

[0004] According to the first aspect of the present invention there is provided a network comprising: ~~a first base transceiver station (BTS) operable to provide a first signal including a plurality of first carriers; a first digital access unit (DAU) coupled to a first base transceiver station (BTS) and operable to receive a first signal from the first BTS, wherein the first signal includes a plurality of first carriers; a second BTS operable to provide a second signal including a plurality of second carriers; a second DAU coupled to a second BTS separately located from the first BTS, wherein the second DAU is operable to receive a second signal from the second BTS, wherein the second signal includes a plurality of second carriers; a first set of one or more digital access units (DAUs), each of the one or more DAUs being coupled to at least one of the first BTS or the second BTS; and a set of one or more digital remote units (DRUs) coupled to the first DAU and the second DAU and operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one or more of the second plurality of carriers; and, each of the second DRUs being coupled to one of the one or more the first DAUs and the second DAU and operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one signal or more of the second plurality of carriers~~signal.

[0005] In some embodiments, the first BTS may be associated with a first infrastructure supplier and the second BTS may be associated with a second infrastructure supplier. In some embodiments, the first infrastructure supplier and the second infrastructure supplier are a same infrastructure supplier.

[0006] The one or more BTSs may provide the signal including the plurality of carriers using differing broadcast protocols. The different broadcast protocols may include at least one of CDMA, WCDMA, or LTE. The one or more DAUs may include a plurality of DAUs coupled via at least one of Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link. The one or more DAUs may include a plurality of DAUs coupled to the plurality of DRUs via at least one of Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link. The one or more DRUs may include a plurality of DRUs connected in a daisy chain configuration and/or a star configuration. Each of the one or more DAUs may be coupled to at least one of the first BTS or the second BTS, e.g., via at least one of a Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link.

[0007] According to the second aspect of the present invention, there is provided a method of operating a virtual Distributed Antenna System (DAS) network, the method comprising: receiving a first signal including a first plurality of carriers from a first BTS; routing the first signal to a first DAU coupled to the first BTS; receiving a second signal including a second plurality of carriers from a second BTS; routing the second signal to a second DAU coupled to the second BTS; routing the first and second signals to a first DRU coupled to the first DAU and the second DAU, wherein the first DRU is operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one or more of the second plurality of carriers; and routing the first and second signals to a second DRU coupled to the first DAU and the second DAU, wherein the second DRU is operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one or more of the second plurality of carriers.

[0007a] The method may further include: associating the first and second signals with one of a plurality of DRUs based on a geographic usage pattern, the plurality of DRUs comprising the first DRU and the second DRU. Routing the first and second signals to the second DRU may include routing the first and second signals through a plurality of DAUs.

[0008] According to the third aspect of the present invention, there is provided a method of operating a virtual DAS network, the method comprising: receiving a first signal including a first plurality of carriers from a first BTS; routing the first signal to a first DAU coupled to the first BTS; receiving a second signal including a second plurality of carriers from a second BTS; routing the second signal to a second DAU coupled to the second BTS; routing a first subset of the first plurality of carriers and a first subset of the second plurality of carriers to a first DRU coupled to the first DAU and the second DAU, wherein the first DRU is operable to broadcast to mobile subscribers the first subset of the first plurality of carriers and the first subset of the second plurality of carriers; routing a second subset of the first plurality of carriers and a second subset of the second plurality of carriers to a second DRU coupled to the first DAU and the second DAU, wherein the second DRU is operable to broadcast to mobile subscribers the second subset of the first plurality of carriers and the second subset of the second plurality of carriers; ~~receiving a third signal from the first BTS; and routing the third signal to the second DRU.~~

WHAT IS CLAIMED IS:

1. A network comprising:

~~a first base transceiver station (BTS) operable to provide a first signal including a plurality of first carriers;~~

a first digital access unit (DAU) coupled to ~~the~~ a first base transceiver station (BTS) and operable to receive a first signal from the first BTS, wherein the first signal includes a plurality of first carriers;

~~a second BTS operable to provide a second signal including a plurality of second carriers;~~

a second DAU coupled to ~~the~~ a second BTS separately located from the first BTS, wherein the second DAU is operable to receive a second signal from the second BTS, wherein the second signal includes a plurality of second carriers;

a first digital remote unit (DRU) coupled to the first DAU and the second DAU and operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one or more of the second plurality of carriers; and

a second DRU coupled to the first DAU and the second DAU and operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one or more of the second plurality of carriers.

2. The network of claim 1 wherein the first BTS is associated with a first infrastructure supplier and the second BTS is associated with a second infrastructure supplier.

3. The network of claim 2 wherein the first infrastructure supplier and the second infrastructure supplier are a same infrastructure supplier.

4. The network of claim 1 wherein the first BTS and the second BTS provide the first signal including the plurality of first carriers and the second signal including the second plurality of carriers using differing broadcast protocols.

5. The network of claim 4 wherein the different broadcast protocols comprise at least one of CDMA or WCDMA,

6. The network of claim 4 wherein the different broadcast protocols comprise LTE.

7. The network of claim 1 wherein the first DAU and the second DAU are coupled via at least one of Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link.

8. The network of claim 7 wherein the first DAU and the second DAU are coupled to the first DRU and the second DRU via at least one of Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link.

9. The network of claim 1 wherein the first DRU and the second DRU are connected in a daisy chain configuration.

10. The network of claim 1 wherein the first DRU and the second DRU are connected to the first DAU and the second DAU in a star configuration.

11. The network of claim 1 wherein the first DAU and the second DAU are coupled to at least one of the first BTS or the second BTS via at least one of a Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link.

12. A method of operating a virtual Distributed Antenna System (DAS) network, the method comprising:

receiving a first signal including a first plurality of carriers from a first base

transceiver station (BTS);

routing the first signal to a first digital access unit (DAU) coupled to the first BTS;

receiving a second signal including a second plurality of carriers from a second BTS;

routing the second signal to a second digital access unit (DAU) coupled to the second

BTS;

routing the first signal and the second signal to a first digital remote unit (DRU)

coupled to the first DAU and the second DAU, wherein the first DRU is operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one or more of the second plurality of carriers; and

routing the first signal and the second signal to a second DRU coupled to the first DAU and the second DAU, wherein the second DRU is operable to broadcast to mobile subscribers one or more of the first plurality of carriers and one or more of the second plurality of carriers.

13. The method of claim 12 further comprising:

associating the first signal and the second signal based on a geographic usage pattern;
~~the plurality of DRUs comprising the first DRU and the second DRU.~~

~~14. The method of claim 12 wherein routing the first signal and the second signal to the second DRU comprises routing the first signal and the second signal through a plurality of digital access units (DAU).~~

~~1415.~~ The method of claim 12 wherein the first BTS is associated with a first infrastructure supplier and the second BTS is associated with a second infrastructure supplier.

~~1516.~~ The method of claim ~~1415~~ wherein the first infrastructure supplier and the second infrastructure supplier are a same infrastructure supplier.

~~1617.~~ A method of operating a virtual Distributed Antenna System (DAS) network, the method comprising:

receiving a first signal including a first plurality of carriers from a first base transceiver station (BTS);

routing the first signal to a first digital access unit (DAU) coupled to the first BTS;

receiving a second signal including a second plurality of carriers from a second BTS;

routing the second signal to a second digital access unit (DAU) coupled to the second
BTS;

routing a first subset of the first plurality of carriers and a first subset of the second plurality of carriers to a first digital remote unit (DRU) coupled to the first DAU and the second DAU, wherein the first DRU is operable to broadcast to mobile subscribers the first subset of the first plurality of carriers and the first subset of the second plurality of carriers;

routing a second subset of the first plurality of carriers and a second subset of the second plurality of carriers to a second DRU coupled to the first DAU and the second DAU, wherein the second DRU is operable to broadcast to mobile subscribers the second subset of the first plurality of carriers and the second subset of the second plurality of carriers.

~~1718.~~ The method of claim ~~1617~~ further comprising:

repeatedly assigning the first DRU to one of a plurality of BTSs, the plurality of BTSs including the first BTS and the second BTS.

1819. The method of claim 1718 wherein the first DRU is assigned at least partly in an attempt to evenly distribute combined BTS resources across DRUs in the network.

~~20. The method of claim 17 wherein routing the first subset of the first plurality of carriers and the first subset of the second plurality of carriers and the second subset of the first plurality of carriers and the second subset of the second plurality of carriers including routing through a plurality of digital access units (DAU).~~

1921. The method of claim 1617 wherein the first BTS is associated with a first infrastructure supplier and the second BTS is associated with a second infrastructure supplier.

2022. The method of claim 1921 wherein the first infrastructure supplier and the second infrastructure supplier are a same infrastructure supplier.