

Table 1: Comparing Select Sections of Almeroth Declaration to Corresponding Sections of Petition

Section/Topic	Almeroth Declaration (EX1002)	Petition re: '143 Patent
Grounds for Unpatentability: Overview and Motion to Combine	VI. Chincholi In Combination With Riggert Renders Claims 1-26 Obvious² A. Overview and Motivation to Combine 70. In my opinion, Chincholi in combination with Riggert renders claims 1-30 obvious. As discussed in more detail below, Chincholi teaches the same architecture as the '143 patent, including a wireless networking device with multiple transceivers, each having actual MAC and PHY interfaces. Chincholi uses a single "Opportunistic Multiple-Medium Access Control (MAC) Aggregation layer," positioned above the actual MAC-PHY layers of each transceiver, to aggregate available bandwidth portions to efficiently meet the requirements of data streams from one or more applications. (EX1005 at [0122-0123].) EX1002 ¶ 70 (identical image omitted).	VII. GROUND 1: Chincholi in Combination With Riggert and Renders Claims 1-30 Obvious¹ A. Overview and Motivation to Combine Chincholi in combination with Riggert renders claims 1-30 obvious. (EX1002, ¶70.) As discussed in more detail below, Chincholi teaches the same architecture as the '143 patent, including a wireless networking device with multiple transceivers, each having actual MAC and PHY interfaces. Chincholi uses a single "Opportunistic Multiple-Medium Access Control (MAC) Aggregation layer," positioned above the actual MAC-PHY layers of each transceiver, to aggregate available bandwidth portions to efficiently meet the requirements of data streams from one or more applications. (EX1005, [0122-0123].) Petition at 12-13 (identical image omitted).
	71. Chincholi expressly discloses receiving, at the OMMA layer, feedback information regarding bandwidth availability on a per-transceiver basis and feeding that information back to the OMMA layer's virtual MAC function. (EX1005 at [0137].) Because Chincholi already discloses a partial virtualization of the MAC function at the OMMA layer, a POSITA would have been motivated to leverage this virtualization at the OMMA/transceiver interfaces to further increase flexibility in the system. Specifically, in my opinion, rather than implement static (and limited) interfaces between Chincholi's OMMA layer and each RA—i.e., each network protocol stack and associated transceiver—a POSITA would have recognized the	Chincholi expressly discloses receiving, at the OMMA layer, feedback information regarding bandwidth availability on a per-transceiver basis and feeding that information back to the OMMA layer's virtual MAC function. (EX1005, [0138].) Because Chincholi already discloses a partial virtualization of the MAC function at the OMMA layer, a POSITA would have been motivated to leverage this virtualization at the OMMA/transceiver interfaces to further increase flexibility in the system. (EX1002, ¶71.) Specifically, rather than implement static (and limited) interfaces between Chincholi's OMMA layer and each RAT, a POSITA would have recognized the opportunity to implement "virtual PHY" interfaces. (<i>Id.</i>) Petition at 13-14.

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	opportunity to implement “virtual PHY” interfaces. By 2013, virtualization was a well-understood and widely used tool in computing. A POSITA would have recognized that applying virtualization at the OMMA/transceiver interface—by adding one or more virtual PHY interfaces—would have been a straightforward extension of Chincholi’s basic architecture and system design. EX1002 ¶ 71. 72. Providing a “virtualized” PHY interface between the OMMA layer and the RATs in Chincholi would have been particularly beneficial in implementing an 802.11-based system. This is because implementing virtualized PHY interfaces would allow the system to accommodate communication channels with wireless devices that may operate using various different generations of the 802.11 standards. (EX1005 at [0134] (teaching that “[a] Wi-Fi RAT may be a IEEE802.11n RAT, a IEEE802.11ac RAT, a IEEE802.11af RAT, etc.”).) Virtualization of the physical interface for this purpose is taught, for example, in background reference U.S. Patent Application 2009/0141691 (“Jain”). (See EX1007 at [0034-0037]). A POSITA would have recognized that virtualizing the interfaces between Chincholi’s OMMA layer and individual RATs would result in a flexible and “reconfigurable” PHY interface that could be used to match the different needs of potential recipient devices and networks. (EX1007 (Jain) at [0033].) 73. A POSITA would have understood that one way of implementing virtualized PHY interfaces to further enhance Chincholi is taught in Riggert. Riggert teaches a “bondable virtual interface” which provides a virtualized, flexible interface to the actual PHY interfaces that can be used generically and thus easily substituted across differently configured PHY interfaces in the system. (EX1006 at [0065].) EX1002 ¶¶ 72-73 (identical figure omitted).	Providing a “virtualized” PHY interface between the OMMA layer and the RATs in Chincholi would have been particularly beneficial in implementing an 802.11 system. This is because implementing virtualized PHY interfaces would allow the system to accommodate communication channels with wireless devices that may operate using various different generations of the 802.11 standards. (EX1002, ¶72; EX1005, [0134] (teaching that “[a] Wi-Fi RAT may be a IEEE802.11n RAT, a IEEE802.11ac RAT, a IEEE802.11af RAT, etc.”).) Virtualization of the physical interface for this purpose is taught, for example, in background reference U.S. Patent Application 2009/0141691 (“Jain”). (EX1007, [0034-0037]). A POSITA would have recognized that virtualizing the interfaces between Chincholi’s OMMA layer and individual RATs would result in a flexible and “reconfigurable” PHY interface that could be used to match the different needs of potential recipient devices and networks. (EX1002, ¶72; EX1007, [0033].) A POSITA would have understood that one way of implementing virtualized PHY interfaces to further enhance Chincholi is taught in Riggert. (EX1002, ¶73.) Riggert teaches a “bondable virtual interface” which provides a virtualized, flexible interface to the actual PHY interfaces that can be used generically and thus easily substituted across differently configured PHY interfaces in the system. (EX1006, [0065].)

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	74. A POSITA would have been motivated to modify Chincholi according to the teachings of Riggert's "virtual PHY" to improve the system of Chincholi. The references both arise in the same field of endeavor and are similarly addressed to increasing bandwidth efficiency and throughput in multi-transceiver, wireless communication networks. (EX1005 at [0002] ("Wireless technologies have been demanding higher data throughput rates and lower latencies"); EX1006 at [0004] ("In the field of data streaming in a network, there is a problem in that data streaming from a sending endpoint to a recipient endpoint may be detrimentally affected by limited network bandwidth . . .").) Both references address 802.11 type systems specifically. See, e.g., EX1005 at [0137]; EX1006 at [0057].) Riggert's "bondable virtual interface" would improve the system of Chincholi by providing a flexible, universal interface between the OMMA layer and the actual transceiver resources. (EX1006 at [0065] ("The bondable virtual interfaces 236 and 336 conform to an interface, which allows them to be used generically in the framework.") The combined system would improve Chincholi by allowing the OMMA controller to interface with configurable sets of potentially differently configured RATs, a benefit that cannot be achieved alone by Chincholi's system. This combination would allow Chincholi's system to operate seamlessly with a wider variety of recipient devices, potentially operating on different versions of the 802.11 standards. EX1002 ¶ 74.	Petition at 14-15 (identical figure omitted). A POSITA would have been motivated to modify Chincholi according to the teachings of Riggert's "virtual PHY" to improve the system of Chincholi. The references both arise in the same field of endeavor and are similarly addressed to increasing bandwidth efficiency and throughput in multi-transceiver, wireless communication networks. (EX1005, [0002] ("Wireless technologies have been demanding higher data throughput rates and lower latencies"); EX1006, [0004] ("In the field of data streaming in a network, there is a problem in that data streaming from a sending endpoint to a recipient endpoint may be detrimentally affected by limited network bandwidth").) Both references address 802.11 type systems specifically. (EX1005, [0137]; EX1006, [0057].) Riggert's "bondable virtual interface" would improve the system of Chincholi by providing a flexible, universal interface between the OMMA layer and the actual transceiver resources. (EX1002, ¶74; EX1006, [0065] ("The bondable virtual interfaces 236 and 336 conform to an interface, which allows them to be used generically in the framework.") The combined system would improve Chincholi by providing a universal interface between the OMMA controller and sets of potentially differently configured RATs, a benefit that cannot be achieved alone by Chincholi's system. This combination would allow Chincholi's system to operate seamlessly with a wider variety of recipient devices operating on different versions of the 802.11 standards. (EX1002, ¶74.) Petition at 15-16.

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	75. In my opinion, implementing Riggert's virtualized PHY interfaces into Chincholi would have been straight-forward, requiring no more than the exercise of ordinary skill in the art, given that Chincholi already contemplates a virtualization of the MAC function at the OMMA layer. A POSITA would have been well aware of virtualization as a general technique in computing by 2013 and, given the guidance provided by Riggert in combination with the architecture of Chincholi, would have understood how to implement virtualized PHY interfaces to extend Chincholi's basic architecture and system. In my opinion, based on the above, a POSITA would have recognized that the combination could be accomplished with a reasonable expectation of success. 76. In the analysis below, I refer to the combined prior art system as Chincholi/Riggert. EX1002 ¶¶ 75-76.	Implementing Riggert's virtualized PHY interfaces into Chincholi would be straightforward, requiring no more than the exercise of ordinary skill in the art, given that Chincholi already contemplates a virtualization of the MAC function at the OMMA layer. (EX1002, ¶75.) Based on the above, a POSITA would have recognized that the combination could be accomplished with a reasonable expectation of success. (EX1002, ¶75.) In the analysis below, the combined prior art system is referred to as Chincholi/Riggert. Petition at 16.

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Grounds for Unpatentability: Preamble	B. Limitation-By-Limitation Analysis 1. Claim 1 a) <i>1[pre]: A method of improving the performance of a wireless networking device, comprising the steps of:</i> 77. In my opinion, and to the extent limiting, Chincholi/Riggert discloses the preamble of claim 1. Chincholi discloses a system of wireless networking devices configured “to manage multiple radio access technology (RAT) interfaces” and “enable opportunistic RAT selection and aggregation for sending data traffic over the RAT interfaces.” (EX1005 at [0003].) “In multi-RAT systems reception and/or transmission may be performed over multiple RATs. For example, a network terminal (NT) (e.g., an access point (AP) ...) and a wireless transmit/receive unit (WTRU) ... may communicate over multiple parallel paths.” (EX1005 at [0002].) 78. Chincholi discloses that a network terminal (“NT”), such as an access point, or a wireless transmit/receive unit (“WTRU”) “may be configured to work in an infrastructure mode or an adhoc mode, for example, in an IEEE802.11 based Wi-Fi system,” i.e., both are a wireless networking device. (EX1005 at [0115].) 79. As I discussed in the below limitations, Chincholi discloses a method for improving the performance of the NT or WTRU. EX1002 ¶¶ 77-79.	B. Limitation-By-Limitation Analysis 1. Claim 1 a) <i>1[pre]: A method of improving the performance of a wireless networking device, comprising the steps of:</i> To the extent limiting, Chincholi/Riggert discloses the preamble of claim 1 (EX1002, ¶77.) Chincholi discloses “[s]ystems, methods, and instrumentalities ... for managing multiple radio access technology (RAT) interfaces ...” (EX1005, Abstract; [0003]) and “[to] enable opportunistic RAT selection and aggregation for sending data traffic over the RAT interfaces.” (EX1005, [0003].) “In multi-RAT systems reception and/or transmission may be performed over multiple RATs. For example, a network terminal (NT) (e.g., an access point (AP) ...) and a wireless transmit/receive unit (WTRU) ... may communicate over multiple parallel paths.” (EX1005, [0002].) Chincholi discloses that a network terminal (“NT”), such as an access point, or a wireless transmit/receive unit (“WTRU”) “may be configured to work in an infrastructure mode or an adhoc mode, for example, in an IEEE802.11 based Wi-Fi system,” i.e., both are a wireless networking device. (EX1005, [0115]; EX1002, ¶78.) As discussed in the below limitations, Chincholi/Riggert discloses a method for improving the performance of the NT or WTRU. (EX1002, ¶79.) Petition at 17.

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Grounds for Unpatentability: Claim 1(a)	b) <i>1[a]: connecting an application interface to a processing interface, the application interface being associated with a first application, the first application providing, when the wireless networking device is being used, a first data stream and having a first wireless bandwidth requirement;</i> 80. In my opinion, Chincholi/Riggert discloses this limitation. 81. <i>"application interface being associated with a first application ... providing, when the wireless networking device is being used, a first data stream":</i> Chincholi discloses that "[u]sing multiple RATs simultaneously may provide the benefit of increased bandwidth for an application (e.g., an IP flow) as well as increased reliability." (EX1005 at [0191].) The first data stream of a first application is referred to as an "IP flow." (EX1005 at [0132] ("A single IP flow may refer to a stream of IP packets belong to a particular application.")) In an 802.11 embodiment (Figure 5), IP packets associated with an application data stream come from or are destined to an IP layer 504, and thus the IP flow (i.e. first data stream) is provided by the application <i>when the wireless networking device is being used.</i> (EX1005 at [0138], Table 1 ("S" interface is for "Incoming/Outgoing IP Packets").) The "[S]" interface from the IP layer for the IP stream is therefore an <i>application interface associated with a first application.</i> EX1002 ¶¶ 80-81 (identical figure omitted).	b) <i>1[a]: connecting an application interface to a processing interface, the application interface being associated with a first application, the first application providing, when the wireless networking device is being used, a first data stream and having a first wireless bandwidth requirement;</i> <i>"application interface being associated with a first application ... providing, when the wireless networking device is being used, a first data stream":</i> Chincholi discloses that "[u]sing multiple RATs simultaneously may provide the benefit of increased bandwidth for an application (e.g., an IP flow) as well as increased reliability." (EX1005, [0191].) The first data stream of a first application is referred to as an "IP flow." (EX1005, [0132] ("A single IP flow may refer to a stream of IP packets belong to a particular application.")) In an 802.11 embodiment (Figure 5), IP packets associated with an application data stream comes from or are destined to an IP layer 504, and thus the IP flow (i.e. first data stream) is provided by the application <i>when the wireless networking device is being used.</i> (EX1005, [0138], Table 1 ("S" interface is for "Incoming/Outgoing IP Packets"); EX1002, ¶¶80-81.) The interface from the IP layer for the IP stream "[S]" is therefore an <i>application interface associated with a first application.</i> Petition at 18 (identical figure omitted).

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	82. "connecting an application interface to a processing interface": Chincholi further discloses that its "application interface" is connected to a "processing interface." Chincholi teaches an "Opportunistic Multiple-Medium Access Control (MAC) Aggregation (OMMA) layer." (EX1005 at [0003].) A POSITA would have understood that the plain meaning of "interface" and "layer" in the context of the '143 patent are congruent, which is underscored by the specification describing layers having the same functionality as the claimed interfaces, and the prosecution history of the prior related '591 patent, where Applicant interchangeably used the terms "layer" and "interface" to describe Figure 1. (EX1017, Aug. 8, 2023 Response to Non-Final Office Action ("Figure 1 of the 10/30/2013 '216 provisional shows a wireless networking device in a 'layer' format. It includes an 'application interface' with four applications A-D...Figure 1 also shows a process layer that forms an example of the claimed 'processing interface'...Figure 1 also shows four individual actual MAC layers connected to the processing interface...Figure 1 also shows a single actual PHY layer connected to each one of the actual MAC layers.")). Similarly, in its Sept. 28, 2023 Claim Amendments, Applicant replaced the term "virtual PHY layers" with "virtual PHY interface." (<i>Id.</i>, Sept. 28, 2023 Claim Amendments). EX1002 ¶ 82.	"connecting an application interface to a processing interface": Chincholi further discloses that its "application interface" is connected to a "processing interface." Chincholi's <i>processing interface</i> is referred as an "Opportunistic Multiple-Medium Access Control (MAC) Aggregation (OMMA) layer." (EX1005, [0003].) A POSITA would have understood that the plain meaning of "interface" and "layer" in the context of the '143 patent are congruent, which is underscored by the specification describing layers having the same functionality as the claimed interfaces, and the prosecution history of the prior related '591 patent, where Applicant interchangeably used the terms "layer" and "interface" to describe Figure 1. (EX1002, ¶82; EX1017, Aug. 8, 2023 Response to Non-Final Office Action ("Figure 1 of the 10/30/2013 '216 provisional shows a wireless networking device in a 'layer' format. It includes an 'application interface' with four applications A-D ... Figure 1 also shows a process layer that forms an example of the claimed 'processing interface'...Figure 1 also shows four individual actual MAC layers connected to the processing interface...Figure 1 also shows a single actual PHY layer connected to each one of the actual MAC layers.")). Similarly, in its Sept. 28, 2023 Claim Amendments, Applicant replaced the term "virtual PHY layers" with "virtual PHY interface." (<i>Id.</i>, Sept. 28, 2023 Claim Amendments). Petition at 19-20.

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	83. The OMMA layer is a common layer/module between the IP layer/module and the multiple RAT layers/modules. (EX1005 at [0137]; <i>see also id.</i> at [0120] (“[T]he single thin software layer may enable one RAT to operate over industrial scientific medical (ISM) and another RAT to operate over a TVWS band for the same IP flow.”).) An exemplary OMMA layer enabling a dual-RAT aggregation device in a 802.11n network is shown in Figure 5; 84. The IP layer is connected to the OMMA layer and provides IP packets that the OMMA layer processes. (EX1005 at [0138].) The OMMA “may allow for enhanced throughput and reduced latency for a single IP flow.” (EX1005 at [0120].) The OMMA layer is therefore a processing layer, which processes IP packets and provides an <i>interface</i> between the IP layer and actual MAC layers, <i>i.e.</i>, a <i>processing interface</i>. EX1002 ¶¶ 83-84 (identical figure omitted). 85. “<i>first application ... having a first wireless bandwidth requirement</i>”: Chincholi teaches “a bandwidth requirement for an IP flow.” (EX1005 at [260].) EX1002 ¶ 85.	The OMMA layer is a common layer/module between the IP layer/module and the multiple RAT layers/modules. (EX1005, [0137], [0120] (“[T]he single thin software layer may enable one RAT to operate over industrial scientific medical (ISM) and another RAT to operate over a TVWS band for the same IP flow.”); EX1002, ¶83.) An exemplary OMMA layer enabling a dual-RAT aggregation device in a 802.11n network is shown in Figure 5; The IP layer is connected to the OMMA layer and provides IP packets that the OMMA layer processes. (EX1005, [0138]; EX1002, ¶84.) The OMMA “may allow for enhanced throughput and reduced latency for a single IP flow.” (EX1005, [0120].) The OMMA layer is therefore a processing layer, which processes IP packets and provides an <i>interface</i> between the IP layer and actual MAC layers, <i>i.e.</i>, a <i>processing interface</i>. Petition at 20-21 (identical figure omitted). “<i>first application ... having a first wireless bandwidth requirement</i>”: Chincholi teaches “a bandwidth requirement for an IP flow.” (EX1005, [260]; Petition at 21.
Grounds for Unpatentability: Claim 1(b)	c) <i>1[b]: connecting first, second and third actual MAC interfaces to the processing interface:</i> 86. In my opinion, Chincholi/Riggert discloses this limitation. Chincholi discloses first, second, and third <i>actual MAC interfaces</i> connected to the processing interface (<i>i.e.</i>, the common OMMA layer). Figure 5, for example, depicts a “dual-RAT aggregation” with the common OMMA layer existing above and connected to two RATs 501a and 501b, which comprise first and second actual MAC interfaces 502, respectively. (EX1005 at [0138] (“<i>The RATs 501a, 501b may comprise a MAC layer/module 502 and one or more physical layers/modules 503.</i>”).)	c) 1[b]: connecting first, second and third actual MAC interfaces to the processing interface; Chincholi discloses first, second, and third <i>actual MAC interfaces</i> connected to the processing interface (<i>i.e.</i>, the common OMMA layer). (EX1002, ¶86.) Figure 5, for example, depicts a “dual-RAT aggregation” with the common OMMA layer existing above and connected to two RATs 501a and 501b, which comprise first and second actual MAC interfaces 502, respectively. (EX1005, [0138] (“<i>The RATs 501a, 501b may comprise a MAC layer/module 502 and one or more physical layers/modules 503.</i>”).)

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	87. While Figure 5 depicts only first and second actual MAC interfaces, Chincholi discloses that there can be any number of MAC interfaces in an 802.11 implementation. For example, Figure 4—a more general block diagram of the architecture set forth in Figure 5—depicts the OMMA layer existing above any number of RATs. 88. Consistent with Figure 5, Chincholi explains that a given “RAT 401” can comprise a “PHY/MAC,” i.e. includes an actual MAC interface. (EX1005 at [0135].) A POSITA would have understood that in a typical 802.11 implementation, each one of the three RATs would have actual MAC and PHY interfaces. EX1002 ¶¶ 86-88 (identical figures omitted).	While Figure 5 depicts only first and second actual MAC interfaces, Chincholi discloses that there can be any number of MAC interfaces in an 802.11 implementation. (EX1002, ¶87.) For example, Figure 4—a more general block diagram of the architecture set forth in Figure 5—depicts the OMMA layer existing above any number of RATs. Consistent with Figure 5, Chincholi explains that a given “RAT 401” can comprise a “PHY/MAC,” i.e. includes an actual MAC interface. (EX1005, [0135].) A POSITA would have understood that in a typical 802.11 implementation, each one of the three RATs would have actual MAC and PHY interfaces. (EX1002, ¶88.) Petition at 23-24 (identical figures omitted).
Grounds for Unpatentability: Claim 1(c)	d) 1[c]: connecting first, second and third actual PHY interfaces respectively to the first, second and third actual MAC interfaces: 89. In my opinion, Chincholi discloses this limitation. Each RAT in Chincholi comprises <i>one or more physical layers</i>. (EX1005 at [0138] (“The RATs 501a, 501b may comprise a MAC layer/module 502 and <i>one or more physical layers/modules 503.</i>”). The actual PHY layers are connected to the actual MAC interfaces: 90. As discussed above, limitation 1[b], Chincholi Figure 4 and its associated description disclose a common OMMA layer existing above any number of RATs. In an 802.11 system, each RAT shown in Figure 4 would correspond to an actual MAC-PHY pair, thus disclosing first, second and third actual PHY interfaces connected to first, second, and third actual MAC interfaces. (EX1005 at [0135].) EX1002 ¶¶ 89-90 (identical figure omitted).	d) 1[c]: connecting first, second and third actual PHY interfaces respectively to the first, second and third actual MAC interfaces; Each RAT in Chincholi comprises <i>one or more physical layers</i>. (EX1005, [0138] (“The RATs 501a, 501b may comprise a MAC layer/module 502 and <i>one or more physical layers/modules 503.</i>”). The actual PHY layers are respectively connected to the actual MAC interfaces. (EX1002, ¶89.) As discussed above, limitation 1[b], Chincholi Figure 4 and its associated description disclose a common OMMA layer existing above any number of RATs. In an 802.11 system, each RAT shown in Figure 4 would correspond to an actual MAC-PHY pair, thus disclosing connecting first, second and third actual PHY interfaces to first, second, and third actual MAC interfaces. (EX1005, [0135]); (EX1002, ¶90.) Petition at 24-25 (identical figure omitted).

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Grounds for Unpatentability: Claim 1(d)	e) 1[d]: first, second, and third wireless transceivers respectively associated with the first, second, and third actual PHY interfaces, wherein each one of the first, second, and third wireless transceivers (i) is suitable for use in a wireless local area network, (ii) has a first, second, and third bandwidth availability up to a first, second, and third actual bandwidth, and (iii) is adapted to emit radio waves in first, second, and third different bands of frequencies, the second, and third frequency bands both being higher in frequency than the first frequency band: 91. In my opinion, Chincholi/Riggert discloses this limitation. 92. "associating first, second, and third wireless transceivers respectively with the first, second, and third actual PHY interfaces ... suitable for use in a wireless local area network": Chincholi Figures 4 and 5 illustrate how each actual PHY interface of each RAT is associated with an antenna/radio frequency (RF) front-end pair. (EX1005 at [0133].) 93. The antenna/radio frequency (RF) front-end pairs in Figures 4 and 5 are first, second, and third transceivers. A POSITA would have understood that a "transceiver" is a physical device that can both transmit and receive information. Thus, each of Chincholi's disclosed "antenna RF front-end pairs" are a transceiver because they operate on wireless protocols that both transmit and receive data, such as IEEE802.11, IEEE802.11ac, IEEE802.11af, LTE, WCDMA, etc. (EX1005 at [0134].) A POSITA would have further understood that the transceivers in Figures 4 and 5 would be associated with the actual PHY layer of each respective RAT, as the PHY layer is understood as the physical connection between a transceiver and the rest of the RAT. 94. Chincholi also teaches that each RAT may be implemented as a Wi-Fi RAT, and thus their associated transceivers are suitable for use in a wireless local area network (EX1005 at [0134].)	e) 1[d]: associating first, second and third wireless transceivers respectively with the first, second and third actual PHY interfaces, wherein each of the first, second and third wireless transceivers (i) is suitable for use in a wireless local area network, (ii) has a first, second and third bandwidth availability up to first, second and third actual bandwidths, and (iii) is adapted to emit radio waves in first, second and third bands of frequencies, the first and second frequency bands being different from each other; "associating first, second, and third wireless transceivers respectively with the first, second, and third actual PHY interfaces ... suitable for use in a wireless local area network": Chincholi Figures 4 and 5 illustrate how each actual PHY interface of each RAT is associated with an antenna/radio frequency (RF) front-end pair. (EX1005, [0133].) The antenna/radio frequency (RF) front-end pairs in Figures 4 and 5 include first, second, and third transceivers. (EX1002, ¶¶91-92.) A POSITA would have understood that a "transceiver" is a physical device that can both transmit and receive information. (EX1002, ¶93.) Thus, each of Chincholi's disclosed "antenna/RF front-end pairs" are a transceiver because they operate on wireless protocols that both transmit and receive data, such as IEEE802.11, IEEE802.11ac, IEEE802.11af, LTE, WCDMA, etc. (Ex. 1005 at [0134].) A POSITA would have further understood that the transceivers in Figures 4 and 5 would be associated with the actual PHY layer of each respective RAT, as the PHY layer is understood as the physical connection between a transceiver and the rest of the RAT. (EX1002, ¶93.) Chincholi also teaches that each RAT may be implemented as a Wi-Fi RAT, and thus their associated transceivers are suitable for use in a wireless local area network. (Ex. 1005 at [0134]; EX1002, ¶94). Petition at 27-28.

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	EX1002 ¶¶ 91-94. 95. <i>"each of the first, second and third wireless transceivers ... has a first, second, and third bandwidth availability up to first, second and third actual bandwidths"</i>: In my opinion, the plain meaning of this limitation is that each of the wireless transceivers has at least three bandwidth availabilities and three respective actual bandwidths. However, I understand that Patent Owner has alleged in the parallel litigation that this limitation may be met by each of the three wireless transceivers having one respective bandwidth availability up to an actual bandwidth. (EX1012; EX1013 at 18-19.) Regardless, Chincholi discloses or renders obvious this limitation under either interpretation. 96. Consistent with PO's infringement contentions, a POSITA would have recognized that each transceiver has an "actual" bandwidth (i.e., total bandwidth of the transceiver) with a "bandwidth availability" that may be a subset of the actual bandwidth (i.e., sub-portions of the total bandwidth that are available for use). Indeed, as Chincholi teaches, the RATs associated with each transceiver provide "meta-data feedback" allowing the OMMA layer to split IP packets amongst the RATs based on their available bandwidth. (EX1005 at [0138]; [0161] (listing "Channel bandwidth(s)" sent by the PHY layer as an example of "feedback metric"))	<i>"each of the first, second and third wireless transceivers ... has a first, second, and third bandwidth availability up to first, second and third actual bandwidths"</i>: The plain meaning of this limitation is that each of the wireless transceivers has at least three bandwidth availabilities and three respective actual bandwidths. (EX1002, ¶95.) However, Patent Owner has alleged in the parallel litigation that this limitation may be met by each of the three wireless transceivers having one respective bandwidth availability up to an actual bandwidth. (EX1012; EX1013, 19-20.) Regardless, Chincholi discloses or renders obvious this limitation under either interpretation. Consistent with PO's infringement contentions, a POSITA would have recognized that each transceiver has an "actual" bandwidth (i.e., total bandwidth of the transceiver) with a "bandwidth availability" that may be a subset of the actual bandwidth (i.e., sub-portions of the total bandwidth that are available for use). (EX1002, ¶96.) Indeed, as Chincholi teaches, the RATs associated with each transceiver provide "meta-data feedback" allowing the OMMA layer to split IP packets amongst the RATs based on their available bandwidth. (EX1005, [0138]; [0161] (listing "Channel bandwidth(s)" sent by the PHY layer as an example of

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	used by an OMMA layer”); <i>see also id.</i> at [0167] (“At startup, the OMMA layer may receive the available bandwidth of each of the one or more RATs.”).) Thus, Chincholi discloses that each of the three transceivers has a bandwidth availability up to an actual bandwidth. 97. Chincholi also discloses that there are multiple available bandwidths for each transceiver, specifically that a transceiver’s feedback metrics include available “[c]hannel bandwidth(s)” in the form of a “Vector/list of elements which are multiple of 0.5 MHz.” (EX1005 at [0161], Table 2.) A POSITA would understand a “vector” or “list” data structure is a data structure for transferring multiple data elements of indeterminate count, and would therefore understand that the number of available “channel bandwidths” stored in the vector could and would exceed two. EX1002 ¶¶ 95-97. 98. <i>“each of the first, second and third wireless transceivers ... is adapted to emit radio waves in first, second and third bands of frequencies, the first and second frequency bands being different from each other”:</i> In my opinion, the plain meaning of this limitation is that each of the three transceivers emit radio waves in all three frequency bands. I understand that Patent Owner, however, has read this limitation to only require that each transceiver emit on a single, mutually exclusive frequency band. For example, in its infringement contentions, Patent Owner alleges that this limitation is met by implementation of the Wi-Fi 7 Draft Standard where “[t]he first transceiver is the 2.4 GHz transceiver,” the second is “one of the 5 GHz and 6 GHz transceivers” and the third is “the other one of the 5 GHz and 6 GHz transceivers.” (EX1012; EX1013 at 19.) Regardless, Chincholi discloses or renders obvious this limitation under either interpretation.	“feedback metric[] used by an OMMA layer”); <i>see also id.</i> at [0167] (“At startup, the OMMA layer may receive the available bandwidth of each of the one or more RATs.”).) Thus, Chincholi discloses that each of the three transceivers has a bandwidth availability up to an actual bandwidth. Chincholi also discloses that there are multiple available bandwidths for each transceiver, specifically that a transceiver’s feedback metrics include available “[c]hannel bandwidth(s)” in the form of a “Vector/list of elements which are multiple of 0.5 MHz.” (EX1005, [0161], Table 2.) A POSITA would understand a “vector” or “list” data structure is a data structure for transferring multiple data elements of indeterminate count, and would therefore understand that the number of available “channel bandwidths” stored in the vector could and would exceed two. (EX1002, ¶97.) Petition at 28-29. <i>“each of the first, second and third wireless transceivers ... is adapted to emit radio waves in first, second and third bands of frequencies, the first and second frequency bands being different from each other”:</i> The plain meaning of this limitation is that each of the three transceivers emit radio waves in all three frequency bands. (EX1002, ¶98.) Patent Owner, however, has read this limitation to only require that each transceiver emit on a single, mutually exclusive frequency band. For example, in its infringement contentions, Patent Owner alleges that this limitation is met by implementation of the Wi-Fi 7 Draft Standard where “[t]he first transceiver is the 2.4 GHz transceiver,” the second is “one of the 5 GHz and 6 GHz transceivers” and the third is “the other one of the 5 GHz and 6 GHz transceivers.” (EX1012; EX1013, 19.) Regardless, Chincholi discloses or renders obvious this limitation under either interpretation.

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	EX1002 ¶ 98 99. The transceivers of each RAT are adapted to emit radio waves in respective different bands of frequencies, consistent with Patent Owner's infringement contentions. In the context of Figure 4, Chincholi discloses that "[f]or multiple RATs 401, each RAT 401 may be operating on a specific band. For example, a 802.11n PHY/MAC operating over 2.4GHz ISM band, a 802.11af PHY/MAC operating over 512 MHz-698 MHz TVWS band, an LTE RAT operating of a licensed band (e.g., 700 MHz band), a Bluetooth RAT operating on 2.4 GHz ISM band, etc." (EX1005 at [0135].) Thus, a POSITA would understand that Chincholi discloses this limitation under PO's interpretation. EX1002 ¶ 99.	Petition at 29-30. The transceivers of each RAT are adapted to emit radio waves in respective different bands of frequencies, consistent with PO's infringement contentions. In the context of Figure 4, Chincholi discloses that "[f]or multiple RATs 401, each RAT 401 may be operating on a specific band. For example, a 802.11n PHY/MAC operating over 2.4GHz ISM band, a 802.11af PHY/MAC operating over 512 MHz-698 MHz TVWS band, an LTE RAT operating of a licensed band (e.g., 700 MHz band), a Bluetooth RAT operating on 2.4 GHz ISM band, etc." (EX1005, [0135].) Thus, a POSITA would understand that Chincholi discloses this limitation under PO's interpretation. (EX1002, ¶99.) Petition at 30.
	100. Chincholi also discloses that each transceiver can emit radio waves within all of the at least three frequency bands. For example, Chincholi describes that an NT and WTRU "may communicate with each other over a single radio frequency (RF) spectral band" such as "2.4 GHz ISM band, or 5 GHz ISM band," even when the devices are "multi-RAT capable devices," i.e. comprising multiple transceivers (EX1005 at [0118].) Chincholi further describes that the frequency band is comprised of "multiple contiguous or noncontiguous channels" within the band over which the devices communicate. <i>Id.</i> Accordingly, a POSITA would understand that each transceiver operating on the 2.4 GHz ISM band is adapted to emit radio waves in any one of three contiguous channels, i.e. the first, second, and third different bands of frequencies, and thus satisfies the claim limitation under the alternative interpretation. EX1002 ¶ 100.	Chincholi also discloses that each transceiver can emit radio waves within all of the at least three frequency bands. For example, Chincholi describes that an NT and WTRU "may communicate with each other over a single radio frequency (RF) spectral band" such as "2.4 GHz ISM band, or 5 GHz ISM band," even when the devices are "multi-RAT capable devices," i.e. comprising multiple transceivers. (EX1005, [0118].) Chincholi further describes that the frequency band is comprised of "multiple contiguous or noncontiguous channels" within the band over which the devices communicate. (<i>Id.</i>) Accordingly, a POSITA would understand that each transceiver operating on the 2.4 GHz ISM band is adapted to emit radio waves in any one of three contiguous channels, i.e. the first, second, and third different bands of frequencies, and thus satisfies the claim limitation under the alternative interpretation. (EX1002, ¶100.) Petition at 30-31.

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Grounds for Unpatentability: Claim 1(e)	f) I[e]: forming in the processing interface (i) at least one virtual MAC interface and (ii) first, second and third virtual PHY interfaces that, during operation of the wireless networking device, feed information regarding the bandwidth availabilities of the first, second and third wireless transceivers back to the at least one virtual MAC interface; 101. In my opinion, Chincholi discloses or renders obvious and/or Chincholi/Riggert render this limitation obvious. According to the '143 patent, the claimed virtual MAC and PHY layers "enable simultaneous allocation of multiple PHY resources for different signal types associated with different applications." (EX1001 at 3:41-47.) The patent states that the virtual MAC layer comprises the functionality of "decision," "processing," and "ultra-streaming" blocks, while the virtual PHY layer may comprise one or more "RF blocks." (EX1001 at 4:39-44.) The virtual PHY layer may include multiple RF blocks, each representing the virtual use of some set of allocated transceiver resources. (EX1001 at 4:41-44; see also Fig. 3 (depicting two RF blocks associated with "two sets" of transceiver resources).) "By employing a virtual MAC and virtual PHY between an application layer and an	f) I[e]: forming in the processing interface (i) at least one virtual MAC interface and (ii) first, second and third virtual PHY interfaces that, during operation of the wireless networking device, feed information regarding the bandwidth availabilities of the first, second and third wireless transceivers back to the at least one virtual MAC interface; According to the '143 patent, the claimed virtual MAC and PHY layers "enable simultaneous allocation of multiple PHY resources for different signal types associated with different applications." (EX1001, 3:41-47.) The patent states that the virtual MAC layer comprises the functionality of "decision," "processing," and "ultra-streaming" blocks, while the virtual PHY layer may comprise one or more "RF blocks." (EX1001, 4:39-44.) The virtual PHY layer may include multiple RF blocks, each representing the virtual use of some set of allocated transceiver resources. (EX1001, 4:41-44; see also Fig. 3 (depicting two RF blocks associated with "two sets" of transceiver resources).) "By employing a virtual MAC and virtual PHY between an application layer and an actual MAC and PHY layer, wireless transceiver resources may be allocated more efficiently to handle various data

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	actual MAC and PHY layer, wireless transceiver resources may be allocated more efficiently to handle various data bandwidth requirements from different applications.” (EX1001 at 5:60-64.) 102. First, Chincholi discloses that the OMMA (i.e., the processing interface) includes the claimed “virtual MAC interface.” Indeed, “OMMA” is an abbreviation for “opportunistic multi-medium access control (MAC) aggregation,” which refers to the fact that the OMMA layer aggregates multiple MAC interfaces, as depicted in Figure 5. (EX1005 at [0120].) The OMMA layer includes an interface acting as a “virtual MAC interface” because it transparently “distributes and/or combines” packets between the IP layer and the RATs. (EX1005 at [0120]; [0192].) A POSITA would have recognized that this “virtualizes” a MAC interface because the OMMA would effectively appear to the IP layer as a single interface for exchanging packets that are ultimately sent or received by the actual MAC-PHY pairs. 103. Chincholi’s OMMA layer also includes all of the functionality that the '143 patent associates with the “virtual MAC interface.” Specifically, Figure 6 of Chincholi is a block diagram of an OMMA layer, comprising an IP QoS Scheduler 603, a MAC Resource Reservation module 602, and a Traffic Shaping Module 601. (EX1005 at [0139].) EX1002 ¶¶ 101-03 (identical figure omitted).	bandwidth requirements from different applications.” (EX1001, 5:60-64; EX1002, ¶101.) First, Chincholi discloses that the OMMA (i.e., the processing interface) includes the claimed “virtual MAC interface.” Indeed, “OMMA” is an abbreviation for “opportunistic multi-medium access control (MAC) aggregation,” which refers to the fact that the OMMA layer aggregates multiple MAC interfaces, as depicted in Figure 5. (EX1005, [0120].) The OMMA layer includes an interface acting as a “virtual MAC interface” because it transparently “distributes and/or combines” packets between the IP layer and the RATs. (EX1005, [0120], [0192].) A POSITA would have recognized that this “virtualizes” a MAC interface because the OMMA would effectively appear to the IP layer as a single interface for exchanging packets that are ultimately sent or received by the actual MAC-PHY pairs. (EX1002, ¶102.) Chincholi’s OMMA layer also includes all of the functionality that the '143 patent associates with the “virtual MAC interface.” (EX1002, ¶103.) Specifically, Figure 6 of Chincholi is a block diagram of an OMMA layer, comprising an IP QoS Scheduler 603, a MAC Resource Reservation module 602, and a Traffic Shaping Module 601. (EX1005, [0139].) Petition at 31-32 (identical figure omitted).

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	104. The IP QoS Scheduler classifies incoming packets of a packet stream, and may segregate them into distinct IP QoS streams (EX1005 at [0143]), which a POSITA would have recognized to fulfill the functionality of the "decision block" of the '143 patent's "virtual MAC interface" (EX1001 at 3:41-44). The MAC Resource Reservation module determines the time duration or spectral fragment/bandwidth required by a packet or set of packets (EX1005 at [0142]), which a POSITA would have recognized to fulfill the functionality of the "processing block" of the '143 patent's "virtual MAC interface" (EX1001 at 3:24-26). Finally, the Traffic Shaping module determines the way packets are routed across RATs using either policy based routing or feedback based routing (EX1005 at [0139]), which a POSITA would have recognized to fulfill the functionality of the "ultra-streaming block" of the '143 patent's "virtual MAC interface" (EX1001 at 3:26-30). Thus, a POSITA would have recognized that Chincholi's OMMA layer includes a "virtual MAC interface." 105. <i>Second</i>, Chincholi discloses that its processing interface comprises the "first, second, and third, virtual PHY interfaces formed in the processing interface" to feed information regarding the bandwidth availabilities of the first, second, and third, wireless transceivers back to the at least one virtual MAC interface. Chincholi discloses that the traffic shaping module of the OMMA (<i>i.e.</i>, part of the "virtual MAC interface") may determine packet routing using "feedback based routing." (EX1005 at [0139].) In feedback based routing, "the OMMA transmitter may use measurement metrics fed back from each RAT," which include "channel quality metrics and the number of available resources on the medium." (EX1005 at [0161].) EX1002 ¶¶ 104-05 (identical figure omitted).	The IP QoS Scheduler classifies incoming packets of a packet stream, and may segregate them into distinct IP QoS streams (EX1005, [0143]), which a POSITA would have recognized to fulfill the functionality of the "decision block" of the '143 patent's "virtual MAC interface" (EX1002, ¶104; EX1001, 3:41-44). The MAC Resource Reservation module determines the time duration or spectral fragment/bandwidth required by a packet or set of packets (EX1005, [0142]), which a POSITA would have recognized to fulfill the functionality of the "processing block" of the '143 patent's "virtual MAC interface" (EX1002, ¶104; EX1001, 3:24-26). Finally, the Traffic Shaping module determines the way packets are routed across RATs using either policy based routing or feedback based routing (EX1005, [0139]), which a POSITA would have recognized to fulfill the functionality of the "ultra-streaming block" of the '143 patent's "virtual MAC interface" (EX1002, ¶104; EX1001, 3:26-30). Thus, a POSITA would have recognized that Chincholi's OMMA layer includes a "virtual MAC interface." (EX1002, ¶104.) <i>Second</i>, Chincholi discloses that its processing interface comprises the "first and second virtual PHY interfaces formed in the processing interface" to feed information regarding the bandwidth availabilities of the first, second, and third, wireless transceivers back to the at least one virtual MAC interface. (EX1002, ¶105.) Chincholi discloses that the traffic shaping module of the OMMA (<i>i.e.</i>, part of the "virtual MAC interface") may determine packet routing using "feedback based routing." (EX1005, [0139].) In feedback based routing, "the OMMA transmitter may use measurement metrics fed back from each RAT," which include "channel quality metrics and the number of available resources on the medium." (EX1005, [0161].) Petition at 33-34 (identical figure omitted).

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	106. Figures 28, 29, and their associated descriptions describe how Chincholi collects feedback from each RAT for the traffic shaping module. Figure 28 illustrates how the OMMA layer includes an OMMA Controller, which interfaces with each RAT to collect metrics regarding the channel quality and number of resources available on the medium. Specifically, using interface "A2" in Figure 28, "[a] RAT (e.g., each RAT) may provide feedback metrics (e.g., a vector comprising a value of serving rate, jitter, packet delay, and packet loss rate on its MAC) to the OMMA Controller 2900 per device (e.g., WTRU or NT) per access category supported at that RAT." (EX1005 at [0205].) It would have been obvious to a POSITA to incorporate first, second, and third virtual PHY interfaces into the OMMA Controller of Chincholi to collect the disclosed feedback metrics from each RAT over the "A2" interface and feed it back to the virtual MAC interface. EX1002 ¶ 106 (identical figure omitted). 107. Further details regarding the implementation of virtual PHY interfaces is disclosed by Riggert. As discussed above, <i>supra</i> Section IV, Riggert teaches a "bondable virtual interface" that provides one or more virtualized physical interfaces to the actual PHY layers of the communication channels, allowing for easy substitution of the interface throughout the system. (EX1006 at [0065].) Providing this sort of virtualized physical interface for transceivers in an 802.11 system is particularly beneficial as it allows an access point to accommodate communication channels with wireless devices that may operate using various different generations	Figures 28, 29, and their associated descriptions describe how Chincholi collects feedback from each RAT for the traffic shaping module. Figure 28 illustrates how the OMMA layer includes an OMMA Controller, which interfaces with each RAT to collect metrics regarding the channel quality and number of resources available on the medium. Specifically, using interface "A2" in Figure 28, "[a] RAT (e.g., each RAT) may provide feedback metrics (e.g., a vector comprising a value of serving rate, jitter, packet delay, and packet loss rate on its MAC) to the OMMA Controller 2900 per device (e.g., WTRU or NT) per access category supported at that RAT." (EX1005, [0205].) It would have been obvious to a POSITA to incorporate first, second, and third virtual PHY interfaces into the OMMA Controller of Chincholi to collect the disclosed feedback metrics from each RAT over the "A2" interface and feed it back to the virtual MAC interface. (EX1002, ¶106.) Petition at 34-35 (identical figure omitted). Further details regarding the implementation of virtual PHY interfaces is disclosed by Riggert. As discussed above, <i>supra</i> Section IV.B.2, Riggert teaches a "bondable virtual interface" that provides one or more virtualized physical interfaces to the actual PHY layers of the communication channels, allowing for easy substitution of the interface throughout the system. (EX1006, [0065].) Providing this sort of virtualized physical interface for transceivers in an 802.11 system is particularly beneficial as it allows an access point to accommodate communication channels with wireless devices that may operate using various different generations

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	of the 802.11 standards. Virtualization of the physical interface for this purpose is taught, for example, in background reference U.S. Patent Application 2009/0141691 ("Jain"). (See EX1007 at [0034-0037]). 108. Figure 5 teaches the basic architecture for implementing "bondable physical interfaces" in the wireless network devices of a multi-channel network: EX1002 ¶¶ 107-08 (identical figure omitted). 109. The "bondable virtual interface" in Figure 5 on the server side is denoted as a "bondable PHY" (240). While the exemplary architecture depicts only a single "bondable virtual interface" associated with four actual transceiver resources, Riggert teaches that <i>multiple</i> physical bondable interfaces are possible in a single device. For example, each network endpoint may comprise a "plurality of bondable virtual interface connectors 244 and 344, respectively," each one of which may be associated with specific bondable virtual interface. (EX1006 at [0069].) 110. For the reasons discussed above, see Section VII.A, a POSITA would have been motivated to combine Riggert's implementation of virtual PHY interfaces into the OMMA Controller of Chincholi for the purposes of receiving the feedback statistics over the "A2" interfaces and passing that feedback data to Chincholi's traffic shaping module. The resulting combination would implement one or more bondable virtual PHY interfaces into Chincholi's OMMA controller, each associated with one or more actual MAC-PHY pairs, thus increasing flexibility in the system. EX1002 ¶¶ 109-110.	of the 802.11 standards. (EX1002, ¶107.) Virtualization of the physical interface for this purpose is taught, for example, in background reference U.S. Patent Application 2009/0141691 ("Jain"). (See EX1007, [0034-0037]); (EX1002, ¶107). Figure 5 teaches the basic architecture for implementing "bondable virtual interfaces" in the wireless network devices of a multi-channel network (EX1002, ¶108): Petition at 36-37 (identical figure omitted). The "bondable virtual interface" in Figure 5 on the server side is denoted as a "bondable PHY" (240). While the exemplary architecture depicts only a single "bondable virtual interface" associated with four actual transceiver resources, Riggert teaches that <i>multiple</i> physical bondable interfaces are possible in a single device. (EX1002, ¶109.) For example, each network endpoint may comprise a "plurality of bondable virtual interface connectors 244 and 344, respectively," each one of which may be associated with specific bondable virtual interface. (EX1006, [0069].) For the reasons discussed above, see Section VII.A, a POSITA would have been motivated to combine Riggert's implementation of virtual PHY interfaces into the OMMA Controller of Chincholi for the purposes of receiving the feedback statistics over the "A2" interfaces and passing that feedback data to Chincholi's traffic shaping module. The resulting combination would implement one or more bondable virtual PHY interfaces into Chincholi's OMMA controller, each associated with one or more actual MAC-PHY pairs, thus increasing flexibility in the system. (EX1002, ¶110.) Petition at 37-38.

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Grounds for Unpatentability: Claim 1(f)	g) <i>1[f]: wherein the processing interface is configured to, when the wireless networking device is being used, in a manner transparent to any layer of the wireless networking device above the processing interface,</i> 111. In my opinion, Chincholi/Riggert discloses this limitation. Chincholi discloses that its OMMA layer (i.e., processing interface) is configured to operate in a manner transparent to any higher layer. For example, Chincholi discloses that "[t]he OMMA layer <i>may be transparent</i>, in that it distributes and/or combines packets from different RATs and forwards the packets to the IP layer." (EX1005 at [0192], [0126].) This is as opposed to a "non-transparent" configuration in which the OMMA layer would "add[] additional headers [] at the transmitter, and/or reads and removes the headers at the receiver." (EX1005 at [0192].) EX1002 ¶ 111.	g) <i>1[f]: wherein the processing interface is configured to, when the wireless networking device is being used, in a manner transparent to any layer of the wireless networking device above the processing interface,</i> Chincholi discloses that its OMMA layer (i.e., processing interface) is configured to operate in a manner transparent to any higher layer. (EX1002, ¶111.) For example, Chincholi discloses that "[t]he OMMA layer <i>may be transparent</i>, in that it distributes and/or combines packets from different RATs and forwards the packets to the IP layer." (EX1005, [0192], [0126].) This is as opposed to a "non-transparent" configuration in which the OMMA layer would "add[] additional headers [] at the transmitter, and/or reads and removes the headers at the receiver." (EX1005, [0192].) Petition at 38-39.

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Grounds for Unpatentability: Claim 1(g)	h) 1[g]: (i) respectively request or create first, second and third associations between a first recipient and the first, second and third actual MAC and PHY interfaces, 112. In my opinion, Chincholi discloses this limitation. Chincholi discloses techniques for network terminals and WTRUs to discover one another using active and passive scanning procedures. (EX1005 at [0145].) After an authentication procedure, Chincholi discloses that WTRUs may transmit a request to associate with one or more RATs of the network terminal and that the network terminal may provide an association response signal accepting or rejecting the request of the WTRU. (EX1005 at [0149].) A POSITA would have recognized that these scanning procedures disclose the ability of Chincholi's OMMA layer to request or create associations between recipients and first, second, and third actual MAC and PHY interfaces. 113. When operating transparently with respect to higher layers, see limitation [1g], Chincholi's OMMA layer handles the request/response and creation of associations with WTRUs. (EX1005 at [0127] ("[A]ssociation request/response frames may be updated by the OMMA layer to include OMMA device discovery parameters, for example, such as but not limited to OMMA modes, OMMA schemes, OMMA packet distribution modes, etc.")). Thus a POSITA would have recognized that the request or creation by Chincholi's OMMA layer of associations between recipients and the actual MAC and PHY interfaces would be performed in a manner transparent to higher level layers. EX1002 ¶¶ 112-13.	h) 1[g]: (i) respectively request or create first, second and third associations between a first recipient and the first, second and third actual MAC and PHY interfaces, Chincholi discloses techniques for network terminals and WTRUs to discover one another using active and passive scanning procedures. (EX1005, [0145].) After an authentication procedure, Chincholi discloses that WTRUs may transmit a request to associate with one or more RATs of the network terminal and that the network terminal may provide an association response signal accepting or rejecting the request of the WTRU. (EX1005, [0149].) A POSITA would have recognized that these scanning procedures disclose the ability of Chincholi's OMMA layer to request or create associations between recipients and first, second, and third actual MAC and PHY interfaces. (EX1002, ¶112.) When operating transparently with respect to higher layers, see limitation [1g], Chincholi's OMMA layer handles the request/response and creation of associations with WTRUs. (EX1005, [0127] ("[A]ssociation request/response frames may be updated by the OMMA layer to include OMMA device discovery parameters, for example, such as but not limited to OMMA modes, OMMA schemes, OMMA packet distribution modes, etc.")). Thus a POSITA would have recognized that the request or creation by Chincholi's OMMA layer of associations between recipients and the actual MAC and PHY interfaces would be performed in a manner transparent to higher level layers. (EX1002, ¶113.) Petition at 39-40.

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Grounds for Unpatentability: Claim 1(h)	i) 1[h]: (ii) identify at least a portion of bandwidth available for communication of a first selected wireless transceiver of the first, second and third wireless transceivers, 114. In my opinion, Chincholi/Riggert discloses this limitation. Chincholi teaches that NTs and WTRUs communicate with one another over “channels,” which are portions of a transceiver bandwidth availability. Specifically, “[t]he NT and WTRU may communicate with each other over a single radio frequency (RF) spectral band, for example, 2.4 GHz ISM band, or 5 GHz ISM band, or TVSWS band, or 60 GHz band, using a channel within the band or aggregating multiple contiguous or noncontiguous channels.” (EX1005 at [0118]; see also <i>id.</i> at [0121] (“An 802.11 based system may operate in a time division duplexing (TDD) mode, for example, on a band over a single 20/40MHz channel in the case of ISM band or a single 5/10/20 MHz channel in television white space (TVWS) band using contiguous/non-contiguous carrier aggregation.”).) 115. Chincholi also discloses identifying available bandwidth channels of a selected wireless transceiver for communication. The OMMA layer receives various feedback information from each RAT. (EX1005 at [0123].) For example, “the OMMA transmitter may use measurement metrics fed back from each RAT,” which include “channel quality metrics and the number of available resources on the medium.” (EX1005 at [0161].) Amongst the available resources provided as part of the feedback information are the “number of channels” and “channel bandwidth” (i.e., the width of the channel, such as 20/40 MHz in the case of the ISM band). (EX1005 at [0161].) EX1002 ¶¶ 114-15.	i) 1[h]: (ii) identify at least a portion of bandwidth available for communication of a first selected wireless transceiver of the first, second and third wireless transceivers, Chincholi teaches that NTs and WTRUs communicate with one another over “channels,” which are portions of a transceiver bandwidth availability. (EX1002, ¶114.) Specifically, “[t]he NT and WTRU may communicate with each other over a single radio frequency (RF) spectral band, for example, 2.4 GHz ISM band, or 5 GHz ISM band, or TVSWS band, or 60 GHz band, using a channel within the band or aggregating multiple contiguous or noncontiguous channels.” (EX1005, [0118]; see also <i>id.</i> at [0121] (“An 802.11 based system may operate in a time division duplexing (TDD) mode, for example, on a band over a single 20/40MHz channel in the case of ISM band or a single 5/10/20 MHz channel in television white space (TVWS) band using contiguous/non-contiguous carrier aggregation.”).) Chincholi also discloses identifying available bandwidth channels of a selected wireless transceiver for communication. (EX1002, ¶115.) The OMMA layer receives various feedback information from each RAT. (EX1005, [0123].) For example, “the OMMA transmitter may use measurement metrics fed back from each RAT,” which include “channel quality metrics and the number of available resources on the medium.” (EX1005, [0161].) Amongst the available resources provided as part of the feedback information are the “number of channels” and “channel bandwidth” (i.e., the width of the channel, such as 20/40 MHz in the case of the ISM band). (EX1005, [0161].) Petition at 40-41.

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	116. In my opinion, a POSITA would have understood that the ability of Chincholi's OMMA layer to receive from each RAT a number of channels and channel bandwidth is an identification of "at least one portion" (i.e., at least one available channel, or an aggregation of multiple contiguous or non-contiguous channels) of the first actual bandwidth of a first selected wireless transceiver. A POSITA would have further understood that each identified channel bandwidth is comprised of a number of frequency carriers, which are a set of given communication resources for the identified channel. 117. In my opinion, Chincholi further discloses that the OMMA layer evaluates the identified channel availabilities with respect to the first bandwidth requirement of the first application and allocates bandwidth resources accordingly. As Chincholi teaches, "the OMMA layer may determine a time duration and a bandwidth requirement for an IP flow." (EX1005 at [260].) With knowledge of this total bandwidth requirement, as well as the feedback information indicating the number of channels available on each RAT, Chincholi teaches how its "OMMA layer may intelligently manage data traffic across multiple RATs . . . as a function of the link quality of each RAT." (EX1005 at [0194].) EX1002 ¶¶ 116-17.	A POSITA would have understood that the ability of Chincholi's OMMA layer to receive from each RAT a number of channels and channel bandwidth is an identification of "at least one portion" (i.e., at least one available channel, or an aggregation of multiple contiguous or non-contiguous channels) of the first actual bandwidth of a first selected wireless transceiver. (EX1002, ¶116.) A POSITA would have further understood that each identified channel bandwidth is comprised of a number of frequency carriers, which are a set of given communication resources for the identified channel. (EX1002, ¶116.) Chincholi further discloses that the OMMA layer allocates bandwidth resources to the transceiver resources. (EX1002, ¶117.) As Chincholi teaches, "the OMMA layer may determine a time duration and a bandwidth requirement for an IP flow." (EX1005, [260].) With knowledge of this total bandwidth requirement, as well as the feedback information indicating the number of channels available on each RAT, Chincholi teaches how its "OMMA layer may intelligently manage data traffic across multiple RATs as a function of the link quality of each RAT." (EX1005, [0194].) Petition at 41.

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	118. Specifically, Chincholi discloses how “[t]he OMMA layer may request resources on a first RAT and on a second RAT based on the time duration and the bandwidth requirement for the first IP packet and the second IP packet of the IP flow.” (EX1005 at [0260].) “The resources are characterized by the time duration and the bandwidth requirement.” (<i>Id.</i>) This functionality may be performed, for example, by a “MAC Resource Reservation module 602” of the OMMA layer, which “determine[s] an amount of time duration and/or spectral fragment/bandwidth required by a packet or a set of packets.” (EX1005 at [0142].) 119. Chincholi goes on to detail multiple feedback-based OMMA algorithms for allocating IP packets across respective RATs based on their bandwidth availability. (EX1005 at [0162].) For example, in a “cold start” phase, Chincholi teaches how the OMMA layer “may request the individual RATs to transmit the total channel bandwidths supported by them.” (EX1005 at [0163].) Thus, the distribution of IP packets across two separate RATs, operating on two different frequency bands, may be calculated as the simple ratio of available bandwidth on the two RATs: $BW_{ISM} : \sum_{k=1}^N BW_{TVWS}^k$ (EX1005 at [0163].) Chincholi then discloses more sophisticated algorithms for allocating packets based on <i>both</i> available bandwidth and link quality for each of a “ramp-up phase” and a “steady state phase.” (EX1005 at [0164]-[0165]). EX1002 ¶¶ 118-19.	Specifically, Chincholi discloses how “[t]he OMMA layer may request resources on a first RAT and on a second RAT based on the time duration and the bandwidth requirement for the first IP packet and the second IP packet of the IP flow.” (EX1005, [0260]; EX1002, ¶118.) “The resources are characterized by the time duration and the bandwidth requirement.” (EX1005, [0260].) This functionality may be performed, for example, by a “MAC Resource Reservation module 602” of the OMMA layer, which “determine[s] an amount of time duration and/or spectral fragment/bandwidth required by a packet or a set of packets.” (EX1005, [0142].) Chincholi goes on to detail multiple feedback-based OMMA algorithms for allocating IP packets across respective RATs based on their bandwidth availability. (EX1005, [0162].) For example, in a “cold start” phase, Chincholi teaches how the OMMA layer “may request the individual RATs to transmit the total channel bandwidths supported by them.” (EX1005, [0163].) Thus, the distribution of IP packets across two separate RATs, operating on two different frequency bands, may be calculated as the simple ratio of available bandwidth on the two RATs (EX1002, ¶119): $BW_{ISM} : \sum_{k=1}^N BW_{TVWS}^k$ (EX1005, [0163].) Chincholi then discloses more sophisticated algorithms for allocating packets based on <i>both</i> available bandwidth and link quality for each of a “ramp-up phase” and a “steady state phase.” (EX1005, [0164]-[0165]). Petition at 41-42.

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	121. Indeed, consistent with the purported technological advance of the '143 patent, Chincholi teaches how the common OMMA layer, situated above the actual MAC interfaces, is uniquely positioned to make a global evaluation of the bandwidth requirement for an IP flow with respect to available transceiver resources. An individual actual MAC, for example, "may be unaware of the resource allocation to the NT and WTRU by other MACs," and thus permitting multi-RAT resource allocation would "not be globally optimal." (EX1005 at [259].) "Since the OMMA layer may be the common entity which is aware of the link quality metrics on each RAT for a device and QoS class . . . , a globally optimal resource allocation may be performed at the OMMA layer, and the optimal resource allocation may be signaled to the MAC on each RAT." (EX1005 at [259].) EX1002 ¶¶ 120-21.	Indeed, consistent with the purported technological advance of the '143 patent, Chincholi teaches how the common OMMA layer, situated above the actual MAC interfaces, is uniquely positioned to make a global evaluation of the bandwidth requirement for an IP flow with respect to available transceiver resources. (EX1002, ¶¶120-21.) An individual actual MAC, for example, "may be unaware of the resource allocation to the NT and WTRU by other MACs," and thus permitting multi-RAT resource allocation would "not be globally optimal." (EX1005, [259].) "Since the OMMA layer may be the common entity which is aware of the link quality metrics on each RAT for a device and QoS class . . . , a globally optimal resource allocation may be performed at the OMMA layer, and the optimal resource allocation may be signaled to the MAC on each RAT." (EX1005, [259].) Petition at 43.

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Grounds for Unpatentability: Claim 1(i)	j) 1[i]: (iii) prepare the first data stream for transmission to the first recipient from the first selected wireless transceiver using a specific subset of frequencies corresponding to the identified portion of the available bandwidth of the first selected wireless transceiver, and 122. In my opinion, Chincholi/Riggert discloses this limitation. Based on its evaluation of transceiver bandwidth availability with respect to application bandwidth requirement, Chincholi discloses using the bandwidth availabilities of a selected transceiver to transmit the first data stream to a recipient using a specific subset of frequencies corresponding to their identified portions. 123. As discussed above, see limitation 1[h], Chincholi reserves resources from the identified portions of available bandwidth of the transceiver to prepare the data stream for transmission. Once bandwidth and spectral fragments have been allocated, preparing the data stream for transmission further includes segmenting the data, mapping the data stream to the allocated bandwidth resources, applying appropriate modulation and coding schemes, and generating the physical-layer signals for transmission over the selected transceiver. The data stream is then transmitted. (EX1005 at [0172], Fig. 19). EX1002 ¶¶ 122-23.	j) 1[i]: (iii) prepare the first data stream for transmission to the first recipient from the first selected wireless transceiver using a specific subset of frequencies corresponding to the identified portion of the available bandwidth of the first selected wireless transceiver, and Chincholi discloses using the bandwidth availabilities of a selected transceiver to transmit the first data stream to a recipient using a specific subset of frequencies corresponding to their identified portions. (EX1002, ¶122.) As discussed above, see limitation 1[h], Chincholi reserves resources from the identified portions of available bandwidth of the transceiver to prepare the data stream for transmission. Once bandwidth and spectral fragments have been allocated, preparing the data stream for transmission further includes segmenting the data, mapping the data stream to the allocated bandwidth resources, applying appropriate modulation and coding schemes, and generating the physical-layer signals for transmission over the selected transceiver. (EX1002, ¶123.) The data stream is then transmitted. (EX1005, [0172], Fig. 19). Petition at 43-44.
Grounds for Unpatentability: Claim 1(j)	k) 1[j]: (iv) cause the prepared first data stream to be transmitted from the first selected wireless transceiver to thereby at least partially satisfy the first wireless bandwidth requirement of the first application; 124. In my opinion, Chincholi discloses causing the prepared first data stream to be transmitted from the selected transceiver. Figure 11, for example, shows how the OMMA layer splits a single IP stream of packets (i.e., "MAC Service Data Units" or "MSDUs") for transmission across two RATs simultaneously.	k) 1[j]: (iv) cause the prepared first data stream to be transmitted from the first selected wireless transceiver to thereby at least partially satisfy the first wireless bandwidth requirement of the first application; Chincholi discloses causing the prepared first data stream to be transmitted from the selected transceiver. Figure 11, for example, shows how the OMMA layer splits a single IP stream of packets (i.e., "MAC Service Data Units" or "MSDUs") for transmission across two RATs simultaneously. (EX1002, ¶124.)

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	125. As Chincholi discloses, “[u]sing multiple RATs <i>simultaneously</i> may provide increased bandwidth and/or increased reliability for an application.” (EX1005 at [0194].) Since the transceivers were selected based on their ability to partially satisfy the application’s bandwidth requirement, the transmission <i>partially satisfies the bandwidth requirement</i>. 126. Finally, Chincholi discloses that the transceiver selection, data stream preparation, and simultaneous transmission is all performed by the OMMA in a manner transparent to higher levels: “[t]he OMMA layer <i>may be transparent</i>, in that it distributes and/or combines packets from different RATs and forwards the packets to the IP layer.” (EX1005 at [0192], [0126].) EX1002 ¶¶ 124-26.	As Chincholi discloses, “[u]sing multiple RATs <i>simultaneously</i> may provide increased bandwidth and/or increased reliability for an application.” (EX1005, [0194].) Since the transceivers were selected based on their ability to partially satisfy the application’s bandwidth requirement, the transmission <i>partially satisfies the bandwidth requirement</i>. (EX1002, ¶125.) Finally, Chincholi discloses that the transceiver selection, data stream preparation, and simultaneous transmission is all performed by the OMMA in a manner transparent to higher levels: “[t]he OMMA layer <i>may be transparent</i>, in that it distributes and/or combines packets from different RATs and forwards the packets to the IP layer.” (EX1005, [0192], [0126]; EX1002, ¶126.) Petition at 45-46.
Grounds for Unpatentability: Claim 1(l)	m) 1[l]: (i) identify at least a portion of bandwidth available for communication of a second selected wireless transceiver of the first, second and third wireless transceivers to receive a data stream transmitted from a second recipient. 128. In my opinion, Chincholi/Riggert discloses this limitation. This limitation is similar to limitation 1[h], however where limitation 1[h] requires identifying bandwidth for a <i>first</i> transceiver to transmit data to a <i>first</i> recipient, this limitation instead requires identifying bandwidth for a <i>second</i> transceiver to receive data from a <i>second</i> recipient. 129. As I discussed for limitation 1[h], Chincholi describes how the OMMA receives feedback from “each RAT” in a multi-RAT (<i>i.e. multi-transceiver</i>) NT or WTRU in order to identify which portion of the channel bandwidth to allocate for	m) 1[l]: (i) identify at least a portion of bandwidth available for communication of a second selected wireless transceiver of the first, second and third wireless transceivers to receive a data stream transmitted from a second recipient. This limitation is similar to limitation 1[h]. Where limitation 1[h] requires identifying bandwidth for a <i>first</i> transceiver to transmit data to a <i>first</i> recipient, this limitation requires identifying bandwidth for a <i>second</i> transceiver to receive data from a <i>second</i> recipient. (EX1002, ¶128.) As discussed for limitation 1[h], Chincholi describes how the OMMA receives feedback from “each RAT” in a multi-RAT (<i>i.e. multi-transceiver</i>) NT or WTRU in order to identify which portion of the channel bandwidth to allocate for transmitting or receiving data for an IP flow. EX1005, [0123], [0142], [0161]-[0165], [0259]-[0260]. Thus, Chincholi describes identifying available bandwidth

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	transmitting or receiving data for an IP flow. EX1005 at [0123], [0142], [0161]-[0165], [0259]-[0260]. Thus, Chincholi describes identifying available bandwidth for a second transceiver. 130. And as I further discussed for limitation 1[g], Chincholi discloses multiple WTRUs (<i>i.e. first and second recipients</i>) associating with one or more RATs of the network terminal (<i>i.e. second transceiver</i>), thus disclosing the ability of Chincholi's OMMA layer to request or create associations between multiple recipients and multiple transceivers that receive data streams from said recipients. (EX1005 at [0149]). As depicted in Figure 2, a communications system includes an NT (201) interfacing with multiple WTRUs (202), wherein each WTRU transmits and receives data streams on bandwidth portions of one or more transceivers (TVWS and/or ISM). (EX1005 at [0121]); <i>see also</i> [0349] ("For example, a NT may communicate substantially simultaneously with multiple UTs (e.g., as illustrated in FIG. 53). Multiple IP flows belonging to different QoS classes may be served by the NT-WTRU links (e.g., each NT-WTRU link), where each IP flow may have different packet delay and/or throughput requirements."). EX1002 ¶¶ 128-130 (identical figure omitted). 131. Chincholi also discloses how its OMMA layer enables identification of the available bandwidth for receipt of an IP flow. Figure 5, for example, depicts a two-way data flow between the actual MAC layer and the OMMA layer on links "A1" and "A2". EX1002 ¶ 131 (identical figure omitted).	for a second transceiver. (EX1002, ¶129.) As further discussed in limitation 1[g], Chincholi discloses multiple WTRUs (<i>i.e. first and second recipients</i>) associating with one or more RATs of the network terminal (<i>i.e. second transceiver</i>), thus disclosing the ability of Chincholi's OMMA layer to request or create associations between multiple recipients and multiple transceivers that receive data streams from said recipients. (EX1005, [0149]; EX1002, ¶130.) As depicted in Figure 2, a communications system includes an NT (201) interfacing with multiple WTRUs (202), wherein each WTRU transmits and receives data streams on bandwidth portions of one or more transceivers (TVWS and/or ISM). (EX1005, [0121]); <i>see also</i> [0349] ("For example, a NT may communicate substantially simultaneously with multiple UTs (e.g., as illustrated in FIG. 53). Multiple IP flows belonging to different QoS classes may be served by the NT-WTRU links (e.g., each NT-WTRU link), where each IP flow may have different packet delay and/or throughput requirements."). Petition at 46-47 (identical figure omitted). Chincholi also discloses how its OMMA layer enables identification of the available bandwidth for receipt of an IP flow. (EX1002, ¶131.) Figure 5, for example, depicts a two-way data flow between the actual MAC layer and the OMMA layer on links "A1" and "A2". Petition at 48 (identical figure omitted).

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	132. Further, Table 1 of Chincholi describes the "A1" and "A2" links of Figure 5 as involving both the "Incoming" and "Outgoing" MAC MSDUs (MAC service data units). (EX1005 at [0138].) Indeed, Chincholi describes that the OMMA layer aggregates bandwidth across multiple RATs, in a manner transparent to higher levels, to either "distribute[]" or "combine[]" packets from different RATs. A POSITA would have understood that the ability of the OMMA layer to "combine" packets relates to combining simultaneously received packets across multiple RATs from a single IP flow prior to transmission up to the IP layer. Finally, a POSITA would have also recognized that the ability to implement Chincholi's system to simultaneously transmit the first data stream using the first transceiver and receive the second data stream using the second transceiver. Because Chincholi's system is capable of implementing multiple antenna/RF pairs, each operating on a different specific frequency band (EX1005 at [0136]), a POSITA would recognize the ability to implement Chincholi as a simultaneous transmit and receive system. EX1002 ¶ 132.	Further, Table 1 of Chincholi describes the "A1" and "A2" links of Figure 5 as involving both the "Incoming" and "Outgoing" MAC MSDUs (MAC service data units). (EX1005, [0138].) Indeed, Chincholi describes that the OMMA layer aggregates bandwidth across multiple RATs, in a manner transparent to higher levels, to either "distribute[]" or "combine[]" packets from different RATs. A POSITA would have understood that the ability of the OMMA layer to "combine" packets relates to combining simultaneously received packets across multiple RATs from a single IP flow prior to transmission up to the IP layer. (EX1002, ¶132.) Finally, a POSITA would have also recognized that the ability to implement Chincholi's system to simultaneously transmit the first data stream using the first transceiver and receive the second data stream using the second transceiver. Because Chincholi's system is capable of implementing multiple antenna/RF pairs, each operating on a different specific frequency band (EX1005, [0136]), a POSITA would recognize the ability to implement Chincholi as a simultaneous transmit and receive system. (EX1002, ¶132.) Petition at 49-50.

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	133. Operating a multi-transceiver system like Chincholi to simultaneously transmit from one transceiver and receive from another was well-known and obvious to a POSITA at the time of the '143 patent. This is explained, for example, in background reference U.S. Patent 10,567,147 ("DiFazio") (EX1010). DiFazio teaches that a "full duplex" system is one that transmits and receives the radio frequency RF signal simultaneously. (EX1010 at 1:24-26.) This is most often accomplished by implementing "frequency division duplexing (FDD) where the Tx and Rx bands may be sufficiently separated in frequency such that filters can adequately attenuate any energy from the Tx signal that would leak into the Rx signal path and otherwise corrupt the Rx signal and prevent proper operation." (EX1010 at 1:26-31; <i>see also id.</i> at 16:51-67, 17:48-18:23.) Additionally, DiFazio teaches a "full duplex single channel" (FDSC) capability, wherein a base station may even simultaneously transmit and receive data streams in a single frequency channel. (EX1010 at 13:31-56.) 134. In my opinion, a POSITA would have been motivated to implement a simultaneous transmit and receive functionality into the system taught by Chincholi to achieve greater network efficiency and throughput. DiFazio teaches, for example, the ability to simultaneously transmit and receive using FDSC can achieve 70% greater throughput as compared to conventional half-duplex systems. (EX1010 at 16:29-30.) To the extent not explicitly disclosed by Chincholi, implementing a simultaneous transmit and receive functionality into its disclosed system would have been technologically feasible and could be accomplished in straightforward manner with a reasonable expectation of success. EX1002 ¶¶ 133-34.	Operating a multi-transceiver system like Chincholi to simultaneously transmit from one transceiver and receive from another was well-known and obvious to a POSITA at the time of the '143 patent. (EX1002, ¶133.) This is explained, for example, in background reference U.S. Patent 10,567,147 ("DiFazio") (EX1010). DiFazio teaches that a "full duplex" system is one that transmits and receives the radio frequency RF signal simultaneously. (EX1010, 1:24-26.) This is most often accomplished by implementing "frequency division duplexing (FDD) where the Tx and Rx bands may be sufficiently separated in frequency such that filters can adequately attenuate any energy from the Tx signal that would leak into the Rx signal path and otherwise corrupt the Rx signal and prevent proper operation." (EX1010, 1:26-31; <i>see also id.</i> at 16:51-67, 17:48-18:23.) Additionally, DiFazio teaches a "full duplex single channel" (FDSC) capability, wherein a base station may even simultaneously transmit and receive data streams in a single frequency channel. A POSITA would have been motivated to implement a simultaneous transmit and receive functionality into the system taught by Chincholi to achieve greater network efficiency and throughput. (EX1002, ¶134.) DiFazio teaches, for example, the ability to simultaneously transmit and receive using FDSC can achieve 70% greater throughput as compared to conventional half-duplex systems. (EX1010, 16:29-30.) To the extent not explicitly disclosed by Chincholi, implementing a simultaneous transmit and receive functionality into its disclosed system would have been technologically feasible and could be accomplished in straightforward manner with a reasonable expectation of success. (EX1002, ¶134.) Petition at 50-51.

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Grounds for Unpatentability: Claim 1(m)	n <i>I[m]: (ii) receive the data stream transmitted to the wireless networking device from the second recipient utilizing a specific subset of frequencies corresponding to the identified portion of the bandwidth available for communication of the second selected wireless transceiver.</i> 135. In my opinion, Chincholi/Riggert discloses this limitation. As I discussed above for limitations 1[h] and 1[i], Chincholi describes that its OMMA layer identifies portions of available bandwidth for a transceiver to transmit and receive data in the form of "channels," with each channel being associated with a specific frequency sub-band. (EX1005 at [0118] ("The NT and WTRU may communicate with each other over a single radio frequency (RF) spectral band, for example, 2.4 GHz ISM band, or 5 GHz ISM band, or TVSWS band, or 60 GHz band, using a channel within the band or aggregating multiple contiguous or noncontiguous channels."), [0121].) 136. And as I further discussed for limitation 1[l], Chincholi teaches receiving a data stream transmitted by a <i>second recipient</i> by utilizing the assigned portion of available of a <i>second transceiver</i>. EX1002 ¶¶ 135-36.	n <i>I[m]: (ii) receive the data stream transmitted to the wireless networking device from the second recipient utilizing a specific subset of frequencies corresponding to the identified portion of the bandwidth available for communication of the second selected wireless transceiver.</i> As discussed above for limitations 1[h] and 1[i], Chincholi describes that its OMMA layer identifies portions of available bandwidth for a transceiver to transmit and receive data in the form of "channels," with each channel being associated with a specific frequency sub-band. (EX1005, [0118] ("The NT and WTRU may communicate with each other over a single radio frequency (RF) spectral band, for example, 2.4 GHz ISM band, or 5 GHz ISM band, or TVSWS band, or 60 GHz band, using a channel within the band or aggregating multiple contiguous or noncontiguous channels."), [0121]; EX1002, ¶135.) And as discussed for limitation 1[l], Chincholi teaches receiving a data stream transmitted by a <i>second recipient</i> by utilizing the assigned portion of available of a <i>second transceiver</i>. (EX1002, ¶136.) Petition at 51-52.

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Grounds for Unpatentability: Claim 1(n)	o) <i>I[n]: wherein the transmission of the first data stream to the first recipient occurs at least partially simultaneously with the reception of the data stream transmitted from the second recipient;</i> 137. In my opinion, Chincholi/Riggert discloses this limitation. Chincholi discloses that the transmission of a first data stream on a first transceiver occurs simultaneously with the reception of a data stream on a second transceiver. In particular, Chincholi discloses that "a NT may communicate substantially simultaneously with multiple UTs [user terminals] [i.e. recipients]" where "[m]ultiple IP flows belonging to different QoS classes may be served by the NT-WTRU links (e.g., each NT-WTRU link), where each IP flow may have different packet delay and/or throughput requirements." (EX1005 at [0349]). Further, as depicted in Figure 2, the NT simultaneously communicates with multiple WTRUs performing transmission and reception of data. EX1002 ¶ 137.	o) <i>I[n]: wherein the transmission of the first data stream to the first recipient occurs at least partially simultaneously with the reception of the data stream transmitted from the second recipient;</i> Chincholi discloses that the transmission of a first data stream on a first transceiver occurs simultaneously with the reception of a data stream on a second transceiver. (EX1002, ¶137.) In particular, Chincholi discloses that "a NT may communicate substantially simultaneously with multiple UTs [user terminals] [i.e. recipients]" where "[m]ultiple IP flows belonging to different QoS classes may be served by the NT-WTRU links (e.g., each NT-WTRU link), where each IP flow may have different packet delay and/or throughput requirements." (EX1005, [0349]). Further, as depicted in Figure 2, the NT simultaneously communicates with multiple WTRUs performing transmission and reception of data. Petition at 52.
Grounds for Unpatentability: Claim 1(o)-(p)	p) <i>I[o]: wherein the wireless networking device's utilization of the available bandwidth of the first selected wireless transceiver does not prevent other wireless networking devices from utilizing a range of frequencies corresponding to the remaining portion of</i>	p) <i>I[o]: wherein the wireless networking device's utilization of the available bandwidth of the first selected wireless transceiver does not prevent other wireless networking devices from utilizing a range of frequencies corresponding to the remaining portion of the bandwidth availability of the first selected wireless transceiver for data transmission or reception purposes at the same time that data is being sent from the first selected wireless</i>

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	<i>the bandwidth availability of the first selected wireless transceiver for data transmission or reception purposes at the same time that data is being sent from the first selected wireless transceiver; and</i> <i>1[p]: wherein the wireless networking device's utilization of the available bandwidth of the second selected wireless transceiver does not prevent other wireless networking devices from utilizing a range of frequencies corresponding to the remaining portion of the bandwidth availability of the second selected wireless transceiver for data transmission or reception purposes at the same time that data is being received by the second selected wireless transceiver.</i> 138. In my opinion, Chincholi/Riggert discloses these two limitations. These two limitations are identical in that they require that each transceiver allow transmission or reception on bandwidth portions that are not being utilized by the first and second recipient. 139. Chincholi discloses examples of "multi-WTRU multi-IP flow cases." (EX1005 at [0328].) For example, "[a] system may comprise multiple WTRUs, a single NT, and multiple IP flows from the NT to one or more WTRUs." (EX1005 at [0328].) This is disclosed, for example in Figure 3. EX1002 ¶¶ 138-39 (identical figure omitted). 140. To manage data flows for multiple WTRUs, Chincholi teaches techniques for queuing packets according to their access categories and/or WTRU addresses and optimizing the distribution of packets of multiple streams for multiple WTRUs across multiple RATs. (EX1005 at [0351]-[0356].) For example, Chincholi discloses a MAC layer of a given transceiver may implement multiple transmission buffers, denoted Q_{ik}, where "i" refers to the WTRU for which a group of packets is designated and "k" refers to the IP flow associated with the group of packets. (EX1005 at [352].)	transceiver; and 1[p]: wherein the wireless networking device's utilization of the available bandwidth of the second selected wireless transceiver does not prevent other wireless networking devices from utilizing a range of frequencies corresponding to the remaining portion of the bandwidth availability of the second selected wireless transceiver for data transmission or reception purposes at the same time that data is being received by the second selected wireless transceiver. These two limitations are identical in that they require that each transceiver allow transmission or reception on bandwidth portions that are not being utilized by the first and second recipient. (EX1002, ¶138.) This is disclosed by Chincholi. Chincholi discloses examples of "multi-WTRU multi-IP flow cases." (EX1005, [0328].) For example, "[a] system may comprise multiple WTRUs, a single NT, and multiple IP flows from the NT to one or more WTRUs." (EX1005, [0328].) This is disclosed, for example in Figure 3. (EX1002, ¶139.) Petition at 52-53 (identical figure omitted). To manage data flows for multiple WTRUs, Chincholi teaches techniques for queuing packets according to their access categories and/or WTRU addresses and optimizing the distribution of packets of multiple streams for multiple WTRUs across multiple RATs. (EX1005, [0351]-[0356]; EX1002, ¶140.) For example, Chincholi discloses a MAC layer of a given transceiver may implement multiple transmission buffers, denoted Q_{ik}, where "i" refers to the WTRU for which a group of packets is designated and "k" refers to the IP flow associated with the group of packets. (EX1005, [352].)

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	141. Chincholi further discloses how utilization of the available transceiver bandwidth for one WTRU does not prevent other WTRUs from utilizing a range of frequencies corresponding to the remaining transceiver bandwidth at the same time. As discussed above, Chincholi's OMMA layer receives feedback metrics from each RAT. (EX1005 at [0161].) Amongst the feedback metrics are the "MAC Type," for example "OFDMA." (EX1005 at [0161] & Table 2.) OFDMA stands for "Orthogonal Frequency Division Multiple Access," which was a known wireless communication technique for dividing an available bandwidth into smaller subcarriers (i.e. frequency ranges) which are then allocated to different users. These subcarriers are described as orthogonal because they do not interfere with each other when simultaneously transmitted. A POSITA would have recognized that OFDMA techniques would allow multiple WTRUs to access different channels of the transceiver resources simultaneously and without interference. 142. Because Chincholi's RATs may provide feedback to the OMMA indicating that they are operating as an OFDMA MAC Type, a POSITA would have recognized that Chincholi discloses the capability to allow multiple WTRUs to simultaneously utilize different portions of a transceiver's available bandwidth. EX1002 ¶¶ 140-42.	Chincholi further discloses how utilization of the available transceiver bandwidth for one WTRU does not prevent other WTRUs from utilizing a range of frequencies corresponding to the remaining transceiver bandwidth at the same time. As discussed above, Chincholi's OMMA layer receives feedback metrics from each RAT. (EX1005, [0161].) Amongst the feedback metrics are the "MAC Type," for example "OFDMA." (EX1005, [0161] & Table 2.) OFDMA stands for "Orthogonal Frequency Division Multiple Access," which was a known wireless communication technique for dividing an available bandwidth into smaller subcarriers (i.e. frequency ranges) which are then allocated to different users. (EX1002, ¶141.) These subcarriers are described as orthogonal because they do not interfere with each other when simultaneously transmitted. A POSITA would have recognized that OFDMA techniques would allow multiple WTRUs to access different channels of the transceiver resources simultaneously and without interference. (EX1002, ¶141.) Because Chincholi's RATs may provide feedback to the OMMA indicating that they are operating as an OFDMA MAC Type, a POSITA would have recognized that Chincholi discloses the capability to allow multiple WTRUs to simultaneously utilize different portions of a transceiver's available bandwidth. (EX1002, ¶142.) Petition at 54-55.