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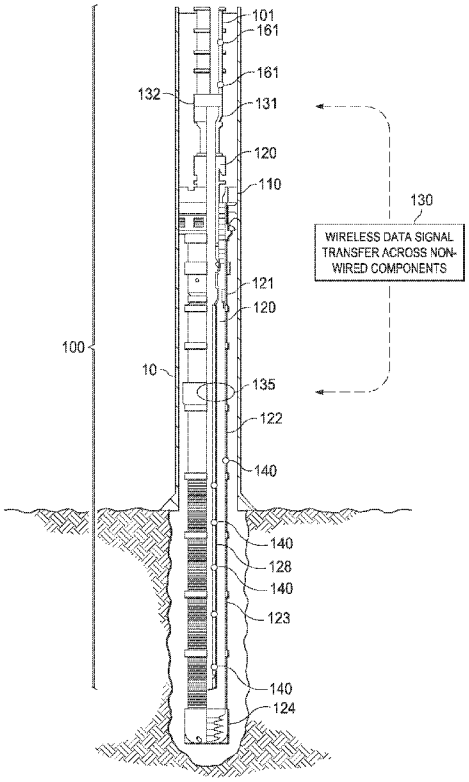
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[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR REAL TIME DATA TRANSMISSION DURING WELL COMPLETIONS



(57) Abstract: Presently, existing completion tools have not been designed to couple with wired drill pipe. As such, present completions operations and tools have not been able to take advantage of the expanded bandwidth in wire drill pipe. Instead of designing new completions tools with wired pipe connections, the disclosed system and methods propose use of a short-hop or wireless system (131, 135) to transmit data from a completions tool (120) to an upper receiver module coupled to the wired drill pipe. Various measurements from the region around the completions tool may be transmitted from one or more lower wireless modules to the upper wireless module and then transmitted through the wired drill pipe to the surface. Likewise, signals may be transmitted from the surface through the wired drill pipe to the upper module and then to the lower wireless module.

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GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, 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).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/030879

A. CLASSIFICATION OF SUBJECT MATTER
INV. E21B47/12 E21B43/04 E21B47/14
ADD.

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)
E21B

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.
X	US 2007/235185 A1 (PATEL DINESH R [US] ET AL) 11 October 2007 (2007-10-11)	1-5, 7-11,13, 16,17
Y	paragraphs [0015], [0018], [0021], [0022], [0029]; figure 2	6,12,14, 15
Y	WO 2009/023668 A1 (SCHLUMBERGER CA LTD [CA]; SCHLUMBERGER SERVICES PETROL [FR]; SCHLUMBER) 19 February 2009 (2009-02-19) paragraphs [0007], [0008], [0016], [0017], [0021]; figures 1, 3	6,12,14, 15
A	WO 2009/015109 A1 (SCHLUMBERGER CA LTD [CA]; SCHLUMBERGER HOLDINGS; SCHLUMBERGER TECHNOLO) 29 January 2009 (2009-01-29) paragraphs [0049], [0062]; figure 3	1-18

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[X] Further documents are listed in the continuation of Box C.

[X] 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

Date of the actual completion of the international search	Date of mailing of the international search report
16 October 2012	29/10/2012

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
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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 2009/072091 A2 (SCHLUMBERGER CA LTD [CA]; SCHLUMBERGER SERVICES PETROL [FR]; SCHLUMBER) 11 June 2009 (2009-06-11) figure 3	1-18
A	US 2005/016730 A1 (MCMECHAN DAVID E [US] ET AL) 27 January 2005 (2005-01-27) paragraphs [0012], [0013], [0038], [0039], [0042]; figure 2	19,20
A	US 2004/246141 A1 (TUBEL PAULO S [US] ET AL) 9 December 2004 (2004-12-09) paragraphs [0014], [0016], [0017], [0028]; claims 10, 26; figures 1-3	19,20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/030879

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.:

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.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/030879

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007235185 A1	11-10-2007	US 2007235185 A1	11-10-2007
		US 2010186953 A1	29-07-2010
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		WO 2005017312 A1	24-02-2005
US 2004246141 A1	09-12-2004	NONE	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-18

A method of transmitting data during well completions comprising:
a) inserting a completions tool coupled to a wired drill pipe into a well to complete the well, wherein the completions tool comprises a short-hop wireless communications system having an upper wireless module and a lower wireless module, the upper wireless module is coupled to the wired drill pipe and converts wireless signals for transmittal through the wired drill pipe, and wherein the upper wireless module and the lower wireless module are in wireless communication with one another;
b) initiating a completions operation;
c) measuring one or more well properties during the completions operation using one or more sensors disposed on the completions tool; and
d) transmitting the one or more well properties in real-time via the short-hop wireless communications system from the completions tool to the wired drill pipe and through the wired drill pipe to the surface.
Technical problem: bridging data communication over short distances.

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2. claims: 19, 20

A system for transmitting data during well completion comprising:
an upper wireless acoustic module;
a completions tool disposed below the upper wireless module;
a lower wireless acoustic module disposed below the gravel pack service tool;
a wash pipe coupled to the lower wireless acoustic module, wherein the wash pipe comprises one or more sensors for measuring one or more downhole properties;
a wired drill pipe coupled to the upper wireless acoustic module, wherein the upper wireless acoustic module is configured to receive and transmit acoustic signals to the lower wireless acoustic module and to convert acoustic signals to electrical signals for transmission through the wired drill pipe.
Technical problem: bridging data communication over long distances.
