

EXHIBIT B

Infringement of U.S. Patent No. 9,197,358 by the SpiderCloud Enterprise Radio Access Network (“E-RAN”) System

The SpiderCloud E-RAN System including E-RAN small cell systems, such as SpiderCloud services and radio nodes,¹ and all applicable software, including software that implements SpiderCloud’s Dynamic Fractional Frequency Reuse features, capabilities, methods and processes, infringes claims 7-13, 15 and 17-21 of the ’358 patent either literally or under the doctrine of equivalents.

Corning induces the direct infringement of claims 7-13 of the ’358 patent by users of the SpiderCloud E-RAN System. Corning has actual knowledge of the ’358 patent and knowingly induces and specifically intends to cause users to directly infringe the ’358 patent when they use the SpiderCloud E-RAN System. When users of the SpiderCloud E-RAN System use the SpiderCloud E-RAN System as intended and instructed by Corning, these users directly infringe the ’358 patent. Because Corning has knowledge of the ’358 patent and that users infringe the ’358 patent when they use the SpiderCloud E-RAN System as Corning intends and instructs them to do, Corning induces and specifically intends to cause users to infringe the ’358 patent.

A. Claim 7

- **7[Preamble] A method of distributing communications frequencies, the method providing:**

SpiderCloud E-RAN System - Claim 7[Preamble]
To the extent that the Court deems the preamble of claim 1 to be limiting, the SpiderCloud E-RAN System meets this claim element. For example, according to Corning’s SpiderCloud product literature, the SpiderCloud E-RAN System distributes UMTS, LTE and LTE-LAA wireless communications, which include various communication frequencies. ² The SpiderCloud E-RAN System is “made up of one rack-unit-sized services node that manages multiple single-carrier or dual-carrier radio nodes operating in 3G, LTE, and unlicensed spectrum.” ³

¹ Upon information and belief, SpiderCloud E-RAN services node include, but not limited to, the Corning Spider Cloud Services Node 9000 4G LTE Air Technology and Corning SpiderCloud Services 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface services node models. Upon information and belief, SpiderCloud radio nodes include, but not limited to, the SCR-N-310, SCR-N-220, SCR-N-320, SCR-N-330 and SCR-N-340 radio node models.

² NDCA-00044204-07 (E-RAN Introduction) at D00044204-05; *see also* COCDALI_00000014-15 (Small Cell Technology), COCDALI_00000016-18 (Small Cell Service Nodes).

³ *Id.* at D00044205.

E-RAN Platform

An E-RAN system is made up of one rack-unit-sized services node that manages multiple single-carrier or dual-carrier radio nodes operating in 3G, LTE, and unlicensed spectrum.

Services Node

The services node lies at the heart of the SpiderCloud® E-RAN solution. It ensures that the E-RAN system is easy to deploy and manage and that it delivers the performance mobile operators expect. The services node is access technology agnostic, supporting UMTS, LTE, and LTE-LAA. It orchestrates the self-organizing network (SON) process, controls the operation of different radio nodes during neighbor discovery, gathers information from different radio nodes, and creates optimized neighbor lists based on information received from the neighbor scans.

SON capabilities include:

- Discovering the macro cells in the area as well as internal small cell and collocated Wi-Fi topologies.
- Assigning UMTS primary scrambling codes, LTE physical cell identifier, and LAA unlicensed channels.
- Setting maximum transmit power levels based on transmit power detected from adjacent radio nodes and surrounding macro signals.
- Automatically configuring cell neighbor lists to make the system operational.



Radio Nodes

Like Wi-Fi access points, radio nodes are small with low profiles. An E-RAN platform offers a wide range of radio nodes for many different applications and mobile operator configurations. All models are powered by PoE+ (802.11at) Ethernet switch ports.

Installation is quick and easy using commonly available PoE+.

1. Pull a structured cable (CAT 5e or greater).
2. Attach the radio to wall or ceiling.
3. Connect Ethernet patch cords at both ends.

- **7[A] providing a set of communications units;**

SpiderCloud E-RAN System - Claim 7[A]

The SpiderCloud E-RAN system meets this claim element. For example, the SpiderCloud E-RAN system provides a family of radio nodes, each serving as a “communication unit” including first and second communication units.⁴

⁴ NDCA-00044204-07 (E-RAN Introduction) at D00044205.

Radio Node Family



Capabilities	SCRN-310	SCRN-220	SCRN-320	SCRN-330	SCRN-340
Available models	Band 4 & 13 (model -0413) Band 4 & 2 (model -04L2)	Band 4 (66) or Band 2(25) or Band 13	Band 4 + 5 GHz Band 2 + 5 GHz Band 4(66) + 5 GHz	Band 41 (Sprint) or 48 (CBRS)	Band 2 (25) or 4 (66) & Band 13 or 14
Carrier aggregation (CA)	Yes	No	Licensed and unlicensed up to 60 MHz (3 CC CA)	No	Yes
Peak speed (Mbps)	225 Mbps with CA (0413) 300 Mbps with CA (04L2) 150 Mbps without CA	150	270 Mbps (Chan 32 only) 400 Mbps (3 CCA)	Peak DL rate of 100 Mbps with FC2	225 Mbps with CA 150 Mbps without CA
Number of active users	128/band (256 for dual-band)	128	128 (with LAA)	128	128/band (256 for dual-band)
Number of VoLTE users (subset of number active)	64 with CA 128 (64/band), without CA	64	64 (with LAA)	64	64 with CA 128 (64/band), without CA
Support for CAT-M1	No	Yes	Yes	No	Yes
Transmit power	250 mW	500 mW	500 mW	500 mW	500 mW
Coverage	8,000 – 10,000	10,000 – 13,000	10,000 – 13,000	10,000 – 13,000	10,000 – 13,000
Antennas	Internal External as option	Internal External as option	Internal	Internal External as option	Internal External as option

According to SpiderCloud product literature, the SpiderCloud E-RAN System is a scalable small cell system “comprised of one services node, can manage 100 dual-carrier radio nodes, providing **reliable coverage** and capacity for sites up to 1.5 million square feet.”⁵ In particular, the SpiderCloud E-RAN system provides multiple radio nodes (communication units) that are connected to a SpiderCloud E-RAN services node using standard Ethernet LAN infrastructure.⁶ Such a system includes first and second radio nodes.

⁵ COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001; *see also* NDCA-00044204-07 (E-RAN Introduction) at NDCA-00044206.

⁶ *Id.*

- **7[B] transmitting and receiving, from a first communications unit of the set of communications units:**

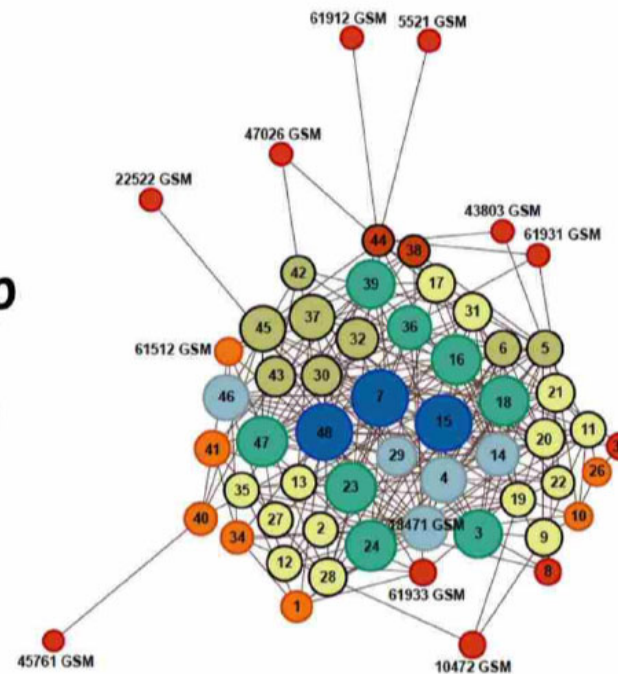
SpiderCloud E-RAN System - Claim 7[B]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud E-RAN System provides a plurality of radio nodes for scalable small cell systems that includes UMTS and LTE layers.⁷ The SpiderCloud E-RAN System provides a radio node among a set of radio nodes as that transmits and receives wireless communications in a cell.⁸ The SpiderCloud E-RAN System comprises a service node that “can manage 100 dual-carrier radio nodes, providing reliable **coverage** and capacity for sites up to **1.5 million square feet**.”⁹

The SpiderCloud E-RAN services node performs capabilities such as “discovering the **macro cells** in the **area**, discovering the **internal small cell topology**, assigning UMTS primary scrambling codes and LTE physical cell identifier . . . and automatically configuring cell neighbor lists to make the system operational.”¹⁰

Visualization Map

Corning SpiderCloud's SON for Scalable Small Cell Systems
Includes: UMTS & LTE SON Layers



⁷ NDCA-00044204-07 (E-RAN Introduction) at NDCA-00044204-05; *see also* COCDALI_00000014-15 (Small Cell Technology), COCDALI_00000016-18 (Small Cell Service Nodes).

⁸ COCDALI_00000074-77 (Self-Organizing/Self-Optimizing (SON) Small Cell Technology) at COCDALI_00000075.

⁹ COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001.

¹⁰ COCDALI_00000074-77 (Self-Organizing/Self-Optimizing (SON) Small Cell Technology) at COCDALI_00000074.

- **7[C] a first set of frequencies characterized by a first frequency band and a first geographic footprint; and**

SpiderCloud E-RAN System - Claim 7[C]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud E-RAN System provides a services node that performs capabilities such as “discovering the **macro cells** in the **area**, discovering the **internal small cell topology**, assigning UMTS primary scrambling codes and LTE physical cell identifier . . . and automatically configuring cell neighbor lists to make the system operational.”¹¹

Additionally, according to SpiderCloud E-RAN System product literature, the SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that performs “[c]entrally coordinated **dynamic fractional frequency reuse** for **[inter-cell interference coordination] ICIC**.”¹² Upon information and belief, SpiderCloud’s dynamic fractional frequency reuse scheme is disclosed and operates in accordance with the fractional frequency reuse description in Corning’s United States Patent No. 9,510,205 (SpiderCloud ’205 Patent), titled “Load-Based Dynamic Fractional Frequency Reuse in an LTE Network,” originally issued to SpiderCloud Wireless, Inc.¹³

Upon information and belief, the SpiderCloud E-RAN coordinated dynamic fractional frequency reuse scheme uses different frequencies for outer cell areas to reduce inter-cell interference, while at the same time reusing the frequencies for the inner cell areas. For example, according to the SpiderCloud ’205 Patent, each radio node of the SpiderCloud E-RAN System has a “radio coverage,” – i.e., geographic footprint.¹⁴ SpiderCloud E-RAN System radio nodes transmit (*i.e.* a downlink channel) data to user equipment, such as mobile phones, smartphones, tablet computing devices, and the like (collectively “UEs”) and receives (*i.e.* an uplink channel) data from UEs within the system.¹⁵

In the SpiderCloud ’205 Patent, Figure 3 describes downlink channels in which data is “served” to UEs by a first radio node RN 1 115₁, and Figure 4 describes uplink channels in which data is transmitted from UEs back to the radio node RN 1 115₁. More specifically, referring to Figure 5 of the SpiderCloud ’205 patent, upon information and belief, a SpiderCloud radio node transmits and receives communications using a “first set of frequencies characterized by a first frequency band” over “a first geographic footprint” when performing fractional frequency reuse.¹⁶

¹¹ *Id.* at COCDALI_00000074.

¹² COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

¹³ NDCA-00044637-52 (SpiderCloud ’205 Patent).

¹⁴ *Id.* at 3:4-6 (NDCA-00044648); *see also* COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001.

¹⁵ *Id.* at 3:19-22, 4:42-45 (NDCA-00044648).

¹⁶ *Id.* at Figure 5, 6:23-29 (NDCA-00044642, NDCA-00044649).

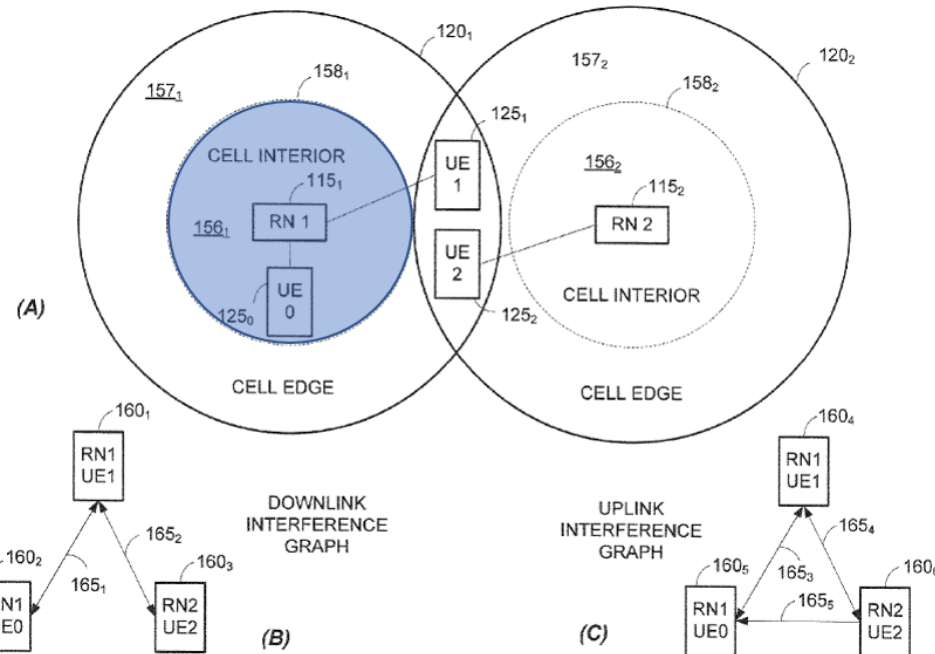


Fig. 5

For example, as explained in the SpiderCloud '205 Patent, “within each cell, different frequencies (or sets of frequencies) may be allocated as between UEs in the cell edge and those in the cell interior.”¹⁷ That is, referring to the annotated Fig. 5 above, the highlighted Cell Interior 156₁ has different allocated frequencies for UEs than those of Cell Edge 157₁. SpiderCloud E-RAN System radio nodes provide multiple software-configurable radio bands.¹⁸ Accordingly, for the SpiderCloud E-RAN System, a SpiderCloud radio node allocates different frequencies within a cell edge than those within a cell interior. Thus, upon information and belief, the SpiderCloud E-RAN System provides a first radio node (*e.g.*, RN 1 115₁) among a set of radio nodes that allocates a first set of frequencies characterized by a first frequency band and a first geographic footprint (*e.g.*, Cell Interior 156₁) when performing fractional frequency reuse.

- **7[D] a second set of frequencies characterized by a second frequency band different from the first frequency band and a second geographic footprint larger than and at least partially surrounding the first geographic footprint; and**

¹⁷ NDCA-00044637-52 (SpiderCloud '205 Patent) at 6:23-29 (NDCA-00044649).

¹⁸ COCDALI_00000054-61 (Spec Sheet LAN-2308-AEN) at COCDALI_00000054; *see also* NDCA-00044204-07 (E-RAN Introduction) at D00044205-06.

SpiderCloud E-RAN System - Claim 7[D]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud R-RAN System provides a family of radio nodes, each serving as a “communication unit” including first and second communication units.¹⁹ The SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that performs “[c]entrally coordinated dynamic **fractional frequency reuse for [inter-cell interference coordination] ICIC.**”²⁰ The SpiderCloud fractional frequency reuse method uses different frequencies for the outer cell area to reduce inter-cell interference, while at the same time reusing the frequencies for the inner cell area, which necessarily performs the limitations of 7[D].

Additionally, as the SpiderCloud’s ’205 Patent explains, the SpiderCloud dynamic fractional frequency reuse method provides that “within each cell, different frequencies (or sets of frequencies) may be allocated as between UEs in the cell edge and those in the cell interior.”²¹ Therefore, a first radio node (*e.g.*, RN 1 115₁) will use a different frequency to transmit and receive data with UEs at its cell edge, which surrounds the cell interior over a larger geographic footprint as illustrated in the highlighted annotation of cell edge 157₁ of Fig. 5 below.

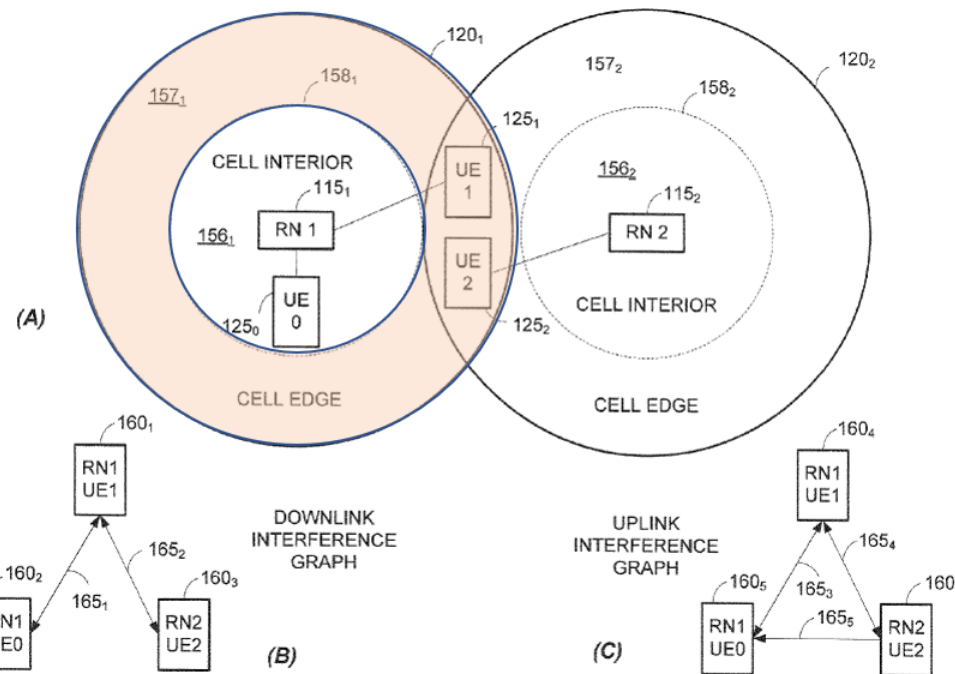


Fig. 5

¹⁹ COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001; *see also* NDCA-00044204-07 (E-RAN Introduction) at NDCA-00044206

²⁰ COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

²¹ NDCA-00044637-52 (SpiderCloud ’205 Patent) at 6:23-29 (NDCA-00044649).

Thus, upon information and belief, SpiderCloud E-RAN System provides a first radio node (*e.g.*, RN 1 115₁) among a set of radio nodes that is allocated a second set of frequencies characterized by a second frequency band different from the first frequency band and second geographic footprint (*e.g.*, Cell Edge 157₁) larger than and at least partially surrounding the first geographic footprint (*e.g.*, Cell Interior 156₁) when performing fractional frequency reuse.

- **7[E] transmitting, and receiving, from a second communications unit of the set of communications units:**

SpiderCloud E-RAN System - Claim 7[E]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud R-RAN System provides a family of radio nodes that includes UMTS and LTE layers, each serving as a “communication unit” including first and second communication units, that transmits and receives wireless communications in a cell.²² The SpiderCloud E-RAN System comprises a service node that “can manage 100 dual-carrier radio nodes, providing reliable **coverage** and capacity for sites up to **1.5 million square feet**.”²³ The SpiderCloud E-RAN services node performs capabilities that include “discovering the **macro cells** in the **area**, discovering the **internal small cell topology**, assigning UMTS primary scrambling codes and LTE physical cell identifier . . . and automatically configuring cell neighbor lists to make the system operational.”²⁴ Accordingly, the SpiderCloud E-RAN System provides a set of radio nodes including first and second radio nodes that transmit and receive communications.

- **7[F] a third set of frequencies including one or more frequencies in the first frequency band and a third geographical footprint; and**

SpiderCloud E-RAN System - Claim 7[F]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud R-RAN System provides a family of radio nodes that includes UMTS and LTE layers, each serving as a “communication unit” including first and second communication units, that transmits and receives wireless communications in a cell.²⁵ The SpiderCloud E-RAN System provides capabilities that include “discovering the **macro cells** in the **area**, discovering the **internal small cell topology**, assigning UMTS primary scrambling codes and LTE physical cell identifier . . . and automatically configuring cell neighbor lists to make the system operational.”²⁶ The SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that implements “[c]entrally coordinated dynamic fractional frequency reuse for [inter-cell interference coordination] ICIC.”²⁷ The SpiderCloud fractional frequency reuse method uses different frequencies for the outer areas of cells including macro cells to reduce inter-cell interference, while at the same time reusing the frequencies used for inner cell areas, which necessarily performs the limitations of 7[F].

²² NDCA-00044204-07 (E-RAN Introduction) at NDCA-00044205; *see also* COCDALI_00000014-15 (Small Cell Technology), COCDALI_00000016-18 (Small Cell Service Nodes).

²³ COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001.

²⁴ *Id.* at COCDALI_00000074.

²⁵ NDCA-00044204-07 (E-RAN Introduction) at NDCA-00044205; *see also* COCDALI_00000014-15 (Small Cell Technology), COCDALI_00000016-18 (Small Cell Service Nodes).

²⁶ *Id.* at COCDALI_00000074.

²⁷ COCDALI_00000023-26 (Spec Sheet LAN-2319-AEN) at COCDALI_00000025.

Additionally, upon information and belief, the SpiderCloud E-RAN System performs dynamic fractional frequency reuse according to the SpiderCloud's '205 Patent such that:

A first frequency may be chosen for a UE within the first cell edge (step 172). A second frequency may then be chosen for a UE within the second cell edge, where the second frequency is different from the first frequency (step 172). Frequencies other than the first (or second) frequencies may then be employed for the first (or second) cell interiors (step 176).²⁸

The SpiderCloud E-RAN System's fractional frequency reuse method therefore provides for radio nodes to transmit and receive data by "reusing" the same frequencies within the cell interiors of adjacent radio nodes as illustrated in annotated highlighted cell interior 156₁ and 156₂ in Fig. 5 for first and second radio nodes RN 1 115₁ and RN 2 115₂.

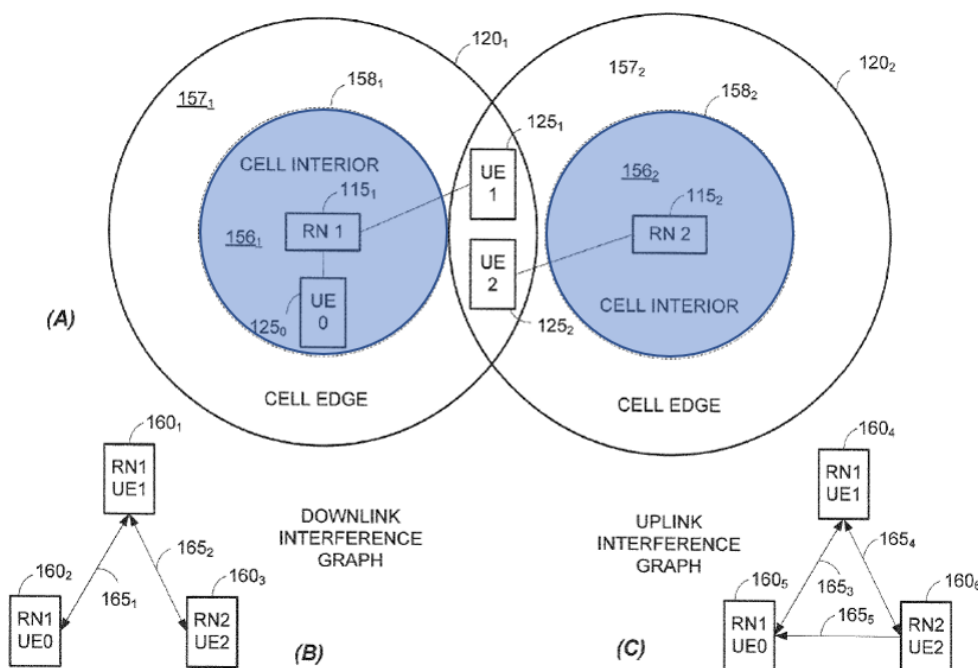


Fig. 5

Thus, upon information and belief, the SpiderCloud E-RAN System provides a second radio node (e.g., RN 2 115₂) among a set of radio nodes that is allocated a third set of frequencies including one or more frequencies in the first frequency band and a third geographical footprint (e.g., Cell Interior 156₂) when performing fractional frequency reuse.

²⁸ NDCA-00044637-52 (SpiderCloud '205 Patent) at 6:34-38 (NDCA-00044649).

- **7[G] a fourth set of frequencies including one or more frequencies in a third frequency band and a fourth geographical footprint larger than and at least partially surrounding the third geographical footprint.**

SpiderCloud E-RAN System - Claim 7[G]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud E-RAN System provides capabilities that include “discovering the **macro cells** in the **area**, discovering the **internal small cell topology**, assigning UMTS primary scrambling codes and LTE physical cell identifier . . . and automatically configuring cell neighbor lists to make the system operational.”²⁹ The SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that implements “[c]entrally coordinated dynamic fractional frequency reuse for [inter-cell interference coordination] ICIC.”³⁰ Upon information and belief, the SpiderCloud E-RAN system performs dynamic fractional frequency reuse according to the SpiderCloud’s ’205 Patent such that:

MAC schedulers at the individual radio nodes are then controlled so that adjacent cell edges use different frequencies, i.e., the method assigns different frequencies to cell-edge UEs (step 164). As an additional step, within each cell, different frequencies (or sets of frequencies) may be allocated as between UEs in the cell edge and those in the cell interior (step 166).³¹

In the SpiderCloud E-RAN System, when implementing fractional frequency reuse for ICIC , a second radio node in an adjacent cell (e.g., RN 2 115₂) will use a frequency to transmit and receive data with UEs at its cell edge over an area that is larger than and surrounds the cell interior, and which frequency is different from the frequency used on the cell edge of the adjacent cell edge of the first communications unit, as illustrated in the annotated cell edges 157₁ and 157₂ in Fig. 5 below.

²⁹ *Id.* at COCDALI_00000074.

³⁰ COCDALI_00000023-26 (Spec Sheet LAN-2319-AEN) at COCDALI_00000025.

³¹ NDCA-00044637-52 (SpiderCloud ’205 Patent) at 6:23-29 (NDCA-00044649).

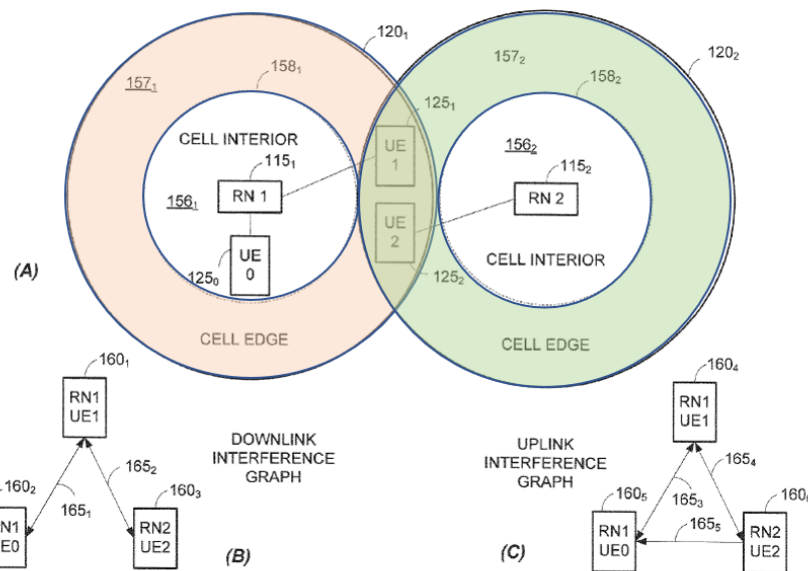


Fig. 5

Thus, upon information and belief, the SpiderCloud E-RAN System provides a second radio node (e.g., RN 2 115₂) among a set of radio nodes that transmits and receives “a fourth set of frequencies including one or more frequencies in a third frequency band” and does so over “a fourth geographical footprint larger (e.g., Cell Edge 157₂) than and at least partially surrounding the third geographical footprint,” when implementing fractional frequency reuse.

B. Claim 8

- The method of claim 7 wherein the set of communications units includes a plurality of remote units in communication with a host unit.

SpiderCloud E-RAN System - Claim 8

The SpiderCloud E-RAN System meets this claim element. For example, according to SpiderCloud E-RAN product literature, the “E-RAN consists of a service node, which controls, configures, and manages up to 100 UMTS and LTE SpiderCloud radio nodes.”³² SpiderCloud radio nodes “are high capacity, power-over-Ethernet (PoE) capable small cells. In any deployment, multiple RNs are deployed inside an enterprise or venue, and are connected to the Services Node using standard Ethernet LAN infrastructure.”³³

³² COCDALI_00000023-26 (Spec Sheet LAN-2319-AEN) at COCDALI_00000023.

³³ COCDALI_00000074-77 (Self-Organizing/Self-Optimizing (SON) Small Cell Technology) at CODALI_00000076.

According to the '358 patent, a “radio base station is often employed at the **host unit** location commonly known as a base station hotel.”³⁴ SpiderCloud E-RAN services node, e.g., SpiderCloud Services Node 90000, connects to a core network as a “Home Node” or “multi-sector eNB” – *i.e.*, a host unit or an equivalent.³⁵

In UMTS deployments, the Service Node plays the role of a Radio Network Controller (RNC) and connects to the public UMTS Core Network either as an RNC or as a Home Node B.

In LTE deployments, the Service Node acts as a Cloud RAN controller, and connects to the public LTE Evolved Packet Core (EPC) as a multi-sector eNB.

In FirstNet deployments, the Service Node acts as a Cloud RAN controller and manages all pre-emption activities for attached First Responder devices and connects to both the public and FirstNet LTE Evolved Packet Core (EPC) as a multi-sector eNB

C. Claim 9

- **The method of claim 7 wherein the first geographic footprint includes a location of the first communications unit.**

SpiderCloud E-RAN System - Claim 9

The SpiderCloud E-RAN System meets this claim element. *See, e.g.*, Claim Chart for 7[C]. As illustrated in the annotated Fig. 5 of the SpiderCloud '205 Patent below, the SpiderCloud E-RAN system provides a radio node (*e.g.*, radio node RN 1 115₁) withing a first geographic footprint (*e.g.*, Cell Interior 158₁).

³⁴ NDCA-00044615-36 ('358 Patent) at 1:20-21 (NDCA-00044625).

³⁵ COCDALI_00000016-18 (Enabling Scalable Small Cells) at COCDALI_00000017.

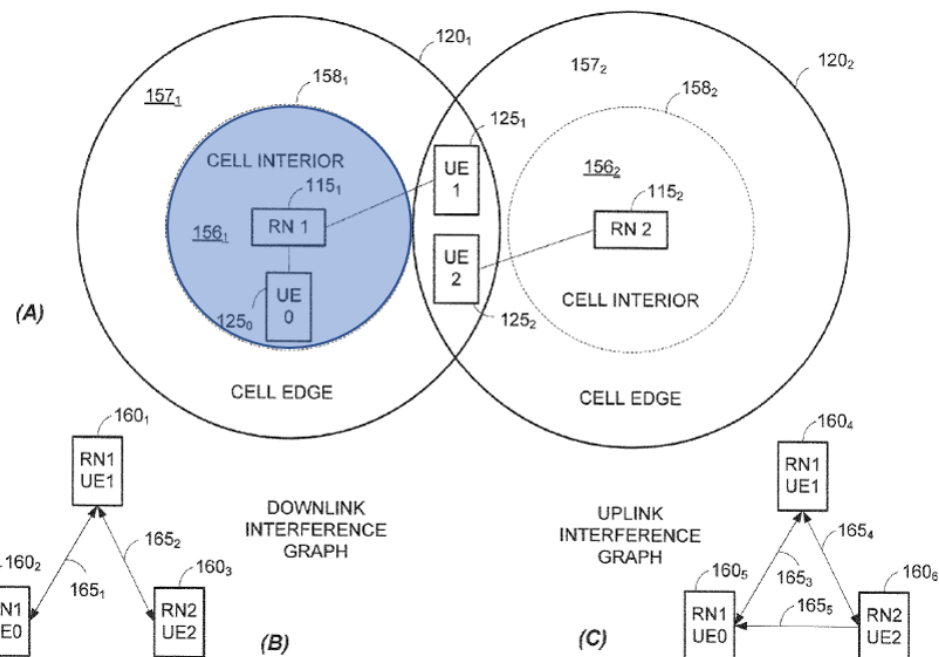


Fig. 5

D. Claim 10

- The method of claim 9 wherein the second geographic footprint covers the first geographic footprint and further extends over a peripheral footprint adjacent the first geographical footprint.

SpiderCloud E-RAN System - Claim 10

The SpiderCloud E-RAN System meets this claim element. See Chart for 7[D]. As illustrated in the annotated Fig. 5 of the SpiderCloud '205 Patent below, the SpiderCloud E-RAN system provides a second geographic footprint (e.g., Cell Edge 157₁) that covers the first geographic footprint (e.g., Cell Interior 156₁) and extends over a peripheral footprint adjacent to the first geographic footprint.

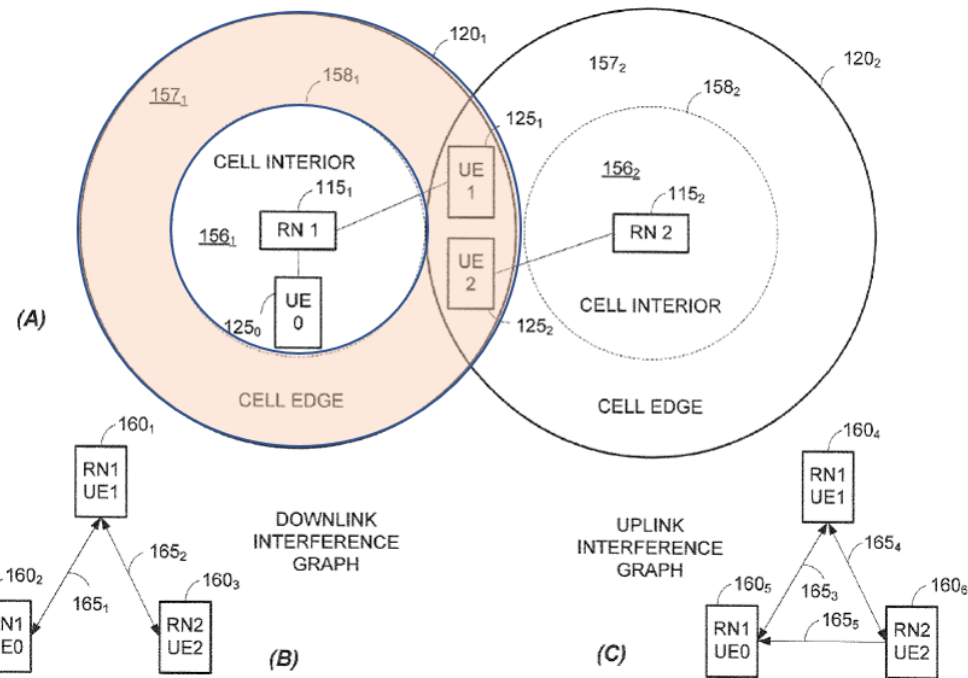


Fig. 5

E. Claim 11

- The method of claim 7 wherein the third geographical footprint includes a location of the second communications unit.

SpiderCloud E-RAN System - Claim 11

The SpiderCloud E-RAN System meets this claim element. *See, e.g.,* Chart for 7[F]. As illustrated in the annotated Fig. 5 of the SpiderCloud '205 Patent below, the SpiderCloud E-RAN system provides a second radio node (*e.g.*, radio node RN 2 115₂) within a third geographical footprint (*e.g.*, Cell Interior 156₂).

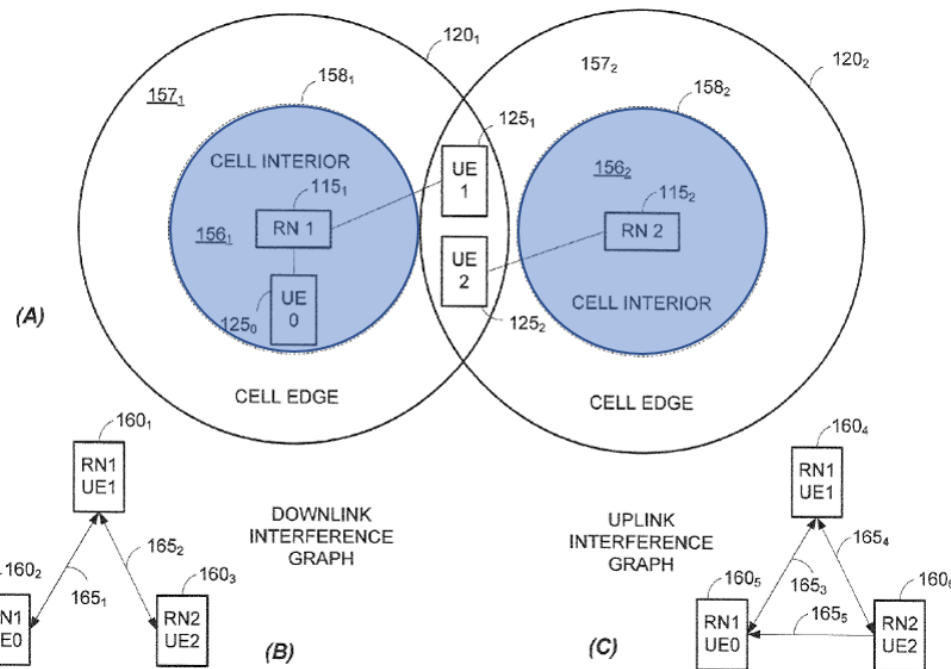


Fig. 5

F. Claim 12

- The method of claim 11 wherein the fourth geographical footprint covers the third geographical footprint and extends over a peripheral footprint adjacent the third geographical footprint.

SpiderCloud E-RAN System - Claim 12

The SpiderCloud E-RAN System meets this claim element. See, e.g., Chart for 7[G]. As illustrated in the annotated Fig. 5 of the SpiderCloud '205 Patent below, the SpiderCloud E-RAN system provides a fourth geographic footprint (e.g., Cell Edge 157₂) that covers the third geographic footprint (e.g., Cell Interior 156₂) and extends over a peripheral footprint adjacent the third geographic footprint.

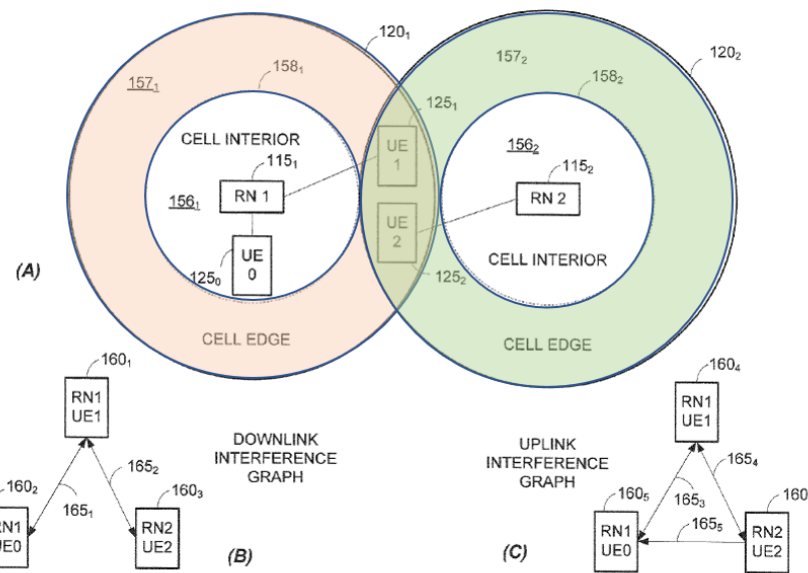


Fig. 5

G. Claim 13

- The method of claim 7 wherein the second geographical footprint abuts the fourth geographical footprint.

SpiderCloud E-RAN System - Claim 13

The SpiderCloud E-RAN System meets this claim element. See, e.g., Chart for 7[G] and 12. As illustrated in the annotated Fig. 5 of the SpiderCloud '205 Patent below, the SpiderCloud E-RAN System provides a second geographic footprint (e.g., Cell Edge 157₁) that abuts the fourth geographic footprint (e.g., Cell Edge 157₂).

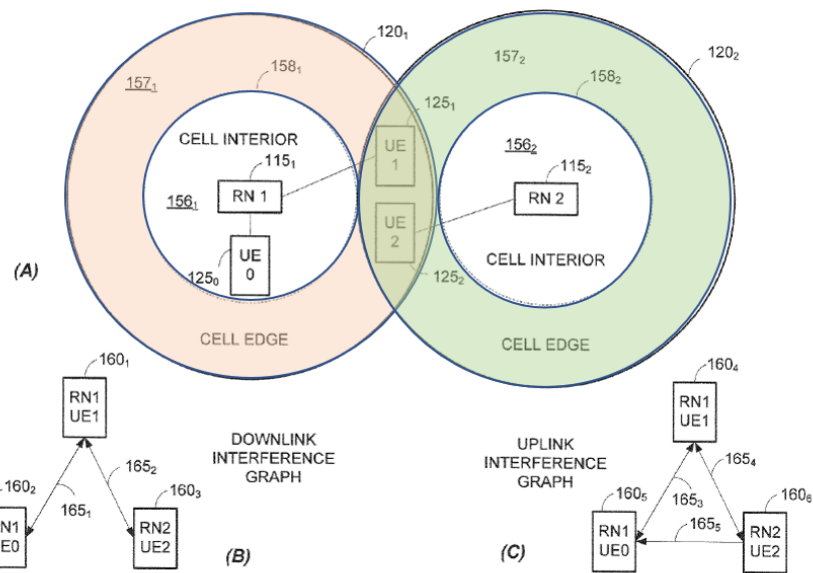


Fig. 5

H. Claim 15

- 15[Preamble] A communications system comprising:

SpiderCloud E-RAN System - Claim 15[Preamble]

To the extent that the Court deems the preamble of claim 1 to be limiting, the SpiderCloud E-RAN System meets this claim element. For example, according to Corning's SpiderCloud product literature, the SpiderCloud E-RAN System is a communication system that distributes UMTS, LTE and LTE-LAA wireless communications, which include various communication frequencies.³⁶ The SpiderCloud E-RAN System is "made up of one rack-unit-sized services node that manages multiple single-carrier or dual-carrier radio nodes operating in 3G, LTE, and unlicensed spectrum."³⁷

³⁶ NDCA-00044204-07 (E-RAN Introduction) at D00044204-05; *see also* COCDALI_00000014-15 (Small Cell Technology), COCDALI_00000016-18 (Small Cell Service Nodes).

³⁷ *Id.* at D00044205.

E-RAN Platform

An E-RAN system is made up of one rack-unit-sized services node that manages multiple single-carrier or dual-carrier radio nodes operating in 3G, LTE, and unlicensed spectrum.

Services Node

The services node lies at the heart of the SpiderCloud® E-RAN solution. It ensures that the E-RAN system is easy to deploy and manage and that it delivers the performance mobile operators expect. The services node is access technology agnostic, supporting UMTS, LTE, and LTE-LAA. It orchestrates the self-organizing network (SON) process, controls the operation of different radio nodes during neighbor discovery, gathers information from different radio nodes, and creates optimized neighbor lists based on information received from the neighbor scans.

SON capabilities include:

- Discovering the macro cells in the area as well as internal small cell and collocated Wi-Fi topologies.
- Assigning UMTS primary scrambling codes, LTE physical cell identifier, and LAA unlicensed channels.
- Setting maximum transmit power levels based on transmit power detected from adjacent radio nodes and surrounding macro signals.
- Automatically configuring cell neighbor lists to make the system operational.



Radio Nodes

Like Wi-Fi access points, radio nodes are small with low profiles. An E-RAN platform offers a wide range of radio nodes for many different applications and mobile operator configurations. All models are powered by PoE+ (802.11at) Ethernet switch ports.

Installation is quick and easy using commonly available PoE+.

1. Pull a structured cable (CAT 5e or greater).
2. Attach the radio to wall or ceiling.
3. Connect Ethernet patch cords at both ends.

- **15[A] a host unit;**

SpiderCloud E-RAN System - Claim 15[A]

The SpiderCloud E-RAN System meets this claim element. For example, according to SpiderCloud E-RAN product literature, the “E-RAN consists of a service node, which controls, configures, and manages up to 100 UMTS and LTE SpiderCloud radio nodes.”³⁸ SpiderCloud radio nodes “are high

³⁸ COCDALI_00000023-26 (Spec Sheet LAN-2319-AEN) at COCDALI_00000023.

capacity, power-over-Ethernet (PoE) capable small cells. In any deployment, multiple RNs are deployed inside an enterprise or venue, and are connected to the Services Node using standard Ethernet LAN infrastructure.”³⁹

According to the ’358 patent, a “radio base station is often employed at the **host unit** location commonly known as a base station hotel.”⁴⁰ SpiderCloud E-RAN services node, e.g., SpiderCloud Services Node 90000, connects to a core network as a “Home Node” or “multi-sector eNB” – i.e., a host unit or an equivalent.⁴¹

In UMTS deployments, the Service Node plays the role of a Radio Network Controller (RNC) and connects to the public UMTS Core Network either as an RNC or as a Home Node B.

In LTE deployments, the Service Node acts as a Cloud RAN controller, and connects to the public LTE Evolved Packet Core (EPC) as a multi-sector eNB.

In FirstNet deployments, the Service Node acts as a Cloud RAN controller and manages all pre-emption activities for attached First Responder devices and connects to both the public and FirstNet LTE Evolved Packet Core (EPC) as a multi-sector eNB

- **15[B] a first communications unit coupled to the host unit and operable to transmit and receive communications using a first set of frequencies in a first frequency range and associated with a first geographical footprint and a second set of frequencies in a second frequency range and associated with a second geographical footprint larger than the first geographical footprint; and**

SpiderCloud E-RAN System - Claim 15[B]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud R-RAN System provides a family of radio nodes, each serving as a “communication unit” including first and second communication units.⁴² According to SpiderCloud E-RAN product literature, SpiderCloud E-RAN System provides multiple radio nodes (communication units) that are connected to a SpiderCloud E-RAN services node using standard Ethernet LAN infrastructure.⁴³

³⁹ COCDALI_00000074-77 (Self-Organizing/Self-Optimizing (SON) Small Cell Technology) at CODALI_00000076.

⁴⁰ NDCA-00044615-36 (’358 Patent) at 1:20-21 (NDCA-00044625).

⁴¹ COCDALI_00000016-18 (Enabling Scalable Small Cells) at COCDALI_00000017.

⁴² NDCA-00044204-07 (E-RAN Introduction) at D00044205.

⁴³ COCDALI_00000001-5 (Small Cell Networks).

Radio Node Family



Capabilities	SCRN-310	SCRN-220	SCRN-320	SCRN-330	SCRN-340
Available models	Band 4 & 13 (model -0413) Band 4 & 2 (model -04L2)	Band 4 (66) or Band 2(25) or Band 13	Band 4 + 5 GHz Band 2 + 5 GHz Band 4(66) + 5 GHz	Band 41 (Sprint) or 48 (CBRS)	Band 2 (25) or 4 (66) & Band 13 or 14
Carrier aggregation (CA)	Yes	No	Licensed and unlicensed up to 60 MHz (3 CC CA)	No	Yes
Peak speed (Mbps)	225 Mbps with CA (0413) 300 Mbps with CA (04L2) 150 Mbps without CA	150	270 Mbps (Chan 32 only) 400 Mbps (3 CCA)	Peak DL rate of 100 Mbps with FC2	225 Mbps with CA 150 Mbps without CA
Number of active users	128/band (256 for dual-band)	128	128 (with LAA)	128	128/band (256 for dual-band)
Number of VoLTE users (subset of number active)	64 with CA 128 (64/band), without CA	64	64 (with LAA)	64	64 with CA 128 (64/band), without CA
Support for CAT-M1	No	Yes	Yes	No	Yes
Transmit power	250 mW	500 mW	500 mW	500 mW	500 mW
Coverage	8,000 – 10,000	10,000 – 13,000	10,000 – 13,000	10,000 – 13,000	10,000 – 13,000
Antennas	Internal External as option	Internal External as option	Internal	Internal External as option	Internal External as option

According to SpiderCloud product literature, the SpiderCloud E-RAN System is a scalable small cell system “comprised of one services node, can manage 100 dual-carrier radio nodes, providing **reliable coverage** and capacity for sites up to **1.5 million square feet**.”⁴⁴ In particular, the SpiderCloud E-RAN System provides multiple radio nodes (communication units) that are connected to a SpiderCloud E-RAN services node using standard Ethernet LAN infrastructure.⁴⁵ The SpiderCloud E-RAN services node performs capabilities such as “discovering the **macro cells** in the

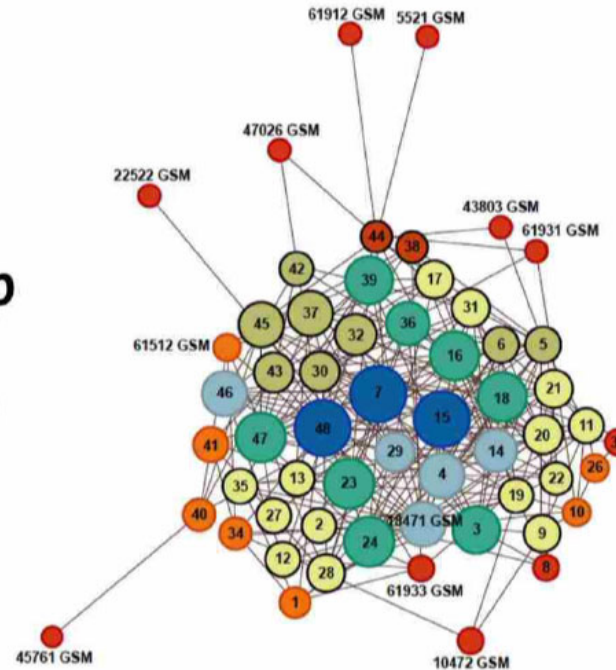
⁴⁴ COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001.

⁴⁵ COCDALI_00000001-5 (Small Cell Networks).

area, discovering the **internal small cell topology**, assigning UMTS primary scrambling codes and LTE physical cell identifier . . . and automatically configuring cell neighbor lists to make the system operational.”⁴⁶

Visualization Map

Corning SpiderCloud's SON for
Scalable Small Cell Systems
Includes: UMTS & LTE SON Layers



Additionally, according to SpiderCloud E-RAN System product literature, the SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that performs “[c]entrally coordinated **dynamic fractional frequency reuse** for **[inter-cell interference coordination] ICIC**.”⁴⁷ Upon information and belief, SpiderCloud’s dynamic fractional frequency reuse scheme is disclosed and operates in accordance with the fractional frequency reuse description in Corning’s United States Patent No. 9,510,205 (SpiderCloud ’205 Patent), titled “Load-Based Dynamic Fractional Frequency Reuse in an LTE Network,” originally issued to SpiderCloud Wireless, Inc.⁴⁸

⁴⁶ COCDALI_00000074-77 (Self-Organizing/Self-Optimizing (SON) Small Cell Technology) at COCDALI_00000074.

⁴⁷ COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

⁴⁸ NDCA-00044637-52 (SpiderCloud ’205 Patent).

Upon information and belief, the SpiderCloud E-RAN coordinated dynamic fractional frequency reuse scheme uses different frequencies for outer cell areas to reduce inter-cell interference, while at the same time reusing the frequencies for the inner cell areas. For example, according to the SpiderCloud '205 Patent, each radio node of the SpiderCloud E-RAN System has a “radio coverage,” – i.e., geographic footprint.⁴⁹ SpiderCloud E-RAN System radio nodes transmit (*i.e.* a downlink channel) data to user equipment, such as mobile phones, smartphones, tablet computing devices, and the like (collectively “UEs”) and receives (*i.e.* an uplink channel) data from UEs within the system.⁵⁰

In the SpiderCloud '205 Patent, Figure 3 describes downlink channels in which data is “served” to UEs by a first radio node RN 1 115₁, and Figure 4 describes uplink channels in which data is transmitted from UEs back to the radio node RN 1 115₁. More specifically, referring to Figure 5 of the SpiderCloud '205 patent, upon information and belief, the SpiderCloud radio node transmits and receives communications using a “first set of frequencies in a first frequency range” and associated with “a first geographic footprint” when performing fractional frequency reuse.⁵¹

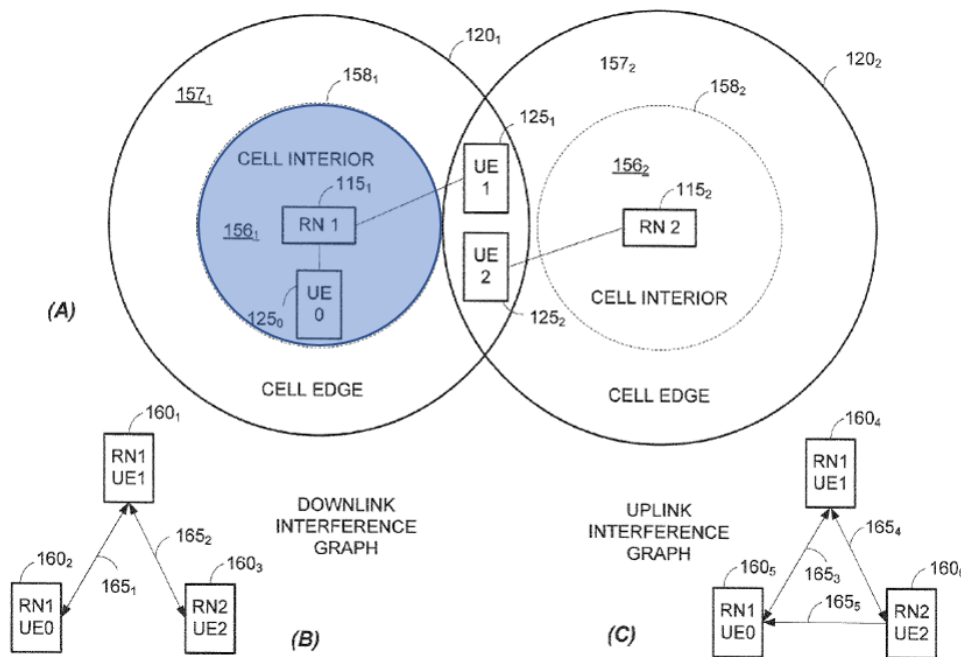


Fig. 5

For example, as explained in the SpiderCloud '205 Patent, “within each cell, different frequencies (or sets of frequencies) may be allocated as between UEs in the cell edge and those in the cell interior.”⁵² That is, referring to the annotated Fig. 5 above, the highlighted Cell Interior 156₁ has

⁴⁹ NDCA-00044637-52 (SpiderCloud '205 Patent) at 3:4-6 (NDCA-00044648); *see also* COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001.

⁵⁰ *Id.* at 3:19-22, 4:42-45.

⁵¹ *Id.* Figure 5, 6:23-29.

⁵² NDCA-00044637-52 (SpiderCloud '205 Patent) at 6:23-29 (NDCA-00044649).

different allocated frequencies for UEs than those of Cell Edge 157₁. SpiderCloud E-RAN System radio nodes provide multiple software-configurable radio bands.⁵³ Accordingly, for the SpiderCloud E-RAN System, a SpiderCloud radio node allocates different frequencies within a cell edge than those within a cell interior.

Additionally, as the SpiderCloud's '205 Patent explains, the SpiderCloud dynamic fractional frequency reuse method provides that "within each cell, different frequencies (or sets of frequencies) may be allocated as between UEs in the cell edge and those in the cell interior."⁵⁴ Therefore, a first radio node (e.g., RN 1 115₁) will use a different frequency to transmit and receive data with UEs at its cell edge, which surrounds the cell interior over a larger geographic footprint as illustrated in the highlighted annotation of cell edge 157₁ of Fig. 5 below.

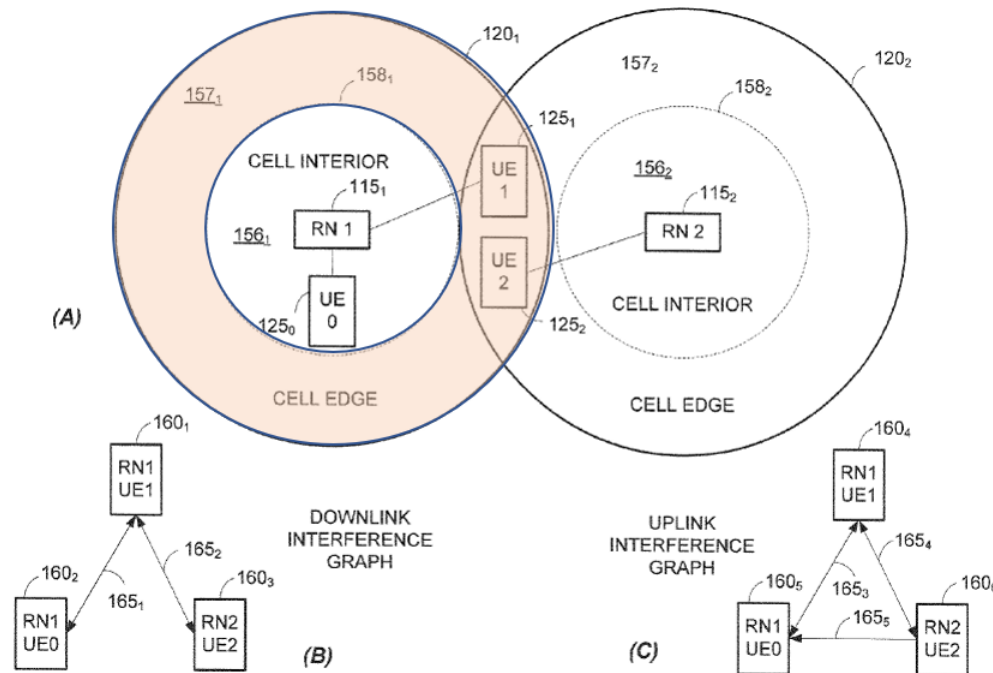


Fig. 5

Thus, upon information and belief, SpiderCloud E-RAN System provides a first radio node (e.g., RN 1 115₁) that transmits and receives communications using a "first set of frequencies in a first frequency range" and associated with a first geographical footprint (e.g., Cell Interior 156₁) and a "second set of frequencies in a second frequency range" and associated with a second geographical footprint (e.g., Cell Edge 157₁) larger than the first geographical footprint.

⁵³ COCDALI_00000054-61 (Spec Sheet LAN-2306-AEN) at COCDALI_00000054; see also NDCA-00044204-07 (E-RAN Introduction) at D00044204-05.

⁵⁴ NDCA-00044637-52 (SpiderCloud '205 Patent) at 6:23-29 (NDCA-00044649).

- **15[C] a second communications unit coupled to the host unit and operable to transmit and receive communications using one or more of the first set of frequencies in a region associated with a third geographical footprint and a third set of frequencies in a third frequency range and associated with a fourth geographical footprint larger than the third geographical footprint.**

SpiderCloud E-RAN System - Claim 15[C]

The SpiderCloud E-RAN System meets this claim element. For example, the SpiderCloud R-RAN System provides a family of radio nodes that includes UMTS and LTE layers, each serving as a “communication unit” including first and second communication units, that transmits and receives wireless communications in a cell.⁵⁵ The SpiderCloud E-RAN System comprises a service node that “can manage 100 dual-carrier radio nodes, providing reliable **coverage** and capacity for sites up to **1.5 million square feet**.”⁵⁶ The SpiderCloud E-RAN services node performs capabilities that include “discovering the **macro cells** in the **area**, discovering the **internal small cell topology**, assigning UMTS primary scrambling codes and LTE physical cell identifier . . . and automatically configuring cell neighbor lists to make the system operational.”⁵⁷ Accordingly, the SpiderCloud E-RAN System provides first and second radio nodes that transmit and receive communications.

The SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that implements “[c]entrally coordinated dynamic **fractional frequency reuse for [inter-cell interference coordination] ICIC**.”⁵⁸ The SpiderCloud fractional frequency reuse method uses different frequencies for the outer areas of cells including macro cells to reduce inter-cell interference, while at the same time reusing the frequencies used for inner cell areas, which necessarily performs the limitations of 7[F]. Additionally, upon information and belief, the SpiderCloud E-RAN System performs dynamic fractional frequency reuse according to the SpiderCloud’s ’205 Patent such that:

A first frequency may be chosen for a UE within the first cell edge (step 172). A second frequency may then be chosen for a UE within the second cell edge, where the second frequency is different from the first frequency (step 172). Frequencies other than the first (or second) frequencies may then be employed for the first (or second) cell interiors (step 176).⁵⁹

The SpiderCloud System’s fractional frequency reuse method therefore provides for radio nodes to transmit and receive data by “reusing” the same frequencies within the cell interiors of adjacent radio nodes as illustrated in annotated highlighted cell interior 156₁ and 156₂ in Fig. 5 for first and second radio nodes RN 1 115₁ and RN 2 115₂.

⁵⁵ NDCA-00044204-07 (E-RAN Introduction) at D00044204-05; *see also* COCDALI_00000014-15 (Small Cell Technology), COCDALI_00000016-18 (Small Cell Service Nodes).

⁵⁶ COCDALI_00000001-5 (Small Cell Networks) at COCDALI_00000001.

⁵⁷ *Id.* at COCDALI_00000074.

⁵⁸ COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

⁵⁹ NDCA-00044637-52 (SpiderCloud ’205 Patent) at 6:34-38 (NDCA-00044649).

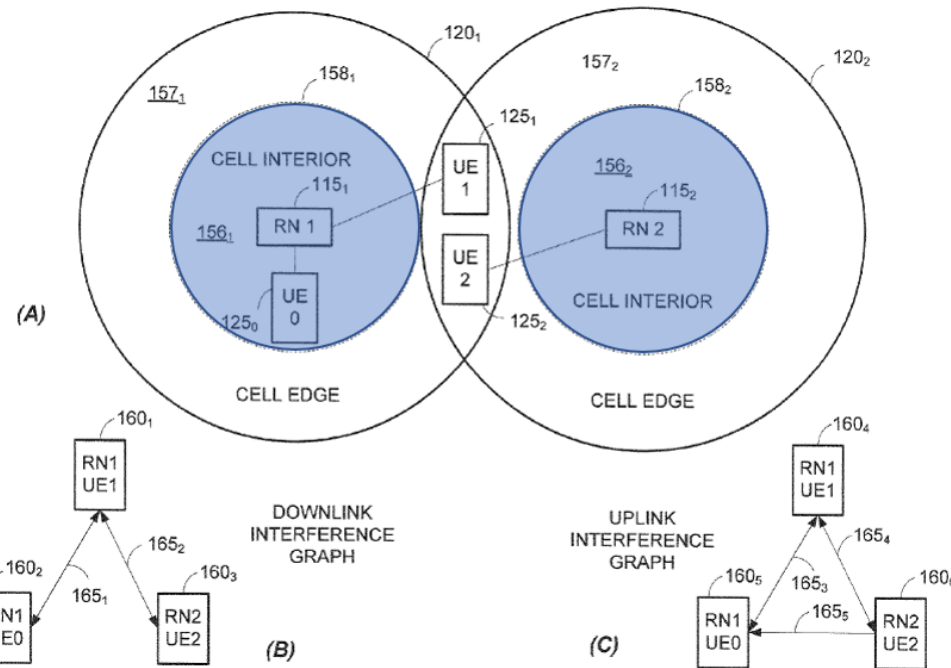


Fig. 5

Thus, upon information and belief, the SpiderCloud E-RAN System provides a second radio node (e.g., RN 2 115₂) that transmits and receives communications using the “first set of frequencies” in a region associated with a third geographical footprint (e.g., Cell Interior 156₂). Furthermore, upon information and belief, the SpiderCloud E-RAN System performs dynamic fractional frequency reuse according to the SpiderCloud’s ‘205 Patent such that:

MAC schedulers at the individual radio nodes are then controlled so that adjacent cell edges use different frequencies, i.e., the method assigns different frequencies to cell-edge UEs (step 164). As an additional step, within each cell, different frequencies (or sets of frequencies) may be allocated as between UEs in the cell edge and those in the cell interior (step 166).⁶⁰

In the SpiderCloud E-RAN System, when implementing fractional frequency reuse for ICIC, a second radio node in an adjacent cell (e.g., RN 2 115₂) will use a frequency to transmit and receive data with UEs at its cell edge over an area that is larger than and surrounds the cell interior, and which frequency is different from the frequency used on the cell edge of the adjacent cell edge of the first communications unit, as illustrated in the annotated cell edges 157₁ and 157₂ in Fig. 5 below.

⁶⁰ NDCA-00044637-52 (SpiderCloud ‘205 Patent) at 6:23-29 (NDCA-00044649).

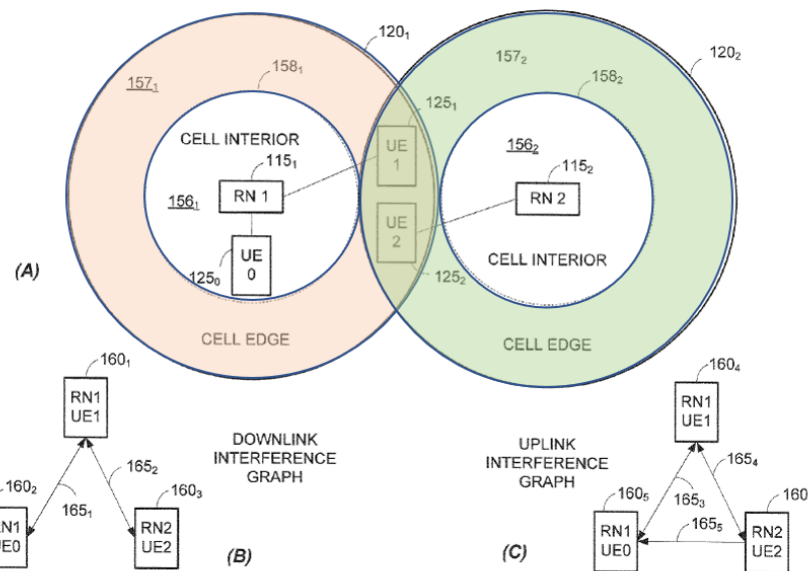


Fig. 5

Thus, upon information and belief, the SpiderCloud E-RAN System provides a second radio node (e.g., RN 2 115₂) that transmits and receives communications using one or more of the “first set of frequencies in a region associated with a third geographical footprint” and a “third set of frequencies in a third frequency range” and associated with a fourth geographical footprint (e.g., Cell Edge 157₂) larger than the third geographical footprint.

I. Claim 17

- The communications system of claim 15 wherein the communications using the first set of frequencies in the first frequency range are associated with a first power level and the communications using the second set of frequencies in the second frequency range are associated with a second power level greater than the first power level.

SpiderCloud E-RAN System - Claim 17

The SpiderCloud E-RAN System meets this claim element. For example, according to SpiderCloud E-RAN System product literature, the SpiderCloud E-RAN system provides a Spider Cloud Services Node 9000 system that performs “[c]entrally coordinated **dynamic fractional frequency reuse** for **[inter-cell interference coordination] ICIC**.”⁶¹ Upon information and belief, SpiderCloud’s dynamic fractional frequency reuse scheme is disclosed and operates in accordance with the fractional frequency reuse description in Corning’s United States Patent No. 9,510,205 (SpiderCloud ‘205 Patent), titled “Load-Based Dynamic Fractional Frequency Reuse in an LTE Network,” originally issued to SpiderCloud Wireless, Inc.⁶² According to

⁶¹ COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

⁶² NDCA-00044637-52 (SpiderCloud ‘205 Patent).

the SpiderCloud '205 patent, the power level for a first radio node at the cell interior (using first set of frequencies) is lower than the power level at the cell edge (using second set of frequencies):

Each edge 165, indicates that nodes at its ends interfere and cannot be simultaneously scheduled on the downlink as the same would cause interference at the two UEs. However, also on the downlink, UE 0, served by the first radio node, may be scheduled simultaneously with UE 2, served by the second radio node, by ensuring **lower power transmissions are used on those frequencies used in a cell interior that are also used at the cell edges . . .**"⁶³

Accordingly, upon information and belief, the SpiderCloud E-RAN System uses communications with the first set of frequencies in the first frequency range are associated with a first power level and the communications using the second set of frequencies in the second frequency range are associated with a second power level greater than the first power level when performing fractional frequency reuse.

J. Claim 18

- **The communications system of claim 15 wherein the communications using one or more of the first set of frequencies in the region associated with a third geographical footprint are associated with a first power level and the communications using the third set of frequencies in the third frequency range are associated with a second power level greater than the first power level.**

SpiderCloud E-RAN System - Claim 18

The SpiderCloud E-RAN System meets this claim element. For example, according to SpiderCloud E-RAN system product literature, the SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that performs "[c]entrally coordinated **dynamic fractional frequency reuse** for **[inter-cell interference coordination] ICIC**."⁶⁴ Upon information and belief, SpiderCloud's dynamic fractional frequency reuse scheme is disclosed and operates in accordance with the fractional frequency reuse description in Corning's United States Patent No. 9,510,205 (SpiderCloud '205 Patent), titled "Load-Based Dynamic Fractional Frequency Reuse in an LTE Network," originally issued to SpiderCloud Wireless, Inc.⁶⁵

The SpiderCloud System's fractional frequency reuse method therefore provides for radio nodes to transmit and receive data by "reusing" the same frequencies within the cell interiors of adjacent radio nodes as illustrated in annotated highlighted cell interior 156₁ and 156₂ in Fig. 5 for first and second radio nodes RN 1 115₁ and RN 2 115₂. Thus, according to the SpiderCloud '205 patent, the power level for a second radio node at the cell interior (using third set of frequencies) is lower than the power level at the cell edge (using fourth set of frequencies):

⁶³ NDCA-00044637-52 (SpiderCloud '205 Patent) at 7:8-18 (NDCA-00044650).

⁶⁴ COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

⁶⁵ NDCA-00044637-52 (SpiderCloud '205 Patent).

Each edge 165, indicates that nodes at its ends interfere and cannot be simultaneously scheduled on the downlink as the same would cause interference at the two UEs. However, also on the downlink, UE 0, served by the first radio node, may be scheduled simultaneously with UE 2, served by the second radio node, by ensuring **lower power transmissions are used on those frequencies used in a cell interior that are also used at the cell edges . . .**⁶⁶

Accordingly, upon information and belief, the SpiderCloud E-RAN System uses communications with the first set of frequencies in the region associated with a third geographical footprint are associated with a first power level and the communications using the third set of frequencies in the third frequency range are associated with a second power level greater than the first power level.

K. Claim 19

- **The communications system of claim 15 wherein the first geographic footprint is characterized by a first border and the second geographic footprint is characterized by a second border, wherein a predetermined distance separates the first border and the second border.**

SpiderCloud E-RAN System - Claim 19

The SpiderCloud E-RAN System meets this claim element. See, e.g., Claim Chart for 15[B]. The first geographic footprint (e.g., Cell Interior 156₁) is characterized with a first border and the second geographic footprint (e.g., Cell Edge 157₁) is characterized with a second border naturally having a distance between the borders.

L. Claim 20

- **The communications system of claim 15 wherein the first frequency band and the second frequency band are contiguous frequency bands.**

SpiderCloud E-RAN System - Claim 20

The SpiderCloud E-RAN System meets this claim element. For example, according to SpiderCloud E-RAN System product literature, the SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that performs “[c]entrally coordinated **dynamic fractional frequency reuse** for **[inter-cell interference coordination] ICIC.**”⁶⁷ Upon information and belief, SpiderCloud’s dynamic fractional frequency reuse scheme is disclosed and operates in accordance with the fractional frequency reuse description in Corning’s United States Patent No. 9,510,205 (SpiderCloud ’205 Patent), titled “Load-Based Dynamic Fractional Frequency Reuse in an LTE Network,” originally issued to SpiderCloud Wireless, Inc.⁶⁸ According to the SpiderCloud ’205 Patent, the first frequency band and second frequency band are different such that the second frequency band can be contiguous with the first frequency band to maintain different frequency bands.

⁶⁶ NDCA-00044637-52 (SpiderCloud ’205 Patent) at 7:8-18 (NDCA-00044650).

⁶⁷ COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

⁶⁸ NDCA-00044637-52 (SpiderCloud ’205 Patent).

M. Claim 21

- The communications system of claim 15 wherein the first frequency range, the second frequency range, and the third frequency range include distinct frequencies.

SpiderCloud E-RAN System - Claim 21

The SpiderCloud E-RAN System meets this claim element. For example, according to SpiderCloud E-RAN System product literature, the SpiderCloud E-RAN System provides a Spider Cloud Services Node 9000 system that performs “[c]entrally coordinated **dynamic fractional frequency reuse** for **[inter-cell interference coordination] ICIC**.”⁶⁹ Upon information and belief, SpiderCloud’s dynamic fractional frequency reuse scheme is disclosed and operates in accordance with the fractional frequency reuse description in Corning’s United States Patent No. 9,510,205 (SpiderCloud ’205 Patent), titled “Load-Based Dynamic Fractional Frequency Reuse in an LTE Network,” originally issued to SpiderCloud Wireless, Inc.⁷⁰ According to the SpiderCloud ’205 Patent, the first, second and third frequency ranges can be distinct – i.e., different:

A first frequency may be chosen for a UE within the first cell edge (step 172). A second frequency may then be chosen for a UE within the second cell edge, where the second frequency is different from the first frequency (step 172). **Frequencies other than the first (or second) frequencies may then be employed for the first (or second) cell interiors (step 176).**⁷¹

Accordingly, upon information and belief, the SpiderCloud E-RAN System uses communications with the first frequency range, the second frequency range, and the third frequency range include distinct frequencies.

⁶⁹ COCDALI_00000023-26 (Corning Spider Cloud Services Node 9000 Dual-Mode 3G UMTS and 4G LTE Air Interface) at COCDALI_00000025.

⁷⁰ NDCA-00044637-52 (SpiderCloud ’205 Patent).

⁷¹ *Id.* at 6:34-38 (NDCA-00044649).