

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Confirmation No.: 5656
First-Named Inventor: Manapragada, Sai C.
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Examiner: Khawar, Saad
Attorney Docket No.: 020505-000008
Title: METHOD AND APPARATUS FOR PROCESSING BANDWIDTH
INTENSIVE DATA STREAMS USING VIRTUAL MEDIA
ACCESS CONTROL AND PHYSICAL LAYERS

THIRD PRELIMINARY AMENDMENT

Please enter the following amendments and remarks in the above-mentioned patent application.

The Commissioner is authorized to charge any extensions of time as well as any additional fees or credit any overcharges to Deposit Account No. 23-3030, but not to include any payment of issue fees.

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 4 of this paper.

Remarks/Arguments begin on page 12 of this paper.

Amendments to the Specification

Please replace the paragraph beginning at page 6, paragraph 25, with the following rewritten paragraph:

[Clean Version]

[0025] In operation, and referring to FIG. 2, the wireless networking system generally determines an overall wireless bandwidth demand or requirement from one or more applications associated with the application layer 102, at 202. FIG. 1 illustrates one example, with Application A demanding a peak bandwidth of 450 Mbps, and Application D requiring a peak bandwidth of 750 Mbps. At 204, the process layer 104 determines available resources in the actual MAC and PHY layers 114 and 116, and allocates the available resources to satisfy the bandwidth demands, at 206.

[Marked-up Version]

[0025] In operation, and referring to FIG. 2, the wireless networking system generally determines an overall wireless bandwidth demand or requirement from one or more applications associated with the application layer 102, at 202. FIG. 1 illustrates one example, with Application A demanding a peak bandwidth of 450 Mbps, and Application D requiring a peak bandwidth of 7[[4]]50 Mbps. At 204, the process layer 104 determines available resources in the actual MAC and PHY layers 114 and 116, and allocates the available resources to satisfy the bandwidth demands, at 206.

Please replace the paragraph beginning at page 15, paragraph 54, with the following rewritten paragraph:

[Clean Version]

[0054] Thus, for the example shown in FIG. 11, the first local user 958 within the coverage of the first node may need bandwidth that may be sufficiently provided by transceiver A1 alone. The second local user 960, positioned within the vicinity of both the first and second nodes, may be assigned transceiver A2 from the first node, and transceiver B2 from the second node, thereby having access to twice the bandwidth. Other examples may involve partial transceiver allocations, where a portion of the transceiver bandwidth is allocated to a first user, and a second portion of the bandwidth allocated to a second user.

[Marked-up Version]

[0054] Thus, for the example shown in FIG. 11, the first local user 958[[7]] within the coverage of the first node may need bandwidth that may be sufficiently provided by transceiver A1 alone. The second local user 960, positioned within the vicinity of both the first and second nodes, may be assigned transceiver A2 from the first node, and transceiver B2 from the second node, thereby having access to twice the bandwidth. Other examples may involve partial transceiver allocations, where a portion of the transceiver bandwidth is allocated to a first user, and a second portion of the bandwidth allocated to a second user.

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) A method of improving the performance of a wireless networking device, comprising the steps of:

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;

connecting first, second and third actual MAC interfaces to the processing interface;

connecting first, second and third actual PHY interfaces respectively to the first, second and third actual MAC interfaces;

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;

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;

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) respectively request or create first, second and third associations between a first recipient and the first, second and third actual MAC and PHY interfaces,

(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,

(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

(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;

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) 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,

(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;

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;

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 transceiver; and

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.

2. (Original) The method of claim 1, wherein the first virtual PHY interface is not contiguous with the virtual MAC interface.
3. (Original) The method of claim 1, wherein the second virtual PHY interface is not contiguous with the virtual MAC interface.
4. (Original) The method of claim 1, wherein the third virtual PHY interface is not contiguous with the virtual MAC interface.
5. (Original) The method of claim 1, wherein the first virtual PHY interface includes an RF block.
6. (Original) The method of claim 1, wherein the second virtual PHY interface includes an RF block.
7. (Original) The method of claim 1, wherein the third virtual PHY interface includes an RF block.
8. (Original) The method of claim 1, wherein the virtual MAC interface includes a decision block.
9. (Original) The method of claim 1, wherein the virtual MAC interface includes a processing block.
10. (Original) The method of claim 1, wherein the virtual MAC interface includes an ultra-streaming block.
11. (Original) The method of claim 1, wherein the processing interface comprises multiple virtual MAC interfaces.

12. (Original) The method of claim 1, wherein the processing interface includes a bandwidth allocator.

13. (Previously Presented) The method of claim 1, wherein the portion of the bandwidth available for communication of the first selected wireless transceiver comprises a single portion.

14. (Previously Presented) The method of claim 1, wherein the portion of the bandwidth available for communication of the first selected wireless transceiver is contiguous.

15. (Previously Presented) The method of claim 1, wherein the portion of the bandwidth available for communication of the second selected wireless transceiver comprises a single portion.

16. (Previously Presented) The method of claim 1, wherein the portion of the bandwidth available for communication of the second selected wireless transceiver is contiguous.

17-20. (Canceled)

21. (Previously Presented) The method of claim 1, wherein at least two of the first, second and third frequency bands are specified in at least one member of the family of IEEE 802.11 standards in existence as of October 30, 2013.

22. (Canceled)

23. (Previously Presented) The method of claim 1, wherein the wireless networking device comprises a wireless access point.

24-25. (Cancelled)

26. (Currently Amended) The method of claim 40 ~~[[1]]~~,

wherein the application interface is associated with a second application, the second application providing, when the wireless networking device is being used, a second data stream and having a second wireless bandwidth requirement;

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) prepare the first and second data streams for simultaneous transmission to the 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

(ii) cause the prepared first and second data streams to be simultaneously transmitted from the first selected wireless transceiver to thereby at least partially satisfy the first and second wireless bandwidth requirements of the first and second applications.

27. (Currently Amended) The method of claim 1 ~~26~~,

wherein, if the identified portion of the bandwidth of the first selected wireless transceiver becomes unavailable during use of the wireless networking device or if the first selected wireless transceiver has an unidentified portion of bandwidth availability that is greater than the identified portion of bandwidth availability of the first selected wireless transceiver during use of the wireless networking device, the processing interface is configured to, as a result of the unavailability or the increased bandwidth availability and in a manner transparent to any layer of the wireless networking device above the processing interface,

(i) identify at least one new portion of the bandwidth of the first selected wireless transceiver that is available for communication,

(ii) prepare the first ~~and second~~ data stream[[s]], without requiring the disassociation of the recipient from the actual MAC and PHY interfaces associated with any wireless transceiver, for transmission to the recipient from the first selected wireless transceiver using a specific subset of frequencies corresponding to the new portion of available bandwidth of the first selected wireless transceiver, and

(iii) cause the prepared first ~~and second~~ data stream[[s]] to be transmitted to the recipient from the first selected wireless transceiver, without requiring the disassociation

of the recipient from the actual MAC and PHY interfaces of any wireless transceiver, to thereby continue to at least partially satisfy the first and second wireless bandwidth requirements of the first and second applications.

28-29. (Canceled)

30. (Previously Presented) The method of claim 27,

wherein, if the identified portion of the bandwidth of the second selected wireless transceiver becomes unavailable during use of the wireless networking device or if the second selected wireless transceiver has an unidentified portion of bandwidth availability that is greater than the identified portion of bandwidth availability of the second selected wireless transceiver during use of the wireless networking device, the processing interface is configured to, as a result of the unavailability or the increased bandwidth availability and in a manner transparent to any layer of the wireless networking device above the processing interface,

(i) identify at least one new portion of the bandwidth of the second selected wireless transceiver that is available for communication, and

(ii) receive the data stream transmitted by the second recipient using a specific subset of frequencies corresponding to the new portion of available bandwidth of the second selected wireless transceiver, without requiring the disassociation of the recipient from the actual MAC and PHY interfaces of any wireless transceiver, to thereby continue to at least partially satisfy a bandwidth requirement associated with the data stream transmitted by the recipient to the wireless networking device.

31-33. (Canceled)

34. (Previously Presented) The method of claim 1, wherein the transmission of the first data stream to the first recipient occurs simultaneously with reception of the data stream transmitted from the second recipient.

35. (Currently Amended) The method of claim 30 ~~[[34]]~~,

further comprising the step of coupling first and second buffer memories respectively to the first and second actual PHY interfaces ~~layers~~,
wherein the first buffer memory is configured to, during use of the wireless networking device, store data prior to its actual transmission to the first recipient,
wherein the second buffer memory is configured to, during use of the wireless networking device, store data that is transmitted to the wireless networking device from the second recipient, and
wherein the capacity of the first and second buffer memories are programmable during use of the wireless networking device.

36. (Previously Presented) The method of claim 35, wherein each of the first and second buffer memories comprises a programmable register.

37. (Currently Amended) The method of claim 30 ~~35~~, 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, respectively request or create fourth, fifth and sixth associations between the second recipient and the first, second and third actual MAC and PHY interfaces without requiring the wireless networking device to break any of the first, second or third associations.

38. (Previously Presented) The method of claim 37, wherein the first and second recipients comprise the same device.

39. (Currently Amended) The method of claim 30 ~~37~~, wherein, during use of the wireless networking device, at least one portion of the available bandwidth of the ~~a third wireless transceiver of the first, second and third wireless transceiver~~ ~~[[s]]~~ is aggregated with the identified portion of the available bandwidth of the first selected wireless transceiver to transmit the prepared first data stream to the first recipient.

40. (Currently Amended) The method of claim 39 ~~37~~, wherein, during use of the wireless networking device, at least one portion of the available bandwidth of the ~~a third wireless~~

~~transceiver of the first, second and third wireless transceiver~~[[s]] is aggregated with the identified portion of the available bandwidth of the second selected wireless transceiver to receive the data stream transmitted from the second recipient.

41. (Previously Presented) The method of claim 40, wherein the selected first selected wireless transceiver is configured to receive a data stream at the same time as when the first selected wireless transceiver is configured to transmit a data stream.

42. (Previously Presented) The method of claim 40, wherein the second selected wireless transceiver is configured to receive a data stream at the same time as when the second selected wireless transceiver is configured to transmit a data stream.

REMARKS

In view of the above amendments and the following remarks, reconsideration and further examination are respectfully requested.

Status of All of the Claims

Below is the status of the claims in this application.

1. Claim(s) pending: 1-16, 21, 23, 26-27, 30, and 34-42.
2. Claim(s) canceled: 17-20, 22, 24-25, 28-29, and 31-33.
3. Claim(s) added: none.
4. Claims withdrawn from consideration but not canceled: none.

Claim and Specification Amendments

It is believed that the above-identified amended claims are supported by the application as originally filed. In particular, the amendments revise certain dependencies of claims which were previously considered allowable and make minor revisions to the terminology of claims 35, 39, and 40 to align with the language of other claims. The specification has been amended to correct minor typographical errors. No new matter has been introduced.

Information Disclosure and Patentability

An IDS is being filed herewith to cite additional prior art that is believed to be cumulative of prior art previously considered by the Examiner. For example, the provisional application that resulted in U.S. Patent No. 9516540 was filed sixteen days before the 10/20/2013 priority filings of the instant application. The '540 patent and its provisional operate in a manner substantially similar to U.S. Patent No. 9560656 that was considered by the Examiner during prosecution of the present application and other related applications which have recently issued. A short analysis in support of this conclusion follows.

Just like the '656 patent, the '540 patent and its provisional do not disclose, teach, or suggest, for example, a virtual MAC layer and a virtual PHY layer for each band providing feedback to the virtual MAC regarding bandwidth availabilities at each PHY layer. For this reason, for example, and unlike the inventions claimed in the instant application, both the '540 patent, its provisional, and the '656 patent require that routing decisions be made at a layer above

the MAC/PHY layer. As a result of this, those decisions are not made in a manner transparent to the layers above the MAC/PHY layer as required by the claims of the instant application. The Examiner's confirmation that the amended claims are patentable over the additional art submitted herewith is respectfully requested.

The term "Upper MAC" is used in the newly cited art such as, for example, in Figures 5A-5B of the '540 patent. It should be noted that that "upper MAC" is not a "virtual MAC" as claimed herein. A person of ordinary skill in the art would understand that one reason for this is that, for example, the claimed "virtual MAC" utilizes a virtual MAC address and allows for bandwidth allocation decisions to be made in a manner transparent to the layers above the MAC/PHY layers. On the other hand, the "upper MAC" in the '540 patent and the other newly cited references is not capable of this as all the allocations decisions are made by upper layers and, therefore, are not transparent to those upper layers as required by the pending claims. Making routing decisions at higher layers necessarily introduces significant latency and lowers throughput as compared to the inventions claimed in this application and its related family of patents. In this regard, please note that the '540 patent utilizes the word "latency" only once at col. 12, line 24 to describe a requirement of "gaming devices." The '540 patent does not discuss "latency" or a decrease thereof in connection with utilizing the wireless communication methods described therein. This is additional confirmation that the newly cited art and, especially the '540 patent, is, at worst, cumulative of the art the Examiner already considered.

Conclusion

If after reviewing this amendment the Examiner feels that any issues remain which must be resolved before the application can be passed to issue, the Examiner is invited to contact the undersigned representative to resolve such issues.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Confirmation No.: 5656
First-Named Inventor: Manapragada, Sai C.
Filing Date: September 20, 2023
Group Art Unit: 2412
Examiner: Khawar, Saad
Attorney Docket No.: 020505-000008
Title: METHOD AND APPARATUS FOR PROCESSING BANDWIDTH
INTENSIVE DATA STREAMS USING VIRTUAL MEDIA
ACCESS CONTROL AND PHYSICAL LAYERS

FOURTH PRELIMINARY AMENDMENT

Please enter the following amendments and remarks in the above-mentioned patent application.

The Commissioner is authorized to charge any extensions of time as well as any additional fees or credit any overcharges to Deposit Account No. 23-3030, but not to include any payment of issue fees.

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 10 of this paper.

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-42. (Cancelled).

43. (New) A method of improving the performance of a wireless networking device, comprising the steps of:

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;

connecting first and second actual MAC interfaces to the processing interface;
connecting first and second actual PHY interfaces respectively to the first and second actual MAC interfaces;

associating first and second wireless transceivers respectively with the first and second actual PHY interfaces, wherein each of the first and second wireless transceivers (i) is suitable for use in a wireless local area network, (ii) has a first and second bandwidth availability up to first and second actual bandwidths, and (iii) is adapted to emit radio waves in first and second bands of frequencies, the first and second frequency bands being different from each other;

forming in the processing interface (i) at least one virtual MAC interface and (ii) first and second virtual PHY interfaces that, during operation of the wireless networking device, feed information regarding the bandwidth availabilities of the first and second wireless transceivers back to the at least one virtual MAC interface;

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,

(a) respectively request or create first and second associations between a recipient and the first and second actual MAC and PHY interfaces,

(b) identify at least one first portion of bandwidth available for communication of the first wireless transceiver and at least one first portion of the bandwidth available for communication of the second wireless transceiver, the identified at least one first portions of the first and second wireless transceivers each comprising a set of given resources,

(c) evaluate whether any of the given resources of the at least one first identified portions of the first and second wireless transceivers are not unavailable for communication,

(d) use the first wireless transceiver to transmit the first data stream to the recipient, without requiring disassociation of either or both of the first and second associations, using a specific subset of frequencies corresponding to the given resources of the identified at least one first bandwidth portion of the first wireless transceiver that are not unavailable for communication to thereby at least partially satisfy the first wireless bandwidth requirement of the first application, and

(e) use the second wireless transceiver to receive a second data stream from the recipient at least partially simultaneously with the first data stream being transmitted to the recipient from the first wireless transceiver, without requiring disassociation of either or both of the first and second associations, using a specific subset of frequencies corresponding to only the given resources of the identified at least one first bandwidth portion of the second wireless transceiver that are not unavailable for communication to thereby at least partially satisfy a second wireless bandwidth requirement associated with the second data stream; and

wherein the wireless networking device's utilization of the at least one first bandwidth portions of the first and second wireless transceivers does not prevent any wireless networking device from utilizing a range of frequencies corresponding to the remaining portion of the bandwidth availabilities of the first and second wireless transceivers for data transmission or reception purposes at the same time that data is being transmitted from or received by the first and second wireless transceivers.

44. (New) The method of claim 43, wherein the second data stream is received by the second wireless transceiver substantially simultaneously with the transmission of the first data stream from the first wireless transceiver.

45. (New) The method of claim 43, wherein the start of the reception of the second data stream by the second wireless transceiver is substantially simultaneous with the start of the transmission of the first data stream from the first wireless transceiver.

46. (New) The method of claim 43, wherein the end of the reception of the second data stream by the second wireless transceiver is substantially simultaneous with the end of the transmission of the first data stream from the first wireless transceiver.

47. (New) The method of claim 43, wherein the wireless networking device comprises a wireless access point.

48. (New) The method of claim 43, wherein the first and second frequency bands are specified in at least one member of the family of IEEE 802.11 standards that was in existence as of October 30, 2013.

49. (New) The method of claim 43, wherein the at least one virtual MAC interface includes a decision block.

50. (New) The method of claim 43, wherein the at least one virtual MAC interface includes a processing block.

51. (New) The method of claim 43, wherein the at least one virtual MAC interface includes an ultra-streaming block.

52. (New) The method of claim 43, wherein the first virtual PHY interface includes an RF block.

53. (New) The method of claim 43, wherein the second virtual PHY interface includes an RF block.

54. (New) The method of claim 43, wherein the processing interface comprises multiple virtual MAC interfaces.

55. (New) The method of claim 43, wherein the processing interface includes a bandwidth allocator.

56. (New) The method of claim 43, wherein the first identified actual bandwidth portion of the first wireless transceiver is contiguous.

57. (New) The method of claim 43, wherein the first identified actual bandwidth portion of the second wireless transceiver is contiguous.

58. (New) The method of claim 43, wherein the first virtual PHY interface is not contiguous with the at least one virtual MAC interface.

59. (New) The method of claim 43, wherein the second virtual PHY interface is not contiguous with the at least one virtual MAC interface.

60. (New) The method of claim 43,
wherein the processing interface is configured to, when the wireless networking device is being used, and in a manner transparent to any layer of the wireless networking device above the processing interface,

(a) identify at least one second portion of the first actual bandwidth of the first wireless transceiver, the identified second bandwidth portion comprising a set of given resources, the first and second identified actual bandwidth portions not being contiguous with each other,

(b) evaluate whether any of the given resources of the second identified actual bandwidth portion are unavailable for communication, and

(c) use the first wireless transceiver to transmit the first data stream to the recipient, without requiring disassociation of the recipient from either or both of the first and second actual MAC and PHY interfaces, using a subset of frequencies corresponding to only the

given resources of the first and second bandwidth portions that are not unavailable for communication to thereby at least partially satisfy the first wireless bandwidth requirement of the first application.

61. (New) The method of claim 60, wherein the second identified actual bandwidth portion of the first wireless transceiver is contiguous.

62. (New) The method of claim 60,
wherein the processing interface is configured to, when the wireless networking device is being used, and in a manner transparent to any layer of the wireless networking device above the processing interface,

(a) identify at least one second portion of the second actual bandwidth of the second wireless transceiver, the identified second bandwidth portion comprising a set of given resources, the first and second identified actual bandwidth portions of the second wireless transceiver not being contiguous with each other,

(b) evaluate whether any of the given resources of the second identified actual bandwidth portion of the second wireless transceiver are unavailable for communication, and

(c) use the second wireless transceiver to receive the second data stream from the recipient, without requiring disassociation of the recipient from either or both of the first and second actual MAC and PHY interfaces, using a subset of frequencies corresponding to only the given resources of the first and second bandwidth portions of the second wireless transceiver that are not unavailable for communication to thereby at least partially satisfy the second wireless bandwidth requirement associated with the second data stream.

63. (New) The method of claim 62, wherein the second identified actual bandwidth portion of the second wireless transceiver is contiguous.

64. (New) The method of claim 62, wherein the processing interface is configured to, when the wireless networking device is being used, and in a manner transparent to any layer of the wireless networking device above the processing interface,

(a) if all of the given resources of the first and second identified bandwidth portions of the first wireless transceiver are unavailable, identify at least one third portion of the first actual bandwidth of the first wireless transceiver, the third identified bandwidth portion comprising a set of given resources,

(b) evaluate whether any of the given resources of the third identified bandwidth portion are unavailable for communication, and

(c) use the first wireless transceiver to transmit the first data stream to the recipient, without requiring disassociation of the recipient from either or both of the first and second actual MAC and PHY interfaces, using a subset of frequencies corresponding to only the given resources of the third identified bandwidth portion that are not unavailable for communication to thereby at least partially satisfy the first wireless bandwidth requirement of the first application.

65. (New) The method of claim 64, wherein the processing interface is configured to, when the wireless networking device is being used, and in a manner transparent to any layer of the wireless networking device above the processing interface,

(a) if all of the given resources of the first and second actual bandwidth portions of the second wireless transceiver are unavailable, identify at least one third portion of the actual bandwidth of the second wireless transceiver, the third identified bandwidth portion comprising a set of given resources,

(b) evaluate whether any of the given resources of the third identified bandwidth portion are unavailable for communication, and

(c) use the second wireless transceiver to receive the second data stream from the recipient, without requiring disassociation of the recipient from either or both of the first and second actual MAC and PHY interfaces, using a subset of frequencies corresponding to only the given resources of the third identified bandwidth portion that are not unavailable for communication to thereby at least partially satisfy the second bandwidth requirement.

66. (New) The method of claim 43, further comprising the steps of
connecting a third actual MAC interface to the processing interface;

connecting a third actual PHY interface respectively to the third actual MAC interface;

associating a third wireless transceiver with the third actual PHY interface, wherein the third wireless transceiver (i) is suitable for use in a wireless local area network, (ii) has a third bandwidth availability up to a third actual bandwidth, and (iii) is adapted to emit radio waves in a third band of frequencies; and

forming in the processing interface a third virtual PHY interface that, during operation of the wireless networking device, feeds information regarding the bandwidth availabilities of the third wireless transceiver back to the at least one virtual MAC interface.

67. (New) The method of claim 66, wherein the processing interface is configured to, when the wireless networking device is being used, and in a manner transparent to any layer of the wireless networking device above the processing interface, aggregate a first identified actual bandwidth portion of the third wireless transceiver with the identified first portion of available bandwidth of the first wireless transceiver to at least partially simultaneously transmit the first data stream to the first recipient from the first and third wireless transceivers.

68. (New) The method of claim 66, wherein the processing interface is configured to, when the wireless networking device is being used, and in a manner transparent to any layer of the wireless networking device above the processing interface, aggregate a first identified actual bandwidth portion of the third wireless transceiver with the identified first portion of available bandwidth of the second wireless transceiver to at least partially simultaneously receive the second data stream from the recipient.

69. (New) The method of claim 66, wherein the third frequency band is specified in at least one member of the family of IEEE 802.11 standards that was in existence as of October 30, 2013.

70. (New) The method of claim 66, wherein the first identified actual bandwidth portion of the third wireless transceiver is contiguous.

71. (New) The method of claim 66, wherein the third virtual PHY interface is not contiguous with the at least one virtual MAC interface.

REMARKS

Please enter the amendments presented above.

Status of All of the Claims

Below is the status of the claims in this application.

1. Claim(s) pending: 43-71.
2. Claim(s) canceled: 1-42.
3. Claims(s) amended: none.
4. Claim(s) added: 43-71.
5. Claims withdrawn from consideration but not canceled: None.

Claim Support & Amendments

It is believed that the above-identified new claims are supported by the application as originally filed including priority to two provisional applications that were filed on October 30, 2013. See, for example, Figure 1 of the application as filed which is included in the 10/30/2013 provisional, Ser. No. 61/897,216. See also, for example, the priority charts that were included in a response filed in application Ser. No. 17/468,509 on 8/8/2023.

The amended claims are substantially similar to the subject matter of claims previously on file but revised to present some features more concisely. Furthermore, the independent claim 43 is narrower in scope to specify that the methods employ simultaneous transmission and reception “using a specific subset of frequencies... that are not unavailable” for both the first and second wireless transceivers.

Patentability

The amended claims presented herewith generally relate to a method of improving the performance of a wireless networking device (*e.g.*, an access point or a smartphone or a tablet) that is provided, when it is manufactured, with the ability to transmit a first data stream to a recipient using a first wireless transceiver at least partially simultaneously with the reception of a second data stream received by the wireless networking device from the recipient.

It is respectfully submitted that the claims presented herein are patentable for at least the same reasons that the previously pending claims are patentable as stated in the last preliminary

amendment and related cases. These reasons include, for example, the inclusion of a processing interface having at least one virtual MAC interface and a virtual PHY interface for each band providing feedback to the at least one virtual MAC during operation about bandwidth availabilities for each band, as well as a requirement that all of the claimed operations of the wireless networking device take place in a manner transparent to the layers of the wireless networking device above its MAC/PHY interfaces. The Examiner's confirmation of this and cooperation in connection with issuing a Notice of Allowance are respectfully requested.

Conclusion

If after reviewing this amendment the Examiner feels that any issues remain which must be resolved before the application can be passed to allowance, the Examiner is invited to contact the undersigned representative to resolve such issues.

Respectfully submitted,

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