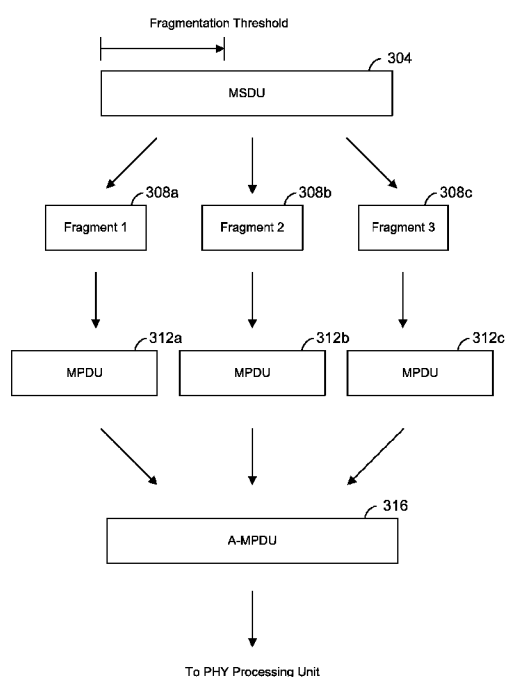




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| 61/494,609 | 8 June 2011 (08.06.2011) | US |
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- (75) **Inventor/Applicant (for US only):** **LIU, Yong** [CN/US]; 1625 Westmont Avenue, Campbell, CA 95008 (US).
- (74) **Agents:** **STANTON, Gregory, E.** et al.; Marshall, Gerstein & Borun LLP, 233 S. Wacker Drive, 6300 Willis Tower, Chicago, IL 60606-6357 (US).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
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[Continued on next page]

(54) **Title:** EFFICIENT TRANSMISSION FOR LOW DATA RATE WLAN**FIG. 5**

(57) **Abstract:** A network interface device utilizes a physical layer (PHY) protocol data unit (PPDU) maximum duration such that, (A) when operating in a first mode of operation, a data unit (i) defined by a protocol in a layer above a PHY protocol in a protocol stack and (ii) having a maximum length defined by the protocol above the PHY protocol will fit entirely within a single PPDU at a lowest possible data rate in the first mode of operation, and (B) when operating in a second mode of operation, the data unit (i) defined by the protocol in the layer above the PHY protocol and (ii) having the maximum length defined by the protocol above the PHY protocol will not fit entirely within a single PPDU at a lowest possible data rate in the second mode of operation.



EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the
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amendments (Rule 48.2(h))*

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7 March 2013

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/041629

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W28/06

ADD. H04W28/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/133427 A1 (CIMINI LEONARD JOSEPH [US] ET AL CIMINI JR LEONARD JOSEPH [US] ET AL) 17 July 2003 (2003-07-17) paragraph [0002] - paragraph [0006] paragraph [0027] - paragraph [0028] paragraph [0045] paragraph [0059] - paragraph [0063] -----	1-22, 75-90
Y	EP 2 144 409 A1 (RESEARCH IN MOTION LTD [CA]) 13 January 2010 (2010-01-13) paragraph [0002] - paragraph [0008] paragraph [0049] - paragraph [0055] -----	1-22, 75-90
Y	EP 1 315 355 A2 (EATON CORP [US]) 28 May 2003 (2003-05-28) column 2 - column 5 paragraph [0035] - paragraph [0040] ----- -/-	1-22, 75-90



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/041629

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02/17043 A2 (NOVATEL WIRELESS INC [US]; SOUISSE SLIM SALAH [US]; ANDREWS MICHAEL SC) 28 February 2002 (2002-02-28) page 1, line 8 - page 5, line 10 page 10, line 6 - page 11, line 7 -----	1-22, 75-90

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/041629

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22, 75-90-----

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22, 75-90

Method and apparatus for fragmenting data units, where operation is carried in two modes, where the two modes have different fragmentation thresholds, where the fragmentation thresholds are determined, and where data units are fragmented in case the data units exceed the fragmentation thresholds.

2. claims: 23-38

Method and apparatus for facilitating power saving.

3. claims: 39-64

A method and apparatus for generating and transmitting a beacon frame.

4. claims: 65-74

A method and apparatus for generating and transmitting a data unit.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/041629

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