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IN THE U.S. PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application of:

APPLICANTS: Kari P. Pajukoski et al.

SERIAL NO.: 14/051,646 FILING DATE: October 11, 2013

EXAMINER: Thompson, Jr, Otis L ART UNIT: 2477

ATTORNEY'S DOCKET NO.: 863.0076.U2 (US)

TITLE: PROVIDING IMPROVED SCHEDULING REQUEST SIGNALING WITH  
ACK/NACK OR CQI

Mail Stop Amendment.  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**RESPONSE TO OFFICE ACTION**

This paper is herewith filed in response to the Examiner's Office Action mailed on August 1, 2014 for the above-captioned U.S. Patent Application. This Response is filed within two months following the shortened statutory period for reply recited in the referenced Office Action. Please consider this as a petition for an extension of time necessary to effect this Response, and charge Deposit Account No. 50-1924 (\$600) for an extension of time fee. However, should the undersigned attorney be mistaken, please consider this a petition for any extension of time that may be required to maintain the pendency of this Patent Application, and charge deposit account no. 50-1924 for any required fee deficiency.

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**IPR2017-1540**  
**Huawei v. NSN**

**AMENDMENTS TO THE CLAIMS:**

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

**Listing of Claims:**

1. (Currently Amended) A method comprising:

determining that an acknowledgment is to be sent on a physical uplink control channel where transmission of the acknowledgment on the physical uplink control channel comprises an unmodulated sequence in addition to the acknowledgement; and

for [[the]] a case where there is also a scheduling request to be sent, combining the acknowledgment with the scheduling request on a scheduling resource,

else placing the acknowledgment in another resource.

2. (Original) The method of claim 1, comprising:

for the case where there is also the scheduling request to be sent, transmitting the acknowledgment with the scheduling request on the scheduling resource.

3. (Previously Presented) The method of claim 1, comprising:

for a case where a channel quality indicator is also to be sent, the channel quality indicator is not sent and the another resource is unused.

4. (Previously Presented) The method of claim 1, where the another resource is a data-non-associated resource.

5. (Original) The method of claim 2, where the transmitting is on a physical uplink control channel.

6. (Previously Presented) The method of claim 2, where the transmitting is on an uplink.

7. (Currently Amended) The method of claim 1, where the transmission of the acknowledgment comprises an unmodulated sequence 1 and a BPSK/QPSK modulated sequence 2.

8. (Cancelled)

9. (Previously Presented) The method of claim 1 implemented in a wireless communications network.

10. (Previously Presented) The method of claim 1 implemented in an evolved universal terrestrial radio access network.

11. (Currently Amended) A non-transitory computer readable medium encoded with a computer program executable by a processor to perform actions comprising:

determining that an acknowledgment is to be sent on a physical uplink control channel, where transmission of the acknowledgement on the physical uplink control channel comprises an unmodulated sequence in addition to the acknowledgement; and

for [[the]] a case where there is also a scheduling request to be sent, combining the acknowledgment with the scheduling request on a scheduling resource,

else placing the acknowledgment in another resource.

12. (Currently Amended) The non-transitory computer readable medium encoded with a computer program of claim 11, comprising:

for the case where there is also the scheduling request to be sent, transmitting the acknowledgment with the scheduling request on the scheduling resource.

13. (Currently Amended) The non-transitory computer readable medium encoded with a computer program of claim 11, comprising:

for a case where a channel quality indicator is also to be sent, the channel quality indicator is not sent and the another resource is unused.

14. (Currently Amended) The non-transitory computer readable medium encoded with a computer program of claim 11, where the another resource is a data-non-associated resource.

15. (Currently Amended) An apparatus comprising:

at least one processor; and

at least one memory including computer program code, where the at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus to at least:

a processor configured to determine that an acknowledgment is to be sent on a physical uplink control channel, where transmission of the acknowledgement on the physical uplink control channel comprises an unmodulated sequence in addition to the acknowledgement; and

the processor further configured to, for [[the]] a case where there is also a scheduling request to be sent, combine the acknowledgment with the scheduling request on a scheduling resource,

else placing the acknowledgment in another resource.

16. (Currently Amended) The apparatus of claim 15, ~~comprising:~~

~~a transmitter configured to~~ where the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus, for the case where there is also the scheduling request to be sent, to transmit the acknowledgment with the scheduling request on the scheduling resource.

17. (Currently Amended) The apparatus of claim 15 ~~comprising:~~

~~the processor further configured to~~ where the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus, for a case where a channel quality indicator is also to be sent, to drop the channel quality indicator such that it is not sent and the another resource is unused.

18. (Previously Presented) The apparatus of claim 15, where the another resource is a data-non-associated resource.

19. (Currently Amended) The apparatus of claim 16, where the ~~transmitter is configured to transmit~~ the acknowledgment with the scheduling request is transmitted on a physical uplink control channel.

20. (Previously Presented) The apparatus of claim 16, where the transmitter is configured to transmit the acknowledgment with the scheduling request on an uplink.

21. (Currently Amended) The apparatus of claim 15, where the transmission of the acknowledgment comprises an unmodulated sequence 1 and a BPSK/QPSK modulated sequence 2.

22. (Previously Presented) The apparatus of claim 15, embodied in a user equipment.

23. (Previously Presented) The apparatus of claim 15, configured to operate in a wireless communications network.

24. (Previously Presented) The apparatus of claim 15 configured to operate in an evolved universal terrestrial radio access network.

25. – 34. (Cancelled)

35. (Currently Amended) A method comprising:

receiving information on a scheduling resource; and

determining that the information received on the scheduling resource comprises an acknowledgment transmission, where the acknowledgement transmission comprises an unmodulated sequence in addition to the acknowledgement.

36. (Original) The method of claim 35, comprising

responding accordingly to the determining that the information received on the scheduling resource comprises the acknowledgment.

37. (Previously Presented) The method of claim 35 where the information is received on a physical uplink control channel.

38. (Previously Presented) The method of claim 35 where the information is received from a wireless communications network.

39. (Previously Presented) The method of claim 31 where the information is received from an evolved universal terrestrial radio access network.

40. (Currently Amended) A non-transitory computer readable medium encoded with a computer program executable by a processor to perform actions comprising:

receiving information on a scheduling resource; and

determining that the information received on the scheduling resource comprises an acknowledgment transmission, where the transmission comprises an unmodulated sequence in addition to the acknowledgement.

41. (Currently Amended) The non-transitory computer readable medium encoded with a computer program of claim 40, comprising

responding accordingly to the determining that the information received on the scheduling resource comprises the acknowledgment

42. (Currently Amended) An apparatus comprising:

~~a receiver;~~

~~the receiver configured to~~ at least one processor; and

at least one memory including computer program code, where the at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus to at least:

receive information on a scheduling resource; and

~~a processor configured to determine that the information received on the scheduling resource comprises an acknowledgment transmission, where the acknowledgement transmission comprises an unmodulated sequence in addition to the acknowledgment.~~

43. (Currently Amended) The apparatus of claim 42 ~~further comprising:~~

~~a transmitter;~~

~~the transmitter and the processor responding where the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to respond accordingly to the determining that the information received on the scheduling resource comprises the acknowledgment transmission.~~

44. (Currently Amended) The apparatus of claim 42 where the ~~receiver is further configured at~~ least one memory including the computer program code is configured with the at least one processor to cause the apparatus to receive the information on a physical uplink control channel.

45. (Currently Amended) The apparatus of claim 42 where the ~~receiver is further configured at~~ least one memory including the computer program code is configured with the at least one processor to cause the apparatus to receive the information from a wireless communications network.

46. (Currently Amended) The apparatus of claim 42 where the ~~receiver is further configured at~~ least one memory including the computer program code is configured with the at least one processor to cause the apparatus to receive the information from an evolved universal terrestrial radio access network.

47. – 49. (Cancelled) ~~An apparatus comprising:~~

~~means for receiving information on a scheduling resource; and~~



~~\_\_\_\_\_ means for determining that the information received on the scheduling resource comprises an acknowledgment.~~

48. ~~(Original) The apparatus of claim 47, comprising~~

~~\_\_\_\_\_ means for responding accordingly to the determining that the information received on the scheduling resource comprises the acknowledgment.~~

49. ~~(Previously Presented) The apparatus of claim 46 where the means for receiving comprises a receiver; the means for determining comprises a processor; and the means for responding comprises a transmitter.~~

50. (Currently Amended) A method comprising:

determining that a scheduling request resource and at least one other resource are reserved for a user equipment in a same sub-frame; and

based on whether a scheduling request is desired to be transmitted by the user equipment, placing at least one of an acknowledgment/negative acknowledgement and a channel quality indicator that is desired to be transmitted by the user equipment in one of the resources and leaving at least one other resource unused, where the transmission comprises an unmodulated sequence in addition to the acknowledgement.

51. (Original) The method of claim 50, where the scheduling request resource and the at least one other resource are physical uplink control channel resources.

52. (Currently Amended) The method of claim 50 comprising:

for ~~[[the]]~~ a case where the user equipment desires to transmit a scheduling request and transmit an acknowledgment/negative acknowledgement, transmitting the

acknowledgment/negative acknowledgement with the scheduling request on the scheduling request resource and leaving the at least one other resource unused; or

for [[the]] a case where the user equipment does not desire to transmit a scheduling request and does desire to transmit an acknowledgment/negative acknowledgement, transmitting the acknowledgment/negative acknowledgement on the at least one other resource and leaving the scheduling request resource unused.

53. (Currently Amended) The method of claim 50 comprising:

for [[the]] a case where the user equipment desires to transmit a scheduling request and a channel quality indicator but no acknowledgment/negative acknowledgement, transmitting the scheduling request on the scheduling request resource and not transmitting the channel quality indicator leaving the at least one other resource unused.

54. (Currently Amended) The method of claim 50 comprising:

for [[the]] a case where the user equipment desires to transmit a scheduling request, transmit a channel quality indicator, and transmit an acknowledgment/negative acknowledgement, transmitting the acknowledgment/negative acknowledgement with the scheduling request on the scheduling request resource and not transmitting the channel quality indicator leaving the at least one other resource unused; or

for [[the]] a case where the user equipment does not desire to transmit a scheduling request and does desire to transmit a channel quality indicator and an acknowledgment/negative acknowledgement, transmitting the acknowledgment/negative acknowledgement and the channel quality indicator on the at least one other resource and leaving the scheduling request resource unused.

55. (Previously Presented) The method of claim 50, where the scheduling request information is conveyed based on a selected physical uplink control channel selection.

56. (New) A method comprising:

determining that an acknowledgment transmission is to be sent; and

for a case where there is also a scheduling request to be sent, transmitting the acknowledgment with the scheduling request on a scheduling resource in an uplink, where there is no need to specify a separate modulation or multiplexing operation used for transmission of the acknowledgement with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource.

57. (New) The method of claim 56, comprising: transmitting the acknowledgment with the scheduling request on the scheduling resource.

58. (New) The method of claim 57, where the transmitting is on a physical uplink control channel.

59. (New) An apparatus comprising:

at least one processor; and

at least one memory including computer program code, where the at least one memory and the computer program code are configured, with the at least one processor, to cause the apparatus to at least:

determine that an acknowledgment transmission is to be sent; and

for a case where there is also a scheduling request to be sent, transmit the acknowledgment with the scheduling request on a scheduling resource in an uplink, where there is

no need to specify a separate modulation or multiplexing operation used for transmission of the acknowledgement with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource.

60. (New) The apparatus of claim 59, where the at least one memory including the computer program code is configured with the at least one processor to cause the apparatus to transmit the acknowledgment with the scheduling request on the scheduling resource.

61. (New) The apparatus of claim 59, where the transmitting is on a physical uplink control channel.

**REMARKS:**

This paper is herewith filed in response to the Examiner's Office Action mailed on August 1, 2014 for the above-captioned U.S. Patent Application. This office action is a rejection of claims 1-55 of the application.

More specifically, the Examiner has rejected claims 1, 3-4, 7, 9-10, 50-51 and 55 under 35 USC 101 asserting that the claimed invention is directed to non-statutory subject matter; rejected claims 1-34 and 52-54 under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention; rejected claims 1-2, 4-12, 14-16, 18-26, 28-52 and 55 under 35 USC 102(e) as anticipated by Bachl (US20080316959); and rejected claims 3, 13, 17, 27 and 53-54 under 35 USC 103(a) as being unpatentable over Bachl and further in view of Papasakellariou (US2009002135). The Applicant respectfully traverses the rejection.

Claims 1, 7, 11-17, 19, 21, 35, 40-46, 50, and 52-54 have been amended. Claims 56-61 have been added. Claims 25-34, and 47-49 are cancelled. Support for the amendments can be found at least in paragraphs [0036] and [0055] of the application as filed. No new matter is added.

**Rejections under 35 USC 101**

Regarding the rejection under 35 USC 101 the Applicant's Representative kindly requests that the Examiner allow this rejection to be addressed at a later time. The Applicant's Representative is working with the client to identify a suitable response to the rejection. The Examiner is sincerely thanked for his consideration in this matter.

**Rejections under 35 USC 112, second paragraph**

Claims 1, 11, and 52-53 have been amended to address the rejection. The rejection under 35 USC 112, second paragraph, is seen to be overcome and the Examiner is requested to remove the

rejection.

**Rejection of Independent Claims 1, 11, 15, 35, 40, 42, and 50**

Although the rejections are not expressly or impliedly agree with, in order to facilitate the prosecution of this patent application towards allowance each of the independent claims 1, 11, 15, 35, 40, 42, and 50 have been amended in a somewhat similar fashion to recite features similar to claim 21. For example, claim 1 now recites:

A method comprising: determining that an acknowledgment is to be sent on a physical uplink control channel, where transmission of the acknowledgement on the physical uplink control channel comprises an unmodulated sequence in addition to the acknowledgement; and for a case where there is also a scheduling request to be sent, combining the acknowledgment with the scheduling request on a scheduling resource, else placing the acknowledgment in another resource

In accordance with an exemplary embodiment of the invention in an acknowledgment transmission is sent in a physical uplink control channel wherein the acknowledgement transmission includes an unmodulated sequence such as a demodulation reference signal sequence for Format 1/1a/1b in addition to an acknowledgment. Bachl does not anticipate at least these similar features as claimed in amended claim 1.

In the rejection of claim 21, now similarly incorporated into claim 1, the Examiner asserts:

*“Regarding claims 21 and 31, Bachl et al. discloses where the acknowledgment comprises an unmodulated sequence 1 and a BPSK/QPSK modulate sequence 2 (Paragraph 0032, wherein the ACK/NACK uses BPSK and QPSK modulation),” (emphasis added), (page 8 of the Office Action).*

First, it is respectfully noted that in the rejection the Examiner cites where Bachl discloses that the ACK/NACK uses BPSK and QPSK modulation. However, Bachl does not disclose a transmission of an acknowledgment on a physical uplink control channel which comprises an unmodulated sequence in addition to the acknowledgement.

Bachl as cited discloses:

“Referring back to FIG. 1, scheduling requests may also collide with other control information transmitted over the unscheduled uplink channel 130. For example, the mobile unit 110 may need to transmit a scheduling request over the unscheduled uplink channel 130 concurrently with transmitting an acknowledgment or non-acknowledgment message. The mobile unit 110 may therefore be able to transmit information indicative of the scheduling request and the other control information using the resources allocated for transmission of the other control information over the unscheduled uplink channel 130. For example, when the scheduling request collides with an acknowledgment or non-acknowledgment message, the mobile unit 110 may switch from the Binary Phase Shift Key (BPSK) modulation that is typically used to modulate the acknowledgment or non-acknowledgment message to a higher order modulation scheme such as Quadrature Phase Shift Key (QPSK) modulation. Using the higher order modulation scheme increases the size of the constellation of symbol values so that information indicative of both the scheduling request and the acknowledgement or non-acknowledgment message can be transmitted using the resources allocated for transmission of the acknowledgment or non-acknowledgment message without increasing the peak-to-average power ratio,” (emphasis added), (paragraph [0032]).

Here, Bachl discloses that when the scheduling request collides with an acknowledgment or non-acknowledgment message the mobile unit 110 may switch from BPSK modulation to QPSK modulation alleging that using the higher order modulation scheme the ack/nack messages can be transmitted without increasing a peak-to-average power ratio.

Bachl does not disclose that the ack/nack messages are transmitted where the transmission on a physical uplink control channel and where the transmission comprises an unmodulated sequence in addition to the ack/nack message. For at least these reasons Bachl does not disclose or suggest at least where amended claim 1 recites in part:

determining that an acknowledgment is to be sent on a physical uplink control channel, where transmission of the acknowledgement on the physical uplink control channel comprises an unmodulated sequence in addition to the acknowledgement; and for a case where there is also a scheduling request to be

sent, combining the acknowledgment with the scheduling request on a scheduling resource, else placing the acknowledgment in another resource

For at least these reasons the rejection of claim 1 should be removed and amended claim 1 should be allowed.

In addition, none of the references cited overcome at least the above stated shortfalls of Bachl.

### **Papasakellariou**

First it is noted that only the provisional applications 60/950,002 and 60/954,171 of Papasakellariou have a filing date earlier than the priority date October 30, 2007 of the instant application based on the filing date of the provisional application No. 61/001,207. The provisional application 60/954,171 of Papasakellariou was filed on January 8, 2008 whereas the provisional filing date of the pending application is October 30, 2007. It is submitted that none of the Papasakellariou provisional applications disclose or suggest at least where amended claim 1 recites in part:

determining that an acknowledgment is to be sent on a physical uplink control channel, where transmission of the acknowledgement on the physical uplink control channel comprises an unmodulated sequence in addition to the acknowledgement; and for a case where there is also a scheduling request to be sent, combining the acknowledgment with the scheduling request on a scheduling resource, else placing the acknowledgment in another resource

Thus, none of the Papasakellariou provisional applications can be seen to overcome at least the shortfalls of Bachl as stated above. Furthermore, it is noted that the Papasakellariou non-provisional application 2009/0022135 as cited in the rejection of claims 3, 13, 17, 27, and 53-54 (see page 16 of the Office Action) discloses:

“As described above in the background, the CQI transmission from a UE in a Physical Uplink Control CHannel (PUCCH), which is typically periodic in nature, may occur in the same sub-frame as the ACK/NACK signal transmission to



support Hybrid Automatic Repeat reQuest (HARQ) (HARQ-ACK) in response to a prior data reception by the UE in the downlink of the communication system. As the ACK/NACK signal transmission usually cannot be postponed, it is beneficial to multiplex it with the CQI signal transmission. Otherwise, the CQI signal transmission should be dropped, which may cause scheduling inefficiencies in the downlink of the communication system due to the absence of relevant CQI,” (emphasis added), (US20090022135 paragraph [0062]).

Although the rejection using Papasakellariou is not agreed to it is respectfully submitted that after a thorough review of each of the three provisional applications of Papasakellariou, as stated above, there cannot be found in any disclosure that the CQI is dropped, as asserted by the Examiner. For this reason alone the rejection is improper and the rejection should be removed.

Further, according to Papasakellariou, “Referring to FIG. 3, the CAZAC sequence 310 is generated through one of the previously described methods (modulated for transmission of CQI bits, un-modulated for RS transmission),” (paragraph [0018]). Thus, for at least these reasons Papasakellariou does not overcome the shortfalls of Bachl as stated above.

Further, it is submitted that the Examiner allow claims 3, 13, 17, 27, and 53-54 or else cite support for the rejection in an application which in its entirety predates the pending application. For these reasons alone the rejection using Papasakellariou should be removed. Therefore, for at least these reasons the Examiner is respectfully requested to remove the rejection and allow claim 1.

In addition, for similar reasons as stated above with regards to claim 1 the references cited do not disclose or suggest independent claims 11, 15, 35, 40, 42, and 50. Thus, for at least these reasons the Examiner is respectfully requested to remove the rejection and allow these claims.

#### **Regarding New Independent Claim 56**

It is respectfully submitted that for at least the reasons already stated none of the references cited disclose or suggest at least where new claim 56 recites in part:

determining that an acknowledgment transmission is to be sent; and for a case where there is also a scheduling request to be sent, transmitting the acknowledgment with the scheduling request on a scheduling resource in an uplink, where there is no need to specify a separate modulation or multiplexing operation used for transmission of the acknowledgement with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource

Therefore, the Examiner is respectfully requested to allow claim 56.

In addition, for similar reasons as stated above with regards to claim 56 the references cited do not disclose or suggest independent claim 59. Thus, for at least these reasons the Examiner is respectfully requested to allow claims 56 and 59.

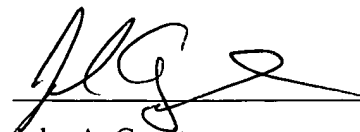
Further, for at least the reason that claims 2-5, 7, and 9; claims 12-14; claims 16-24; claims 36-39; claim 41, claims 43-46; claims 51-55; claims 57-58; and claims 60-61 depend from claims 1, 11, 15, 25, 35, 40, 42, 50, 59, and 59, respectively, the references cited do not disclose or suggest these claims.

Based on the above explanations and arguments, it is clear that the reference cited cannot be seen to disclose or suggest claims 1-7, 9-24, 35-46, and 50-61. The Examiner is respectfully requested to reconsider and remove the rejections of claims 1-7, 9-24, 35-46, and 50-61 and to allow all of the pending claims 1-7, 9-24, 35-46, and 50-61 as now presented for examination.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record. Should any unresolved issue remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

Respectfully submitted:

S.N.: 14/051,646  
Art Unit: 2477

  
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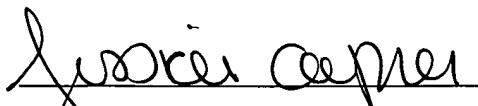
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