sectors and distribute the resources to a plurality of digital remote units (DRUs). Each DRU can serve as an antenna, receiving and transmitting signals, and thereby providing network coverage to a local geographic area surrounding the physical DRU. The DAS may be physically coupled to the base station and to the plurality of DRUs, e.g., through an optical fiber link. Thus, resources provided by one base station may be distributed to a plurality of DRUs, thereby providing coverage over a larger geographical area.

A DAS may be coupled (e.g., through another optical fiber link) to one or more other DASs. Therefore, the DAS may also: (1) allocate part of the resources associated with another base station (which may be referred to as a sector) to the DRUs physically coupled to the DAS; and/or (2) allocate resources from the sector physically coupled to the DAS to serve DRUs physically coupled to another DAS. This may allow a system to dynamically allocate resources from a plurality of sectors to a network of DRUs (e.g., responding to geographic and temporal patterns in device usage), thereby improving the efficiency of the system and meeting desired capacity and throughput objectives and/or wireless subscriber needs.

According to the first aspect of the present invention, there is provided a system for managing resource use in a Distributed Antenna System, the system comprising: a plurality of Digital Remote Units (DRUs) configured to send and receive wireless radio signals; a plurality of sectors, each configured to send and receive wireless radio signals; ~~and~~ a plurality of inter-connected Digital Access Units (DAUs), each configured to communicate with at least one of the DRUs via optical signals, and each being coupled to at least one of the sectors; and an algorithm for determining the power of a signal from one of the plurality of DRUs to one of the plurality of sectors and the power of the same signal from the same one of the plurality of DRUs to another of the plurality of sectors.

The ~~system may further include an~~ algorithm may be ~~(e.g., a~~ nonlinear algorithm~~)~~ ~~for determining the power of a signal from one of the plurality of DRUs to one of the plurality of sectors and the power of the same signal from the same one of the plurality of DRUs to another of the plurality of sectors~~. The at least two of the sectors may be associated with different carriers, and the power of each carrier supplied to each DRU of the plurality of DRUs is independently controlled. The DRUs may be connected in a loop to a plurality of DAUs. A single DAU port may be coupled to a plurality of the sectors. The system may further include a server configured to route signals between the plurality of DAUs. The plurality of sectors may include multiple sectors from one Base Transceiver Station. Each of the plurality of DAUs may be configured to communicate with the at least one of the DRUs by sending and receiving signals over at least one of an optical fiber, an Ethernet cable,

microwave line of sight link, wireless link, or satellite link. Each of the plurality of DAUs may be further configured to convert a radio signal received from the at least one sector to an optical signal. Each of the DAUs may be co-located with the at least one sector. Each of the

WHAT IS CLAIMED IS:

1. A system for managing resource use in a Distributed Antenna System, the system comprising:

a plurality of Digital Remote Units (DRUs) configured to send and receive wireless radio signals;

a plurality of sectors, each configured to send and receive wireless radio signals; ~~and~~

a plurality of inter-connected Digital Access Units (DAUs), each configured to communicate with at least one of the DRUs via optical signals, and each being coupled to at least one of the sectors; and

an algorithm for determining the power of a signal from one of the plurality of DRUs to one of the plurality of sectors and the power of the same signal from the same one of the plurality of DRUs to another of the plurality of sectors.

~~2. The system of claim 1 further comprising an algorithm for determining the power of a signal from one of the plurality of DRUs to one of the plurality of sectors and the power of the same signal from the same one of the plurality of DRUs to another of the plurality of sectors.~~

2. The system of claim ~~2~~ 1 wherein the algorithm is nonlinear.

~~4~~3. The system of claim ~~2~~ 1 wherein the at least two of the sectors are associated with different carriers, and the power of each carrier supplied to each DRU of the plurality of DRUs is independently controlled.

~~5~~4. The system of claim 1 wherein the DRUs are connected in a loop to a plurality of DAUs.

~~6~~5. The system of claim 1 wherein a single DAU port is coupled to a plurality of the sectors.

~~7~~6. The system of claim 1 further comprising a server configured to route signals between the plurality of DAUs.

~~8~~7. The system of claim 1 wherein the plurality of sectors comprises multiple sectors from one Base Transceiver Station.

98. The system of claim 1 wherein each of the plurality of DAUs is configured to communicate with the at least one of the DRUs by sending and receiving signals over at least one of an optical fiber, an Ethernet cable, microwave line of sight link, wireless link, or satellite link.

910. The system of claim 1 wherein each of the plurality of DAUs is further configured to convert a radio signal received from the at least one sector to an optical signal.

1011. The system of claim 1 wherein each of the DAUs is co-located with the at least one sector.

1112. The system of claim 1 wherein each of the plurality of DAUs is connected to a plurality of DRUs.

1213. The system of claim 1 wherein at least some of the DRUs are connected in a daisy chain configuration.

1314. The system of claim 1 wherein the DRUs are connected to the DAUs in a star configuration.

1415. The system of claim 1 further comprising a dynamic database comprising sector assignments for each of the plurality of DRUs, wherein the database is accessible by the plurality of DAUs.

~~16. A method for managing resource use in a Distributed Antenna System, the method comprising:~~

~~assigning a Digital Remote Units (DRU) to a first of a plurality of sectors;~~

~~receiving a first optical signal at a first Digital Access Unit (DAU) from a DRU;~~

~~converting the first optical signal to a first radio signal;~~

~~transmitting the first radio signal to the first sector;~~

~~re-assigning the DRU to a second of the plurality of sectors, the second sector being different from the first sector;~~

~~receiving a second optical signal at the first DAU from the DRU;~~

~~transmitting the second optical signal from the first DAU to a second DAU;~~

~~converting the second optical signal to a second radio signal; and~~

~~transmitting the second radio signal to the second sector.~~

17. The method of claim 16 wherein the re-assignment is based at least partly on an actual or predicted increase use of a wireless network at a portion of the network's coverage.

18. The method of claim 16 further comprising:

storing the assignment in a database; and

updating the database to include the re-assignment.

19. The method of claim 16 wherein a hardware architecture of the Distributed Antenna System is not modified between the assignment and the re-assignment.

20. A method for managing resource use in a Distributed Antenna System, the method comprising:

receiving a radio signal;

decoding at least part of the signal;

identifying a source Digital Remote Unit (DRU) amongst a plurality of DRUs based on the decoded signal;

converting the signal into a digital signal;

determining a subset of recipient sectors from a plurality of sectors based on the identified source DRU; and

transmitting the digital signal to the subset of recipient sectors.

21. The method of claim 20 wherein transmitting the digital signal to the subset of recipient sectors is performed by a first digital access unit (DAU) and comprises transmitting the digital signal to a second DAU.

22. The method of claim 20 wherein the subset of sectors comprises one sector.

23. The method of claim 20 wherein the subset of recipient sectors is determined at least partly by using a dynamic DRU-sector assignment database at least partly based on dynamic geographic discrepancies in network use.

24. A non-transitory computer-readable storage medium comprising a plurality of computer-readable instructions tangibly embodied on the computer-readable storage medium, which, when executed by one or more data processors, provide routing of wireless network signals, the plurality of instructions comprising:

instructions that cause the data processor to decode a digital signal;

~~instructions that cause the data processor to identify a Digital Remote Unit (DRU) based on the decoded signal;~~

~~instructions that cause the data processor to convert the digital signal into a radio frequency signal;~~

~~instructions that cause the data processor to dynamically determine an assignment pairing the DRU with one or more Base Transceiver Station sectors, the assignment being at least partly determined by dynamic geographic discrepancies in network use; and~~

~~instructions that cause the data processor to transmit the digital signal to the one or more assigned sectors.~~

~~25. A system for routing signals in a Distributed Antenna System, the system comprising:~~

~~a plurality of Digital Access Units (DAUs), wherein the plurality of DAUs are coupled and operable to route signals between the plurality of DAUs;~~

~~a plurality of Digital Remote Units (DRUs) coupled to the plurality of DAUs and operable to transport signals between DRUs and DAUs;~~

~~a plurality of Base Transceiver Stations (BTS);~~

~~a plurality of Base Transceiver Station sector RF connections coupled to the plurality of DAUs and operable to route signals between the plurality of DAUs and the plurality of Base Transceiver Stations sector RF port connections; and~~

~~one or more routing tables.~~

~~26. The system of claim 25 wherein the plurality of DRUs is further coupled and operable to route signals between the plurality of DRUs.~~

~~27. The system of claim 25 wherein the plurality of DAUs are coupled via at least one of Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link~~

~~28. The system of claim 25 wherein the plurality of DAUs are 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.~~

~~29. The system of claim 25 wherein the DRUs are connected in a daisy chain configuration.~~

30. The system of claim 25 wherein the DRUs are connected to the DAUs in a star configuration.

31. The system of claim 25 wherein the DAUs are connected to the BTSs via at least one of a Ethernet cable, Optical Fiber, Microwave Line of Sight Link, Wireless Link, or Satellite Link. 32. The system of claim 25 wherein the DRUs are connected in a loop to a plurality of DAUs.

33. The system of claim 25 wherein a single DAU port is connected to a plurality of Base Transceiver Stations.

34. A method for routing signals in a Distributed Antenna System including a plurality of Digital Access Units (DAUs), a plurality of Digital Remote Units (DRUs), a plurality of Base Transceiver Stations (BTS), and a plurality of Base Transceiver Station sector RF connections, the method comprising:

transporting signals between the DRUs and the DAUs;

routing the signals between DAUs using one or more peer ports of the DAUs; and

routing the signals between DAUs and the plurality of BTS sector RF port connections.

35. The method of claim 34 further comprising routing the signals between DRU daisy-chains prior to transporting the signals between the DRUs and DAUs.

36. The method of claim 34 further comprising:

providing routing tables; and

using Merge blocks in the routing tables to route signals from inputs of the DAUs to outputs of the DAUs.

37. The method of claim 36 wherein the routing tables are provided in the DAUs.

38. The method of claim 34 further comprising:

providing routing tables; and

using Merge blocks in the routing tables to route signals from inputs of the DRUs to outputs of the DRUs.

~~39. The method of claim 38 wherein the routing tables are provided in the DRUs.~~

~~40. The method of claim 34 wherein a power level of each carrier in each DRU is independently controlled.~~