

## PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: VALLABH RAJESH  FOLEY HOAG, LLP 155 SEAPORT BOULEVARD BOSTON MA 02210-2600 USA	<h1 style="margin: 0;">PCT</h1> <p style="margin: 0;"><b>NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION</b></p> <p style="margin: 0;">(PCT Rule 44.1)</p>
	Date of mailing <i>(day/month/year)</i> 17 NOVEMBER 2010 (17.11.2010)
Applicant's or agent's file reference SCJ-016.25	<b>FOR FURTHER ACTION</b> See paragraphs 1 and 4 below
International application No. <b>PCT/US2010/027932</b>	International filing date <i>(day/month/year)</i> <b>19 MARCH 2010 (19.03.2010)</b>
Applicant  <b>SKYCROSS, INC. et al</b>	

1.  The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

**Filing of amendments and statement under Article 19:**  
 The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

**When?** The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

**Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

**For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.**

2.  The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3.  **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.


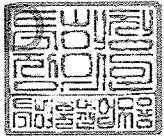
4. **Reminders**  
 The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see [www.wipo.int/pct/en/texts/time\\_limits.html](http://www.wipo.int/pct/en/texts/time_limits.html) and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR  Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea  Facsimile No. 82-42-472-7140	Authorized office  COMMISSIONER  Telephone No. 82-42-48148753 
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\* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

<http://www.kipo.go.kr/en/> => PCT Services => PCT Services

ID : PCT international application number

PW : **TCS0PQFO**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: <http://www.ipkcenter.com>

Email: [ipkc@ipkcenter.com](mailto:ipkc@ipkcenter.com)

Phone: +1 703 388 1066

Fax: +1 703 388 1084

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SCJ-016.25	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. <b>PCT/US2010/027932</b>	International filing date ( <i>day/month/year</i> ) <b>19 MARCH 2010 (19.03.2010)</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) 19 MARCH 2009 (19.03.2009)
Applicant  <b>SKYCROSS, INC. et al</b>		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

the international application in the language in which it was filed

a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b.  This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c.  With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2.  **Certain claims were found unsearchable** (See Box No. II)

3.  **Unity of invention is lacking** (See Box No. III)

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 30A

as suggested by the applicant.

as selected by this Authority, because the applicant failed to suggest a figure.

as selected by this Authority, because this figure better characterizes the invention.

b.  none of the figure is to be published with the abstract.

**A. CLASSIFICATION OF SUBJECT MATTER***H01Q 5/00(2006.01)i, H01Q 1/38(2006.01)i, H01Q 13/08(2006.01)i*

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)

H01Q 5/00; H01Q 9/18; H01Q 21/00; H01Q 9/40; H01Q 1/10; H01Q 1/24

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: antenna, isolat\*, dual, double, triple, multi\*, mode, port, band

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 2008-0278405 A1 (MONTGOMERY, MARK T. et al.) 13 November 2008 See the abstract; figures 2A-23, 27A-29C; paragraphs 78-125, 145-150; and claims 1-20	1-5,8-11,13-18 ,21-25,27-32 6,7,12,19,20 26
X Y A	US 2008-0258991 A1 (MONTGOMERY, MARK T. et al.) 23 October 2008 See the abstract; figures 2A-18B; paragraphs 58-93; and claims 1-27	1-5,8-11,13-18 ,21-25,27-32 6,7,12,19,20 26
Y A	US 5079562 A (YARSUNAS, GEORGE D. et al.) 07 January 1992 See the abstract; figures 3A-3C; column 4 line 8 - column 6 line 30; and claims 1-12	6,7,19,20 1-5,8-18,21-32
Y A	JP 2005-020206 A (KYOCERA CORP) 20 January 2005 See the abstract; figures 1, 2; paragraphs 16-46; and claims 1-4	12 1-11,13-32

 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 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

16 NOVEMBER 2010 (16.11.2010)

Date of mailing of the international search report

**17 NOVEMBER 2010 (17.11.2010)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office  
Government Complex-Daejeon, 139 Seonsa-ro, Seo-  
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

NAM, Yun Kwon

Telephone No. 82-42-481-8357



## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2010/027932

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0278405 A1	13.11.2008	CN 101730957 A	09.06.2010
		EP 2140516 A1	06.01.2010
		JP 2009-521898 A	04.06.2009
		JP 2010-525680 A	22.07.2010
		KR 10-0979437 B1	02.09.2010
		KR 10-2010-0017207 A	16.02.2010
		TW 200843203 A	01.11.2008
		TW 200910688 A	01.03.2009
		US 2008-0258991 A1	23.10.2008
		US 7688273 B2	30.03.2010
		US 7688275 B2	30.03.2010
		WO 2008-130427 A1	30.10.2008
		WO 2008-131157 A1	30.10.2008
		US 2008-0258991 A1	23.10.2008
EP 2140516 A1	06.01.2010		
JP 2009-521898 A	04.06.2009		
JP 2010-525680 A	22.07.2010		
KR 10-0979437 B1	02.09.2010		
KR 10-2009-0068087A	25.06.2009		
KR 10-2010-0017207 A	16.02.2010		
TW 200843203 A	01.11.2008		
TW 200910688 A	01.03.2009		
US 2008-0258991 A1	23.10.2008		
US 2008-0278405 A1	13.11.2008		
US 7688273 B2	30.03.2010		
US 7688275 B2	30.03.2010		
WO 2008-130427 A1	30.10.2008		
WO 2008-131157 A1	30.10.2008		
US 5079562 A	07.01.1992	EP 0464255 A1	08.01.1992
		EP 0464255 B1	29.11.1995
		JP 04-123504 A	23.04.1992
		KR 10-1992-0003577 A	29.02.1992
JP 2005-020206 A	20.01.2005	CN 100452533 C	14.01.2009
		CN 1574460 A	02.02.2005
		JP 04-105987 B2	25.06.2008
		US 2005-0001770 A1	06.01.2005
		US 7098852 B2	29.08.2006

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

VALLABH RAJESH

FOLEY HOAG, LLP 155 SEAPORT BOULEVARD  
BOSTON MA 02210-2600 USA

**PCT**

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) **17 NOVEMBER 2010 (17.11.2010)**

Applicant's or agent's file reference  
SCJ-016.25

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.

**PCT/US2010/027932**

International filing date (day/month/year)

**19 MARCH 2010 (19.03.2010)**

Priority date(day/month/year)

19 MARCH 2009 (19.03.2009)

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

**H01Q 5/00(2006.01)i, H01Q 1/38(2006.01)i, H01Q 13/08(2006.01)i**

Applicant

**SKYCROSS, INC. et al**

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.  
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR  
Korean Intellectual Property Office  
Government Complex-Daejeon, 139  
Seonsa-ro, Seo-gu, Daejeon 302  
-701, Republic of Korea  
Facsimile No. 82-42-472-7140

Date of completion of this opinion  
16 NOVEMBER 2010 (16.11.2010)

Authorized officer

NAM, Yun Kwon

Telephone No.82-42-481-8357



WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2010/027932

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- the international application in the language in which it was filed
- a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

a. a sequence listing filed or furnished

- on paper
- in electronic form

b. time of filing or furnishing

- contained in the international application as filed.
- filed together with the international application in electronic form.
- furnished subsequently to this Authority for the purposes of search.

4.  In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2010/027932

Box No. II Priority

1.  The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date(Rules 43bis.1 and 64.1) is the claimed priority date.
2.  This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

This application claims priority from U.S. Provisional Patent Application No. 61/161,669 filed on March 19, 2009. This application is also a continuation-in-part of U.S. Patent Application No. 12/099,320, filed on April 8, 2008. Therefore, this application is not the initial application by the Stockholm protocol article 4 of the Paris convention. The priority claim of this application is invalid.



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No. <b>PCT/US2010/027932</b>
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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	6,7,12,15,19,20,24,26	YES
	Claims	1-5,8-11,13,14,16-18,21-23,25,27-32	NO
Inventive step (IS)	Claims	26	YES
	Claims	1-25,27-32	NO
Industrial applicability (IA)	Claims	1-32	YES
	Claims	NONE	NO

2. Citations and explanations :

**1. Prior Art**

Reference is made in the present opinion to the following document cited in the search report. The numbering is also retained in the further procedure:

D1: US 2008-0278405 A1 (MONTGOMERY, MARK T. et al.) 13 November 2008

D2: US 5079562 A (YARSUNAS, GEORGE D. et al.) 07 January 1992

D3: JP 2005-020206 A (KYOCERA CORP) 20 January 2005

D1 discloses a multimode antenna structure for transmitting and receiving electromagnetic signals in a communications device, the antenna structure comprising: a plurality of antenna ports; a plurality of antenna elements; and one or more connecting elements.

D2 discloses an antenna comprising: a center-fed coaxial dipole; a coaxial conductor rod having inner and outer conductors; and a coaxial choke.

D3 discloses an antenna comprising: a substrate; a radiation electrode; a feeding electrode; and a ground electrode.

**2. Novelty and Inventive Step (PCT Articles 33(2) and 33(3))**

2.1. Claims 1-13

The subject matter of claim 1 of the present invention relates to a multimode antenna structure for transmitting and receiving electromagnetic signals in a communications device, the antenna structure comprising: a plurality of antenna ports; a plurality of antenna elements; and a plurality of connecting elements.

Document D1 is regarded as the closest prior art to the subject matter of claim 1. The plurality of antenna ports, the plurality of antenna elements, and the plurality of connecting elements of claim 1 correspond respectively to the plurality of antenna ports, the plurality of antenna elements, and the one or more connecting elements of D1. Accordingly, all of the features of claim 1 are disclosed in document D1 and the antenna structure of claim 1 is anticipated by document D1. Therefore, claim 1 lacks novelty and cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

Claims 2-5, 8-11, 13 are dependent on claim 1 of the present application. The additional features of claims 2-5, 8-11, 13 are known from D1. Therefore, the subject matter of claims 2-5, 8-11, 13 lacks novelty and cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

(Continued on the Supplemental Box.)

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2010/027932

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

(Box No. V)

Claims 6, 7 are dependent on claim 1 of the present application. The additional features of claims 6, 7 are known from D2. It would be obvious to a person skilled in the art to combine the features of D1 and D2, thereby arriving at the antenna structure of claims 6, 7. Therefore, the subject matter of claims 6, 7 is considered to be novel but cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

Claim 12 is dependent on claim 1 of the present application. The additional feature of claim 12 is known from D3. It would be obvious to a person skilled in the art to combine the features of D1 and D3, thereby arriving at the antenna structure of claim 12. Therefore, the subject matter of claim 12 is considered to be novel but cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

2.2. Claims 14-26

The subject matter of claim 14 of the present invention relates to a multimode antenna structure for transmitting and receiving electromagnetic signals in a communications device, the antenna structure comprising: a plurality of antenna ports; a plurality of antenna elements; and a connecting element.

Document D1 is regarded as the closest prior art to the subject matter of claim 14. The plurality of antenna ports, the plurality of antenna elements, and the connecting element of claim 14 correspond respectively to the plurality of antenna ports, the plurality of antenna elements, and the one or more connecting elements of D1. Accordingly, all of the features of claim 14 are disclosed in document D1 and the antenna structure of claim 14 is anticipated by document D1. Therefore, claim 14 lacks novelty and cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

Claims 15, 24 are dependent on claim 14 of the present application. D1 does not disclose the additional features of claims 15, 24. However, the additional features of claims 15, 24 come within the scope of the customary practice followed by a person skilled in the art. Therefore, the subject matter of claims 15, 24 is considered to be novel but cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

Claims 16-18, 21-23, 25 are dependent on claim 14 of the present application. The additional features of claims 16-18, 21-23, 25 are known from D1. Therefore, the subject matter of claims 16-18, 21-23, 25 lacks novelty and cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

Claims 19, 20 are dependent on claim 14 of the present application. The additional features of claims 19, 20 are known from D2. It would be obvious to a person skilled in the art to combine the features of D1 and D2, thereby arriving at the antenna structure of claims 19, 20. Therefore, the subject matter of claims 19, 20 is considered to be novel but cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

Claim 26 is dependent on claim 14 of the present application. None of D1-D3 disclose the additional feature of claim 26. Accordingly, it would not have been obvious to a person skilled in the art to apply the knowledge of these documents individually or in combination in order to create the antenna structure of claim 26. Therefore, the subject matter of claim 26 is considered to be novel and to involve an inventive step under PCT Article 33(2) and (3).

2.3. Claims 27-32

The subject matter of claim 27 of the present invention relates to a multimode antenna structure for transmitting and receiving electromagnetic signals in a communications device, the antenna structure comprising: a plurality of antenna ports; a plurality of antenna elements, each antenna element including upper and lower planar sections and a side section; and one or more connecting elements.

(Continued on the Supplemental Box.)

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2010/027932

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.  
Continuation of:

(the Supplemental Box.)

Document D1 is regarded as the closest prior art to the subject matter of claim 27. The plurality of antenna ports, the plurality of antenna elements, and the one or more connecting elements of claim 27 correspond respectively to the plurality of antenna ports, the plurality of antenna elements, and the one or more connecting elements of D1. Accordingly, all of the features of claim 27 are disclosed in document D1 and the antenna structure of claim 27 is anticipated by document D1. Therefore, claim 27 lacks novelty and cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

Claims 28-32 are dependent on claim 27 of the present application. The additional features of claims 28-32 are known from D1. Therefore, the subject matter of claims 28-32 lacks novelty and cannot be considered as involving an inventive step under PCT Article 33(2) and (3).

**3. Industrial Applicability (PCT Article 33(4))**

Claims 1-32 of the present application meet the criteria set out in PCT Article 33(4), because the subject matter of claims 1-32 is considered to be industrially applicable.