed antenna component (210, 220) are at least 0.5 or 10 times a wavelength of the ultra-high frequency in order to enable beam forming.

7. The controller (50) according to one of claims 1 to 6, wherein the first shared user equipment-side distributed antenna component (210, 220) or the second shared user equipment-side distributed antenna component (210, 220) are integrated in an electricity wall outlet socket, electrical light switches, electrical light outlet, a plug socket device that plugs into a wall socket on its one side and offers a free socket on its other side, a street lamp, or a car or in a further user equipment (20a, 20b).

8. The controller (50) according one of claims 1 to 7, wherein the first and second shared user equipment-side distributed antenna component (210, 220) are configured to transmit the first and the second frontend communication signals (21a_1, 21a_2, 21b_1, 21b_2) and the first and second backend communication signals (101a_1, 101a_2, 101b_1, 101b_2) between the first user equipment (20a, 20b) and the first base station group and between the second user equipment (20a, 20b) and second base station group in parallel.

9. The controller (50) according claim 8, wherein the controller (50) controls the first and the second shared user equipment-side distributed antenna component (210, 220) such that the no payload signals are exchanged between the first user equipment (20a, 20b) and the second base station group and between the second user equipment (20a, 20b) and the first base station group.

10. The controller (50) according to one of claims 1 to 9, wherein the first and the second backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) of the first or the second user equipment (20a, 20b) represents a superposition of ultra-high frequency signals transmitted via the first carrier and the second carrier by using at least two antennas (12a, 12b, 12c) of a respective base station group.

11. The controller (50) according to one of claims 1 to 10, wherein the shared user equipment-side distributed antenna system comprises a further shared user equipment-side distributed antenna component (210, 220) being configured to use ultra-high frequency in order to transmit a further backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) to the first and/or the second base station network group (100a, 100b) and to use extremely-high frequency in order to transmit a further frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) to the first and/or the second user equipment (20a, 20b),

wherein the controller (50) is configured to use the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) and/or the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) of the further shared user equipment-side distributed antenna component instead of the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) and/or the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) of the first or second shared user equipment-side distributed antenna component (210, 220), if a link quality of the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) and/or the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) of the further shared user equipment-side distributed antenna component in view of the first and/or the second user equipment (20a, 20b) is higher when compared to a link quality of the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) and/or the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) of the first or second shared user equipment-side distributed antenna component (210, 220) in view of the respective first and/or the second user equipment (20a, 20b).

12. The controller (50) according to one of claims 1 to 11, wherein the controller (50) is a joint controller and/or shared controller (50) integrated within a plurality of entities and/or into first and/or the second user equipment (20a, 20b) and/or into the first and/or the second shared user equipment-side distributed antenna component

(210, 220) or wherein the controller (50) is realized as a protocol or algorithm being executed via a control channel connecting the first and the second user equipment (20a, 20b) and the first and the second shared user equipment-side distributed antenna component (210, 220).

13. The controller (50) according to one of claims 1 to 12, wherein the controller (50) is configured to provide information regarding available shared user equipment-side distributed antenna components (210, 220) to the first and/or second base station group (100a, 100b) such that the first and/or second base station group (100a, 100b) performs the resource allocation of the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) based on the information.

14. The controller (50) according to one of claims 1 to 13, wherein the controller (50) is configured to select or to initiate the selection of time-frequency-code resources used for the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) and to select the first and/or second resources enabling an assignment of the shared user equipment-side distributed antenna components (210, 220) to the respective user equipments (20a, 20b) in order to allow use of multi user MIMO and/or such that the respective shared user equipment-side distributed antenna component (210, 2020) is used either by one of the user equipments (20a, 20b) at any one time or by a plurality of the user equipments (20a, 20b) simultaneously.

15. The controller (50) according to claim 14, wherein the controller (50) select the resources such that multiple simultaneous spreading codes are assigned to one of the user equipments (20a, 20b) in order to allow rate splitting in a MU-MIMO transmission.

16. A first user equipment (20a, 20b), comprising a controller (50) according to one of claims 1 to 15.

17. A shared user equipment-side distributed antenna component which is controllable by a controller according to one of claims 1 to 15.

18. A shared user equipment-side distributed antenna system (200) comprising a first base station network group (100a, 100b) and a second base station network group (100a, 100b), a first and a second shared user equipment-side distributed antenna

component (210, 220) as well as a first user equipment (20a, 20b) assigned to the first base station network group (100a, 100b) and a second user equipment (20a, 20b) assigned to the first base station network group (100a, 100b) and a controller (50) according to one of claims 1 to 15.

19. A method for controlling a shared user equipment-side distributed antenna system (200) implemented as control algorithm integrated into a first or second user equipment (20a, 20b) or into a first or second shared user equipment-side distributed antenna component (210, 220), the shared user equipment-side distributed antenna system (200) comprising a first base station network group (100a) and a second base station network group (100b), a first and a second shared user equipment-side distributed antenna component (210) as well as a first user equipment (20a) assigned to the first base station network group (100a) and a second user equipment (20b) assigned to the second base station network group (100b),

wherein the first and the second shared user equipment-side distributed antenna component (210, 220) are configured to use ultra-high frequency in order to transmit at least one backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) to the first and/or the second base station network group (100a, 100b) and to use extremely-high frequency in order to transmit at least one frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) to the first and/or the second user equipment (20a, 20b) and to forward a payload signal received via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) and to be transmitted via the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) while frequency converting the ultra-high frequency to the extremely-high frequency and to forward the payload signal received via the frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) and to be transmitted via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) while frequency converting the extremely-high frequency to the ultra-high frequency,

wherein the first user equipment (20a) is configured to communicate via a first frontend communication signal (21a_1, 21b_1) with the first shared user equipment-side distributed antenna component (210) and via a second frontend communication signal (21a_2, 21b_2) with a second shared user equipment-side distributed antenna component (220) or via a first frontend communication signal

(21b_1) with the first shared user equipment-side distributed antenna component (210) and via a direct communication signal (102) directly with the first base station network group, wherein the first frontend communication signal (21a_1, 21b_1) is converted to a first backend communication signal (101a_1, 101b_1) used for communication with the first base station network group (100a) by the first shared user equipment-side distributed antenna component (210) and wherein the second frontend communication signal (21a_2, 21b_2) is converted to a second backend communication signal (101a_2, 101b_2) used for communication with the first base station network group (100a) by the second shared user equipment-side distributed antenna component (220);

wherein the second user equipment (20b) is configured to communicate via a first frontend communication signal (21a_1, 21b_1) with the first shared user equipment-side distributed antenna component (210) and via a second frontend communication signal (21a_2, 21b_2) with the second shared user equipment-side distributed antenna component (220) or via a direct communication signal (102) directly with the second base station network group (100b), wherein the first frontend communication signal (21a_1, 21b_1) is converted to a first backend communication signal (101a_1, 101b_1) used for communication with the second base station network group (100b) by the first shared user equipment-side distributed antenna component (220) and wherein the second frontend communication signal (21a_2, 21b_2) is converted to a second backend communication signal (101a_2, 101b_2) used for communication with the second base station network group (100b) by the second shared user equipment-side distributed antenna component (210);

wherein the first and the second user equipment (20a, 20b) are configured to aggregate the first and the second frontend communication signal (21a_1, 21a_2, 21b_1, 21b_2) or the first frontend communication signal (21a_1, 21b_1) and the direct communication signal (102) in order to increase an available data rate;

the method comprising the steps:

selecting first resources, wherein a first portion of the first resources characterizes settings of the first frontend communication signal (21a_1) and of the corresponding first backend communication signal (101a_1) and wherein a second

portion of the first resources characterizes settings of the second frontend communication signal (21a_2) and of the corresponding second backend communication signal (101a_2), for the first user equipment (20a); and

selecting second resources, wherein a first portion of the second resources characterizes settings of the first frontend communication signal (21b_1) and of the corresponding first backend communication signal (101b_1) and wherein a second portion of the second resources characterizes settings of the second frontend communication signal (21b_2) and of the corresponding second backend communication signal (101b_2), for the second user equipment (20b),

taking into account requirements of the first and/or second user equipment (20a, 20b) and/or of the first and/or second base station network group (100a, 100b) and/or such that the first frontend communication signals (21a_1, 21b_1) of the first and the second user equipment (20a, 20b) as well as the second frontend communication signals (21a_2, 21b_2) of the first and the second user equipment (20a, 20b) are distinguishable from each other and/or such that transmission losses caused by interferences within the first frontend communication signal (21a_1, 21b_1) and the second frontend communication signal (21a_2, 21b_2) of the first and second user equipment (20a, 20b) are reduced;

wherein the controlling of the first and/or the second user equipment (20a, 20b) and/or the first and/or the second user equipment-side distributed antenna component (210, 220) is performed via a control signal and based on the access to all relevant information provided by the devices of the system or being available at the control channel.

20. The method according to claim 19, wherein the control algorithm executed by a plurality of entities.

21. Computer readable digital storage medium having stored thereon a computer program having a program code for performing, when running on a computer, the method according to claim 19 or 20.

22. A controller (50) of a shared user equipment-side distributed antenna system (200), wherein the controller (50) is implemented into a first or second user

equipment (20a, 20b) or into a first shared user equipment-side distributed antenna component (210, 220) or into femto base station (100') or the into a first DUAL-shared user equipment-side distributed antenna component (260, 270), the shared user equipment-side distributed antenna system (200) comprising a femto base station (100'), the first shared user equipment-side distributed antenna component (210, 220) and at least the first DUAL-shared user equipment-side distributed antenna component (260, 270) as well as a first user equipment (20),

wherein the each shared user equipment-side distributed antenna component (210, 220) is configured to use ultra-high frequency in order to transmit at least one backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) to the first base station network group(100) or at least one inter-backend communication signal (103) to the DUAL-shared user equipment-side distributed antenna component (260, 270) and to use extremely-high frequency in order to transmit at least one frontend communication signal (21) to the first user equipment (20) and to forward a payload signal received via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) or received via the inter-backend communication signal (103) and to be transmitted via the frontend communication signal (21) while frequency converting the ultra-high frequency to the extremely-high frequency and to forward the payload signal received via the frontend communication signal (21) and to be transmitted via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) or to be transmitted via the inter-backend communication signal (103) while frequency converting the extremely-high frequency to the ultra-high frequency;

wherein each DUAL-shared user equipment-side distributed antenna component (260, 270) is configured to use extremely-high frequency in order to transmit at least one backend communication signal (22) to the femto base station (100') and to use ultra-high frequency in order to transmit at least one inter-backend communication signal (103) to the first shared user equipment-side distributed antenna component (210) or in order to transmit at least one backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) to the first user equipment (20) and to forward a payload signal received via the backend communication signal (22) and to be transmitted via the inter-backend communication signal (103) or via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) while frequency converting the extremely-high

frequency to the ultra-high frequency and to forward the payload signal received via the inter-backend communication signal (103) or received via the backend communication signal (101a_1, 101a_2, 101b_1, 101b_2) and to be transmitted via the backend communication signal (22) while frequency converting the ultra-high frequency to the extremely-high frequency;

wherein the first user equipment (20) is configured to communicate via a first direct communication signal with the femto base station (100') directly or via a first frontend communication signal (21a_1) with the first shared user equipment-side distributed antenna component (210), wherein the first frontend communication signal (21) is converted to a first backend communication signal (101a_1) used for communication with the first base station network group (100)by the first shared user equipment-side distributed antenna component (210); and/or wherein the first frontend communication signal (21) is converted to a first inter-backend communication signal (101) used for communication with the femto base station network group (100') via the DUAL-shared user equipment-side distributed antenna component (260, 270) by the first shared user equipment-side distributed antenna component (210);

wherein the controller (50) is configured to select first resources, wherein a first portion of the first resources characterizes settings of the first frontend communication signal (21) and of the corresponding first backend communication signal (101a_1, 101a_2) or of the inter-backend communication signal (101, 103) , taking into account data rate requirements and/or data rate capabilities of the first and user equipment (20) and/or of the first base station network group(100), and/or such that the first frontend communication signals (21) of the first user equipment (20) are distinguishable from other signals and/or such that transmission losses caused by interferences within the first frontend communication signal (21) of the first user equipment (20) are reduced;

wherein the controller (50) is configured to control via the control signal the first and/or the second user equipment (20a, 20b) and/or the first and/or the second user equipment-side distributed antenna component (210, 220),

and the controller (50) has access to all relevant information provided by the devices of the system or being available at the control channel.

23. The controller according to claim 2, wherein the shared user equipment-side distributed antenna component (210, 220) and/or the DUAL-shared user equipment-side distributed antenna component (260, 270) are formed by an user equipment (20).

24. The controller according to claim 22 or 23, wherein the controller (50) is configured to select the first resources such that the first user equipment (20) communicates via the first frontend communication signal (21a_1) with a further user equipment forming the first shared user equipment-side distributed antenna component (210) in order to operate in a device-to-device operation mode.