Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/019,275	11349200
	Examiner	Art Unit
	KENNETH WHITTINGTON	3992

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
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US Classification - Searched*			
Class	Subclass	Date	Examiner

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Search Notes		
Search Notes	Date	Examiner
PE2E search regarding documents cited in Request	11/02/2023	KJW
Litigation search.	10/18/2023	KJW
Inventor name search.	11/02/2023	KJW
P-TACTS for AIA proceedings.	11/02/2023	KJW
Reviewed IPR2024-00088 documents.	11/02/2023	KJW
Searched PDP for continuity data.	11/02/2023	KJW
Reviewed file wrapper for proceeding no. 90/010275 and application no. 17/246,192.	11/02/2023	KJW

/KENNETH WHITTINGTON/
Primary Examiner, Art Unit 3992

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90/019,275	11349200
	Examiner	Art Unit
	KENNETH WHITTINGTON	3992

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/KENNETH WHITTINGTON/
Primary Examiner, Art Unit 3992

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BIB DATA SHEET

CONFIRMATION NO. 7433

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/019,275	10/12/2023 RULE	343	3992	SKAD002

APPLICANTS

FRACTUS S.A.(OWNER), Residence Not Provided;
UNIFIED PATENTS LLC, CHEVY CHASE, MD;

INVENTORS

11349200, Barcelona, SPAIN;
SKADDEN, ARPS, SLATE, MEAGHER & FLOM, LLP CHRISTOPHER J. COULSON, Residence Not Provided;
Josep MUMBRU, Asnières-sur-Seine, FRANCE;
Jordi ILARIO, Barcelona, SPAIN;

**** CONTINUING DATA ***************************

This application is a REX of 17/246,192 04/30/2021 PAT 11349200
*which is a CON of 16/832,820 03/27/2020 PAT 11031677
which is a CON of 15/856,626 12/28/2017 PAT 10644380
which is a CON of 14/738,090 06/12/2015 PAT 9899727
which is a CON of 14/246,491 04/07/2014 PAT 9099773
which is a CON of 11/614,429 12/21/2006 PAT 8738103
which claims benefit of 60/856,410 11/03/2006
and claims benefit of 60/831,544 07/18/2006

**** FOREIGN APPLICATIONS ***************************

EUROPEAN PATENT OFFICE (EPO) 06117352 07/18/2006

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

Foreign Priority claimed ☐ Yes ☐ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No ☐ Met after Allowance Verified and Acknowledged Examiner's Signature / Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
	SPAIN		20	3

ADDRESS

EDELL, SHAPIRO & FINNAN, LLC
9801 Washingtonian Blvd.
Suite 750
Gaithersburg, MD 20878
UNITED STATES

TITLE

Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices

FILING FEE RECEIVED	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue)

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REEXAM CONTROL NUMBER	FILING OR 371 (c) DATE	PATENT NUMBER
90/019,275	10/12/2023	

CONFIRMATION NO. 7433
REEXAMINATION REQUEST
NOTICE

CHRISTOPHER J. COULSON
SKADDEN, ARPS, SLATE, MEAGHER & FLOM, LLP
ONE MANHATTAN WEST
30TH FLOOR
NEW YORK, NEW YORK 10001

Date Mailed: 10/24/2023

NOTICE OF REEXAMINATION REQUEST FILING DATE

(Third Party Requester)

Requester is hereby notified that the filing date of the request for reexamination is 10/12/2023, the date that the filing requirements of 37 CFR § 1.510 were received.

A decision on the request for reexamination will be mailed within three months from the filing date of the request for reexamination. (See 37 CFR 1.515(a)).

A copy of the Notice is being sent to the person identified by the requester as the patent owner. Further patent owner correspondence will be the latest attorney or agent of record in the patent file. (See 37 CFR 1.33). Any paper filed should include a reference to the present request for reexamination (by Reexamination Control Number).

cc: Patent Owner
27896
EDELL, SHAPIRO & FINNAN, LLC
9801 Washingtonian Blvd.
Suite 750
Gaithersburg, MD 20878

/rbell/

Legal Instruments Examiner
Central Reexamination Unit 571-272-7705; FAX No. 571-273-9900

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REEXAM CONTROL NUMBER	FILING OR 371 (c) DATE	PATENT NUMBER
90/019,275	10/12/2023	

CONFIRMATION NO. 7433

REEXAM ASSIGNMENT NOTICE

27896
EDELL, SHAPIRO & FINNAN, LLC
9801 Washingtonian Blvd.
Suite 750
Gaithersburg, MD 20878

OC0000000063422263

Date Mailed: 10/19/2023

NOTICE OF ASSIGNMENT OF REEXAMINATION REQUEST

The above-identified request for reexamination has been assigned to Art Unit 3992. All future correspondence to the proceeding should be identified by the control number listed above and directed to the assigned Art Unit.

A copy of this Notice is being sent to the latest attorney or agent of record in the patent file or to all owners of record. (See 37 CFR 1.33(c)). If the addressee is not, or does not represent, the current owner, he or she is required to forward all communications regarding this proceeding to the current owner(s). An attorney or agent receiving this communication who does not represent the current owner(s) may wish to seek to withdraw pursuant to 37 CFR 1.36 in order to avoid receiving future communications. If the address of the current owner(s) is unknown, this communication should be returned within the request to withdraw pursuant to Section 1.36.

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The USPTO has implemented a pilot program where, after a reexamination proceeding has been granted a filing date and before the examiner begins his or her review, the patent owner may orally waive the right to file a patent owner's statement. See *"Pilot Program for Waiver of Patent Owner's Statement in Ex Parte Reexamination Proceedings,"* 75 FR 47269 (August 5, 2010). One goal of the pilot program is to reduce the pendency of reexamination proceedings and improve the efficiency of the reexamination process.

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To participate in this pilot program, Patent Owners may contact the USPTO's Central Reexamination Unit (CRU) at 571-272-7705. The USPTO will make the oral waiver of record in the reexamination file in an interview summary and a copy will be mailed to the patent owner and any third party requester.

cc: Third Party Requester(if any)
CHRISTOPHER J. COULSON
SKADDEN, ARPS, SLATE, MEAGHER & FLOM, LLP
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NEW YORK, NEW YORK 10001

/rbell/

Legal Instruments Examiner
Central Reexamination Unit 571-272-7705; FAX No. 571-273-9900

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Kathi Vidal

Kathi Vidal
Under Secretary of Commerce for Intellectual Property and
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Patent Assignment Abstract of Title

Total Assignments: 1

Application #: 17246192 **Filing Dt:** 04/30/2021 **Patent #:** 11349200 **Issue Dt:** 05/31/2022
PCT #: NONE **Intl Reg #:** **Publication #:** US20210351493 **Pub Dt:** 11/11/2021
Inventors: Carles PUENTE BALIARDA, Jordi ILARIO, Josep MUMBRU
Title: Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices

Assignment: 1

Reel/Frame:	Received:	Recorded:	Mailed:	Pages:
064068 / 0344	06/27/2023	06/27/2023	06/28/2023	3

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignors: PUENTE BALIARDA, CARLES **Exec Dt:** 04/07/2014
MUMBRU, JOSEP **Exec Dt:** 04/03/2014
ILARIO, JORDI **Exec Dt:** 04/07/2014

Assignee: FRACTUS, S.A.
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Correspondent: EDELL, SHAPIRO & FINNAN, LLC
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GAITHERSBURG, MD 20878

Search Results as of: 10/18/2023 11:03 AM

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Web interface last modified: Jun 26, 2017 v.2.6

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BIB DATA SHEET

CONFIRMATION NO. 7433

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/019,275	10/12/2023 RULE	343	3992	SKAD002

APPLICANTS

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INVENTORS

11349200, Barcelona, SPAIN;
SKADDEN, ARPS, SLATE, MEAGHER & FLOM, LLP CHRISTOPHER J. COULSON, Residence Not Provided;
Josep MUMBRU, Asnières-sur-Seine, FRANCE;
Jordi ILARIO, Barcelona, SPAIN;

**** CONTINUING DATA ***************************

This application is a REX of 17/246,192 04/30/2021 PAT 11349200
*which is a CON of 16/832,820 03/27/2020 PAT 11031677
which is a CON of 15/856,626 12/28/2017 PAT 10644380
which is a CON of 14/738,090 06/12/2015 PAT 9899727
which is a CON of 14/246,491 04/07/2014 PAT 9099773
which is a CON of 11/614,429 12/21/2006 PAT 8738103
which claims benefit of 60/856,410 11/03/2006
and claims benefit of 60/831,544 07/18/2006

**** FOREIGN APPLICATIONS ***************************

EUROPEAN PATENT OFFICE (EPO) 06117352 07/18/2006

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
❑ Yes ❑ No	SPAIN		20	3

35 USC 119(a-d) conditions met ❑ Yes ❑ No ❑ Met after Allowance

Verified and Acknowledged _____ Examiner's Signature _____ Initials

ADDRESS

EDELL, SHAPIRO & FINNAN, LLC
9801 Washingtonian Blvd.
Suite 750
Gaithersburg, MD 20878
UNITED STATES

TITLE

Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices

FILING FEE RECEIVED	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT	❑ All Fees ❑ 1.16 Fees (Filing) ❑ 1.17 Fees (Processing Ext. of time) ❑ 1.18 Fees (Issue)

BIB (Rev. 05/07).

0.00	No._____ for following:	❑ Other _____ ❑ Credit

Litigation Search Report CRU 3999

Reexamination Control No. 90/019,275

To:	New Request	**From:**	GRAVES, Monica A.
Location:	OCRU	**Location:**	OCRU
Art Unit:	3992	**Phone:**	2-7253
Date:	18 October 2023	**E-mail:**	graves.monica @yahoo.com

Search Notes

US PATENT NO: 11,349,200 - See Attached

1. Performed a KeyCite Search in Westlaw, which retrieves all history on the patent including any litigation.
2. Performed a search on the patent in Lexis CourtLink for any open dockets or closed cases.
3. Performed a search in Lexis in the Federal Courts and Administrative Materials databases for any cases found.
4. Performed a search in Lexis in the IP Journal and Periodicals database for any articles on the patent.
5. Performed a search in Lexis in the news databases for any articles about the patent or any articles about litigation on this patent.

Paper No. 20231018B

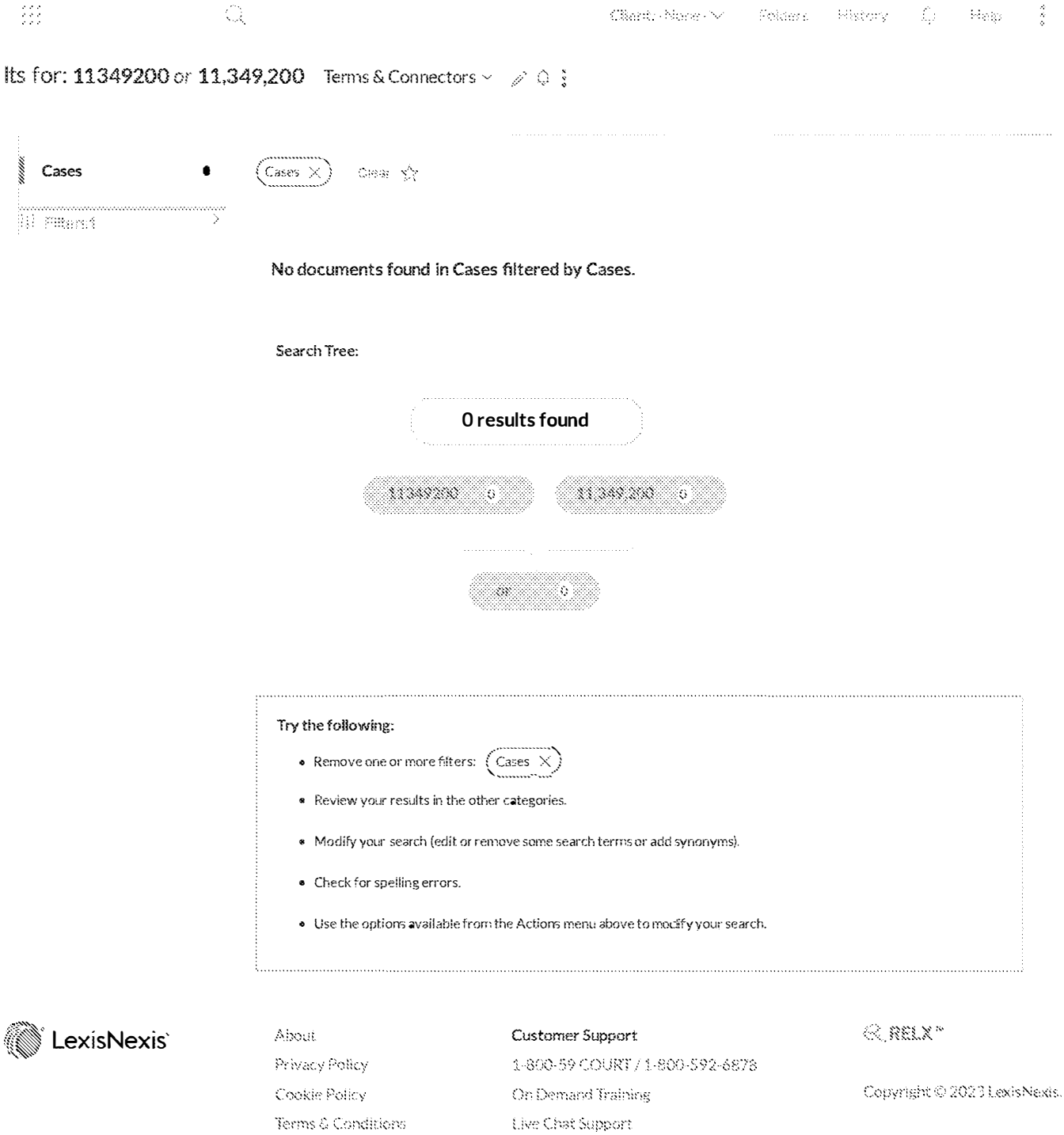
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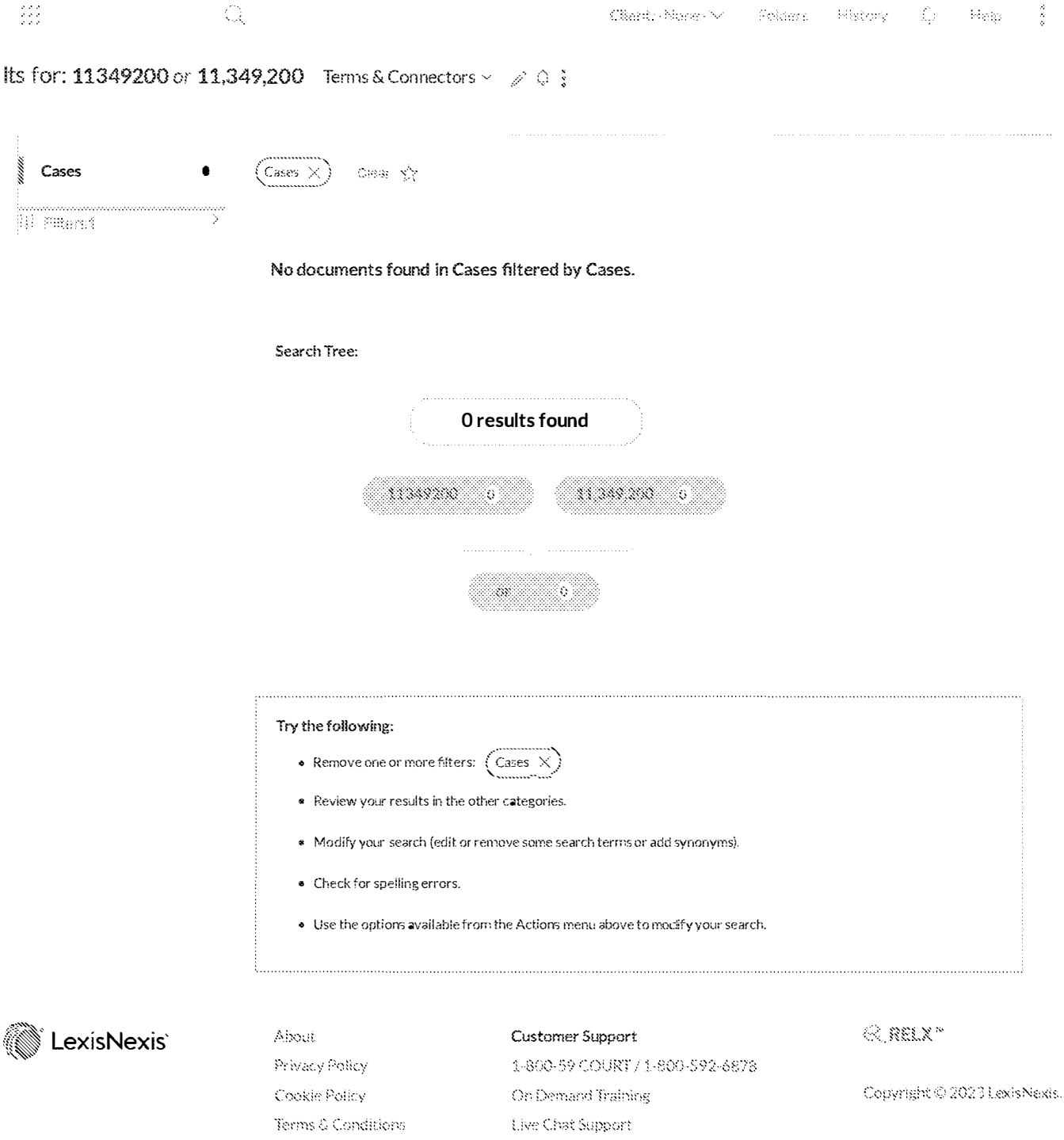
Treatment	Title	Date	Type	Depth	Headnote(s)
—	**1.** PORTABLE MULTIFUNCTION WIRELESS DEVICE I.E. HANDHELD MULTIMEDIA TERMINAL, HAS ANTENNA SYSTEM PLACED WITHIN UPPER BODY AND LOWER BODY AND INCLUDING SHAPE WITH LEVEL OF COMPLEXITY OF ANTENNA CONTOUR DEFINED BY COMPLEXITY FACTORS Out Of Plan DWPI 2021-C73733 ... H01Q-5/40 H01Q-9/0407 H01Q-9/0421 Language:English Claim(s):English 1-20. (canceled)First Derwent Appearance:2022.002 Publication No. (Derwent): US 11349200 B2 Original Title (English):MULTIPLE-BODY-CONFIGURATION MULTIMEDIA AND SMARTPHONE MULTIFUNCTION WIRELESS DEVICES Publication Date:2022-05-31 Application No.:US 246192 Application Date ...	July 18, 2006	DWPI	—	—
—	**2.** WIRELESS DEVICE, SUCH AS PORTABLE MULTIFUNCTION WIRELESS DEVICE (MFWD), COMPRISES ANTENNA SYSTEM COMPRISING GROUND PLANE AND TWO ANTENNAS WITHIN WIRELESS DEVICE, FIRST ANTENNA IS CONFIGURED TO TRANSMIT AND RECEIVE SIGNALS FROM FOURTH GENERATION (4G) COMMUNICATION STANDARD Out Of Plan DWPI 2022-C92317+ ... 2006-07-18 Application priority Earliest Priority Date:2006-07-18 Related:Continuation of US patent number US 9899727 B Continuation of US patent number US 11349200 B Continuation of US patent number US 9099773 B Continuation of US patent number US 10644380 B Continuation of US patent number US 8738103 ...	July 18, 2006	DWPI	—	—
—	**3.** Fractus, S.A. v. ADT LLC	Oct. 21, 2022	Docket Summaries	—	—
—	**4.** Fractus, S.A. v. Vivint, Inc.	Oct. 21, 2022	Docket Summaries	—	—
—	**5.** MULTIPLE-BODY-CONFIGURATION MULTIMEDIA AND SMARTPHONE MULTIFUNCTION WIRELESS DEVICES Out Of Plan US PAT 11735810+ , U.S. PTO Utility A multifunction wireless device having at least one of multimedia functionality and smartphone functionality, the multifunction wireless device including an upper body and a lower... ... Hong, Dung Hong Dung 2643 Priority information Related information:This application is a Continuation of Application No. 17/246,192, filed on 2021/04/30, now Patent No. 11,349,200 US US which is a Continuation of Application No. 16/832,820, filed on 2020/03/27, now Patent No. 11,031,677, issued on 2021 ...	Aug. 22, 2023	Patents	—	—

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Treatment	Title	Date	Type	Depth	Headnote(s)
—	**6.** MULTIPLE-BODY-CONFIGURATION MULTIMEDIA AND SMARTPHONE MULTIFUNCTION WIRELESS DEVICES Cir. Ct. Prac. US PAT APP 20220328954 , U.S. PTO Application A multifunction wireless device having at least one of multimedia functionality and smartphone functionality, the multifunction wireless device including an upper body and a lower... ... ILARIO Barcelona, Spain Barcelona Spain Priority Information Related Information:This application is a Continuation of Application No. 17/246,192, filed on 2021/04/30, now Patent No. 11,349,200 US US which is a Continuation of Application No. 16/832,820, filed on 2020/03/27, now Patent No. 11,031,677 US US which ...	Oct. 13, 2022	Patents	—	—

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Client - None -
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Results for: 11349200 or 11,349,200

Briefs, Pleadings and Motions (14) Sort by: Relevance

1.

Exhibit 3 ; Proceeding Number : 1-4

Oct 21, 2022 | Fractus,S.A.V.Vivint,Inc. | Complaint | 2:22cv413

... 143 EXHIBIT 3 Case 2:22-cv-00413-JRG Document 1-4 [TIF az United States **Patent** Puente Baliarda et al. FAVA rR nr US011349200B2 US **11,349,200** B2 *May 31, 2022 (10) **Patent** No.: 45) Date of **Patent** : (54) MULTIPLE-BODY-CONFIGURATION MULTIMEDIA AND SMARTPHONE MULTIFUNCTION WIRELESS DEVICES (71) (72) ...

... Barcelona (ES) Notice: Subject to any disclaimer, the term of this **patent** is extended or adjusted under 35 U.S.C. 154(b) by 0 days. This **patent** is subject to a terminal disclaimer. 21) (22) Appl. No.: ...

... HO1Q 1/242; HO1Q 1/241; HO1Q 5/50; (Continued) (56) References Cited U.S. **PATENT** DOCUMENTS 2/1963 Du Hamel 7/1970 Shelton (Continued) 3,079,602 A 3,521,284 A FOREIGN **PATENT** DOCUMENTS CA CA 23822128 2416437 3/2001 1/2002 (Continued) OTHER PUBLICATIONS U.S. ...

... 1-4 Filed 10/21/22 Page 3 of 80 PageID #: 145 US **11,349,200** B2 Page 2 Related ...

... **PATENT** DOCUMENTS 2/1963 Du Hamel 7/1970 Shelton (Continued) 3,079,602 A 3,521,284 A FOREIGN **PATENT** DOCUMENTS CA CA 23822128 2416437 3/2001 1/2002 (Continued) OTHER PUBLICATIONS U.S. ...

... 1-4 Filed 10/21/22 Page 3 of 80 PageID #: 145 US **11,349,200** B2 Page 2 Related U.S. Application Data 4912,481 A 3/1990 Mace ...

2.

Exhibit 6

Oct 21, 2022 | Fractus, S.A.V. Adt Llc | Complaint | 2:22cv412

... No. 2 , Pag. 170-182 . Infringement Chart Blackberry 8220. **Patent** 7202822 , Fractus , Nov. 5 , 2009 . Infringement Chart Blackberry 8310. **Patent** 7148850 , Fractus , Nov. 5 , 2009 . Infringement Chart - Blackberry 8310. **Patent** : 7202822 , Fractus , Nov. 5 , 2009 . Infringement Chart Blackberry 8320. **Patent** 7148850 , Fractus , Nov. 5 , 2009 . Infringement Chart Blackberry 8320. **Patent** 7202822 , Fractus , Nov. 5 , 2009 . Infringement Chart- Blackberry 8330. **Patent** 7148850 , Fractus , Nov. 5 , 2009 . Infringement Chart Blackberry 8330. **Patent** 7202822 , Fractus , Nov. 5 , 2009 . Infringement Chart Blackberry 8820. **Patent** 7148850 , Fractus , Nov. 5 , 2009 . Infringement Chart - Blackberry 8820. **Patent** 7202822 , Fractus , Nov. 5 , 2009 . Infringement Chart - Blackberry 8830. **Patent** 7148850 , Fractus , Nov. 5 , 2009 . Infringement Chart Blackberry 8830. **Patent** 7202822 , Fractus , Nov. ...

3.

Corrected Document: . (RE: related document(s)78 Document). Filed by Debtor Blade Global Corporation (Harris, Robert) (Entered: 04/09/2021)

California Northern Bankruptcy Court | Mar 01, 2021 | Blade Global Corporation | MISC | 21-50275

... 6 Sales, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 6 7 Consideration received for technical, managerial, ...

... 19 Purchases, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 19 20 Consideration paid for technical, managerial, ...

... 6 Sales, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 6 7 Consideration received for technical, managerial, ...

... 19 Purchases, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 19 20 Consideration paid for technical, managerial, ...

... 5,798. 200 DB HY 5 COMPUTER 17 02/19 02/28/2019 11,349. 100. **11,349. 200** DB HY 5 COMPUTER 18 03/19 03/31/2019 7,476. 100. 7,476. 200 ...

4.

Document: Attachment To Voluntary Petition And Declaration Of Perry Michael Fischer With Respect Thereto (11 U.S.C. §§1116(1), (2)). (RE: related document(s)1 Voluntary Petition (Chapter 11)). Filed by Debtor Blade Global Corporation (Harris, Robert) (Entered: 03/12/2021)

California Northern Bankruptcy Court | Mar 01, 2021 | Blade Global Corporation | MISC | 21-50275

... 6 Sales, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 6 7 Consideration received for technical, managerial, ...

... 19 Purchases, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 19 20 Consideration paid for technical, managerial, ...

... 6 Sales, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 6 7 Consideration received for technical, managerial, ...

... 19 Purchases, leases, licenses, etc., of intangible property rights (for example, **patents** , trademarks, secret formulas) 19 20 Consideration paid for technical, managerial, ...

... 5,798. 200 DB HY 5 COMPUTER 17 02/19 02/28/2019 11,349. 100. **11,349. 200** DB HY 5 COMPUTER 18 03/19 03/31/2019 7,476. 100. 7,476. 200 ..

5.

ANSWER to 18 Answer to Complaint, Counterclaim by Fractus, S.A..(Tisdall, Adam) (Entered: 01/04/2023)

Oct 21, 2022 | Fractus,S.A.V. Adt Llc | Answer to Counterclaim | 2:22cv412

... Patent No.10,468,770 (the 770 Patent), and U.S. Patent No. 11,349,200 (the 200 Patent) (together the Asserted Patents). All averments and allegations not expressly admitted herein are denied. ...

... COUNTERCLAIM COUNT 1: DECLARATORY JUDGMENT OF NON- INFRINGEMENT OF THE 092 PATENT 8. This paragraph purports to reallege and incorporate by reference paragraphs ...

... 14. COUNTERCLAIM COUNT 2: DECLARATORY JUDGMENT OF INVALIDITY OF THE 092 PATENT 15. This paragraph purports to reallege and incorporate by reference paragraphs ...

... COUNTERCLAIM COUNT 3: DECLARATORY JUDGMENT OF NON- INFRINGEMENT OF THE 103 PATENT 19. This paragraph purports to reallege and incorporate by reference paragraphs ...

... 25. COUNTERCLAIM COUNT 4: DECLARATORY JUDGMENT OF INVALIDITY OF THE 103 PATENT 26. This paragraph purports to reallege and incorporate by reference paragraphs ...

... COUNTERCLAIM COUNT 5: DECLARATORY JUDGMENT OF NON- INFRINGEMENT OF THE 604 PATENT Case 2:22-cv-00412-JRG Document 30 Filed 01/04/23 Page 3 of 18 PageID ...

... 36. COUNTERCLAIM COUNT 6: DECLARATORY JUDGMENT OF INVALIDITY OF THE 604 PATENT 37. This paragraph purports to reallege and incorporate by reference paragraphs ...

6.

COMPLAINT against ADT LLC (Filing fee $ 402 receipt number ATXEDC-9192360), filed by Fractus, S.A.. (Attachments: # 1 Civil Cover Sheet, # 2 Exhibit 1, # 3 Exhibit 2, # 4 Exhibit 3, # 5 Exhibit 4, # 6 Exhibit 5, # 7 Exhibit 6)(Henry, Claire) (Entered: 10/21/2022)

Oct 21, 2022 | Fractus, S.A. V. Adt Llc | Complaint | 2:22cv412

... never disputed the validity of the Patents-in-Suit. In particular, ADT has never communicated any allegedly invalidating prior ...

... or attempted to bring any post-grant action at the United States Patent and Trademark Office. 20. ADTs conduct has demonstrated a pattern of bad-faith actions in continuing to infringe upon the Patents-in-Suit despite being on notice that it was infringing Fractuss patents. Instead of duly obtaining authorization or a license to practice the Patents -in-Suit and as shown below, ADT has continued making, using, selling, ...

... the Universitat Politcnica de Catalunya, is the lead inventor on the Patents - in-Suit. Dr. Puentes early research work focused on fractal antennas ...

... flexible antenna designs that appear in and are covered by the Patents-in- Suit. 12. The Patents -in-Suit were filed as a result of novel research by Fractus ...

... to compromise on other desirable device attributes, such as size. The Patents -in-Suit solve these problems through a variety of novel solutions enabling ...

... The letters informed ADTthat Fractus believed ADTwas infringing Fractuss patents. The letters provided a full list of Fractuss patent portfolio, and specifically identified certain Fractus patentsincluding several of the Patents -in-Suitwhich ADTs products infringed upon. One letter was sent to Mr. ...

7.

COMPLAINT against Vivint, Inc. (Filing fee $ 402 receipt number ATXEDC-9192413), filed by Fractus, S.A.. (Attachments: # 1 Civil Cover Sheet, # 2 Exhibit 1, # 3 Exhibit 2, # 4 Exhibit 3, # 5 Exhibit 4, # 6 Exhibit 5, # 7 Exhibit 6)(Henry, Claire) (Entered: 10/21/2022)

Oct 21, 2022 | Fractus, S.A. V. Vivint, Inc. | Complaint | 2:22cv413

... or attempted to bring any post-grant action at the United States Patent and Trademark Case 2:22-cv-00413-JRG Document 1 Filed 10/21/22 Page 8 of ...

... a pattern of bad-faith actions in continuing to infringe upon the Patents-in-Suit despite being on notice that it was infringing Fractuss patents. Instead of duly obtaining authorization or a license to practice the Patents -in-Suit and as shown below, Vivint has continued making, using, selling, ...

... the Universitat Politcnica de Catalunya, is the lead inventor on the Patents - in-Suit. Dr. Puentes early research work focused on fractal antennas ...

... flexible antenna designs that appear in and are covered by the Patents-in- Suit. 12. The Patents -in-Suit were filed as a result of novel research by Fractus ...

... to compromise on other desirable device attributes, such as size. The Patents -in-Suit solve these problems through a variety of novel solutions enabling ...

... The letters informed Vivint that Fractus believed Vivint was infringing Fractuss patents. The letters provided a full list of Fractuss patent portfolio, and specifically identified certain Fractus patentsincluding two of the Patents -in-Suitwhich, e.g., the Vivint Smart Hub Panel infringed upon. One letter ...

... to include additional Infringing Products with similarly designed antennas. 16. The Patents -in-Suit generally relate to the design and construction of antennas capable ...

8.

Joint Claim Construction and Prehearing Statement by Fractus, S.A.. (Attachments: # 1 Exhibit A)(Tisdall, Adam) (Entered: 10/05/2023)

Oct 21, 2022 | Fractus, S.A. V. Adt Llc | Claim Construction Chart/Prehearing Statement | 2:22cv412

... construction hearing on January 18, 2024 is scheduled to address nine patents: U.S. Patents No. 7,471,246 (the 246 Patent), No. 7,907,092 (the 092 Patent), No. 8,456,365 (the 365 Patent), No. 8,674,887 (the 887 Patent), No. 8,738,103 (the 103 Patent), No. 8,994,604 (the 604 Patent), No. 10,135,138 (the 138 Patent), No. 10,468,770 (the 770 Patent), and No. 11,349,200 (the 200 Patent).1 1 The term Asserted Patents means U.S. Patent Nos. 7,471,246; 7,907,092; 8,456,365; 8,674,887; 8,738,103; 11,349,200; 8,994,604; 10,135,138; and 10,468,770. ...

... to the Courts Docket Control Order (Dkt. No. 41) and Local Patent Rule 4-3, Plaintiff Fractus, S.A. (Fractus) and Defendants ADT LLC and ...

... construction hearing on January 18, 2024 is scheduled to address nine patents: ...

... to the Courts Docket Control Order (Dkt. No. 41) and LocalPatent Rule 4-3, Plaintiff Fractus, S.A. (Fractus) and Defendants ADT LLCand ...

... construction hearing on January 18, 2024 is scheduled to address nine **patents**: U.S. **Patents** No. 7,471,246 (the 246 **Patent**), No. 7,907,092 (the 092 **Patent**), No. 8,456,365 (the 365 **Patent**), No. 8,674,887 (the 887 ...

9.

ANSWER to 1 Complaint, by ADT LLC.(Tepera, Steven) (Entered: 12/14/2022)

Dec 14, 2022 | Fractus, S.A. V. Adt Llc | Answer to Complaint | 2:22cv412

... admits that **patents** asserted in this action are U.S. **Patent** Nos. 7,471,246 (246 **patent**), 7,907,092 (092 **patent**), 8,456,365 (365 **patent**), 8,674,887 (887 **patent**), 8,738,103 (103 **patent**), and **11,349,200** (200 **patent**) (collectively, the **Patents**-in-Suit). ADT lacks sufficient factual basis to determine the accuracy of ...

... **PATENT** NO. 7,907,092 30.ADT admits that the 092 **patent** is entitled Antenna With One or More Holes and that it ...

... that Exhibit 2 purports to be a copy of the 092 **patent**. ADT denies the remaining allegations in paragraph 30 of the ...

... the extent that paragraph 32 contains a summary of the 092 **patent**. ADT neither admits nor denies the summary, and respectfully refers the Court to 092 **patent** for the full content thereof. ADT further denies the allegations of ...

... of Paragraph 32. 33. Paragraph 33 contains excerpts from the 092 **patent**, ADT neither admits nor denies the excerpts, and respectfully refers the Court to the 092 **patent** for the full content thereof. 34. ADT denies the allegations in ...

... ADT denies the allegations in paragraph 37 of the Complaint. U.S. **PATENT** NO. 8,674,887 38. ADT admits that the 887 **patent** is entitled Multi-Band Monopole Antenna for a Mobile Communications Device and ...

10.

Defendant Vivint, Inc.'s ANSWER to Complaint of Fractus, S.A. and, COUNTERCLAIM against Fractus, S.A. by Vivint, Inc..(Tindel, Andy) (Entered: 12/14/2022)

Dec 14, 2022 | Fractus, S.A. V. Adt Llc | Answer to Complaint Counterclaim | 2:22cv412

... infringe and has not infringed any valid claim of the 092 **Patent**, 103 **Patent**, 200 **Patent**, 604 **Patent**, 138 **Patent**, or 770 **Patent**, either literally or under the doctrine of equivalents. Third Defense (Invalidity) The claims of the 092 **Patent**, 103 **Patent**, 200 **Patent**, 604 **Patent**, 138 **Patent**, and 770 **Patent** are invalid for failure to satisfy one or more requirements of ...

... to set forth the language of claim 12 of the 103 **Patent**, but the content of claim 12 of the 103 **Patents** is shown by the 103 **Patent** in its proper context and not by the allegations of the ...

... to set forth the language of claim 1 of the 138 **Patent**, but the content of claim 1 of the 138 **Patents** is shown by the 138 **Patent** in its proper context and not by the allegations of the ...

... to set forth the language of claim 1 of the 604 **Patent** , but ...

11.

NOTICE by Fractus, S.A. Notice Of Readiness for Case Management Conference (Tisdall, Adam) (Entered: 12/19/2022)

Dec 19, 2022 | Fractus, S.A. V. Adt Llc | Notice (Other) | 2:22cv412

... previously filed in the Eastern District of Texas involving the same **patent** or **patents**. The **patents**-in-suit for the consolidated cases are U.S. **Patent** No. 7,907,092, U.S. **Patent** No. 8,738,103, ...

12.

UNOPPOSED MOTION to Amend/Correct Disclosure of Asserted Claims and Infringement Contentions by Fractus, S.A.. (Mina, Argie) (Additional attachment(s) added on 10/10/2023: # 1 Proposed Order) (ch,). (Entered: 10/10/2023)

Oct 21, 2022 | Fractus, S.A. V. Adt Llc | Amend/Correct | 2:22cv412

... noticed a minor typographical error concerning the filing date of European **Patent** No. 061173 52. Specifically, in Fractus **Patent** Rule 3-1(e) Disclosures regarding the Asserted Claims of U.S. **Patent** **11,349,200** (the 200 **Patent**), the filing date of EP 06117352 should be July ...

... 06117352 elsewhere in its disclosures regarding the Asserted Claims of U.S. **Patent** No. 8,738,103 (the 103 **Patent**), and the correct filing date for EP 06117352 is listed on the face of the 200 **Patent** . ...

... Amend Disclosure of Asserted Claims and Infringement Contentions Pursuant to Local **Patent** Rules 3-1 and 3-2. Fractus served its Disclosure of Asserted Claims ...

13.

Affidavit/Declaration of Mailing of Herb Baer Regarding Bar Date Notice, and Proof of Claim form. Filed by Prime Clerk LLC. (Malo, David) (Entered: 01/11/2021)

Oct 12, 2020 | Mallinckrodt plc | Unknown | 20-12522

... ATTN: President & CEO Mississauga ON L5R 0B7 Canada 11363220 Pharma **Patent** Licensing 950 F ST NORTHWEST WASHINGTON DC 20004 11363221 Pharma Solutions ...

... UNITED STATES 2051 JAMIESON AVE, SUITE 300 ATTN DEPOSIT ACCOUNTS 131160, **PATENT** AND TRADEMARK OFFICE ALEXANDRIA VA 22314 11455399 DIRECTOR OF THE UNITED ...

... UNITED STATES 2051 JAMIESON AVE, SUITE 300 ATTN DEPOSIT ACCOUNTS 131160, **PATENT** AND TRADEMARK OFFICE ALEXANDRIA VA 22314 11364671 Directorie 16903 BOTTLEBRUSH COURT ...

... 2051 JAMIESON AVE, SUITE 300ATTN DEPOSIT ACCOUNTS 131160, **PATENT** AND TRADEMARK OFFICE ALEXANDRIA VA 22314 11455399 DIRECTOR OF THE UNITED ...

... UNITED STATES 2051 JAMIESON AVE, SUITE 300 ATTN DEPOSIT ACCOUNTS 131160, **PATENT** AND TRADEMARK OFFICE ALEXANDRIA VA 22314 11364671 Directorie16903 BOTTLEBRUSH COURT ...

14.

Part 5

Virginia Eastern Bankruptcy Court | Jul 23, 2020 | Retail Group, Inc., et al. | Unknown | 20-33113

... 11344634 11287414 11277494 11339874 11369406 11282055 11280314 OUTSIDE GC LLC / **PATENT** GC LLC OUTSLAY, JESSICA OVALL, HOLLY OVALL, JENNY OVALLE, NATALIE OVALLES, ...

... 11337574 11291599 11333926 11317398 11359995 11306996 11323125 11271913 11351111 11277799 OVERSEAS **PATENT** AGENCY, INC. OVERSTREET, CANDY OVERSTREET, KILEY OVERSTREET, LAMIYA OVERSTREET, MYA OVERSTREET, ...

... COUNTY SAN FRANCISCO CA 94145-0901 11118869 11339675 11292447 11360387 11318254 11272930 **11349200** 11327756 11311026 11335138 11316330 11272178 11318059 11277257 11285035 11354150 11359852 11313363 ...

Content type: Briefs, Pleadings and Motions

Terms: 11349200 or 11,349,200

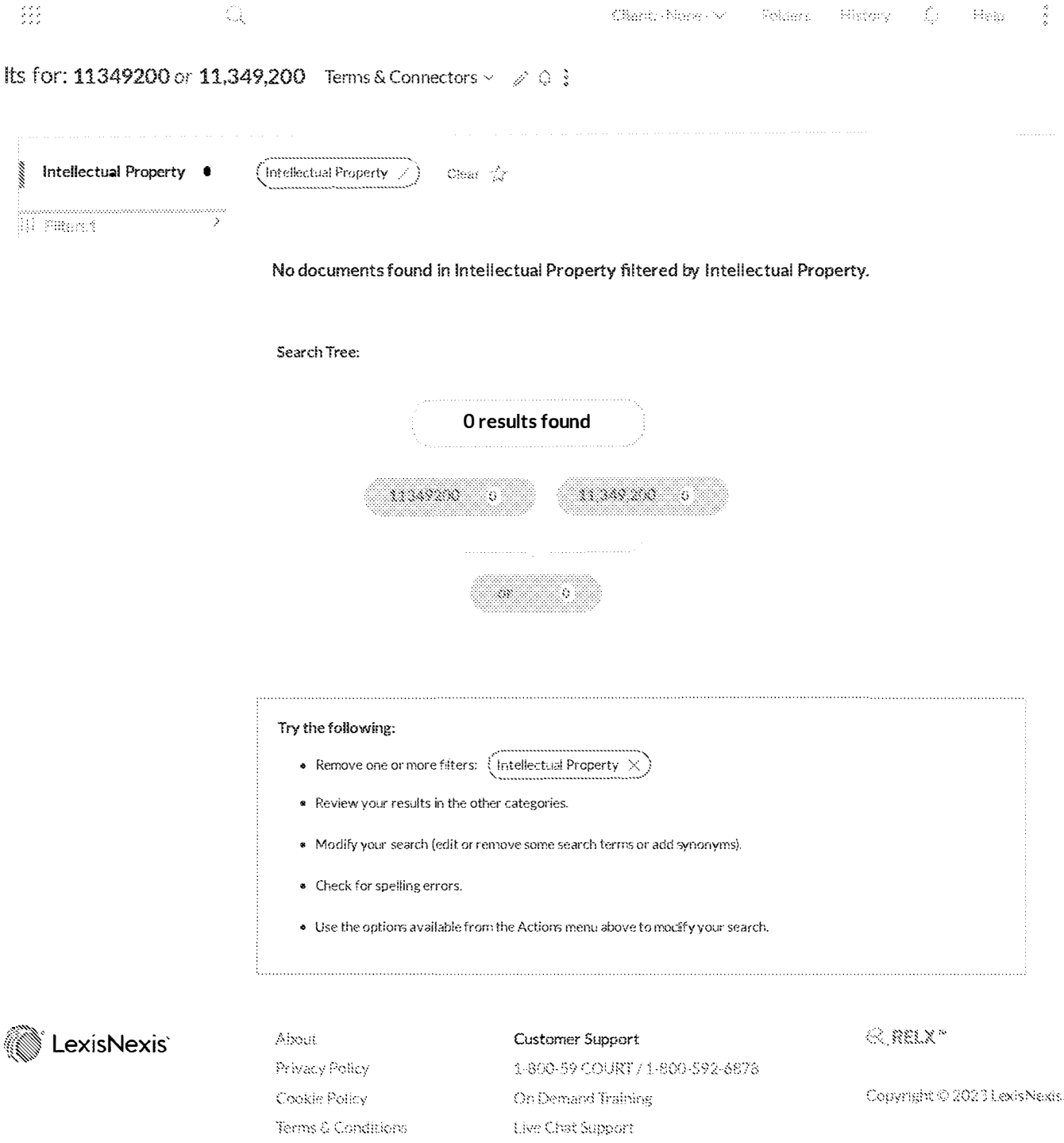
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Results for: 11349200 or 11,349,200

News (1) Sort by: Relevance

1.

US Patent Issued to Fractus on May 31 for "Multiple-body-configuration multimedia and smartphone multifunction wireless devices" (Spanish , French Inventors)

US Fed News | Jun 01, 2022 | 262 words

... US Patent Issued to Fractus on May 31 for "Multiple-body-configuration multimedia and smartphone multifunction wireless devices" (Spanish , French Inventors)...

... ALEXANDRIA , Va., June 1 -- United States Patent no. 11,349,200, issued on May 31, was assigned to Fractus S.A. (Barcelona, Spain). "Multiple-body-configuration multimedia and smartphone multifunction wireless devices" was invented by Carles...

... Puente Baliarda (Barcelona, Spain), Josep Mumbru (Asnieres-sur-Seine, France) and Jordi Ilario (Barcelona, Spain). According to the abstract" released by the U.S. Patent & Trademark Office: "A multifunction wireless device having at least one of...

... having a value of at least 1.05 and not greater than 1.80 and F32 having a value of at least 1.10 and not greater than 1.90." The patent was filed on April 30, 2021, under Application No. 17/246,192. "For further information, including images, charts and...

... tables, please visit: http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=11349200&OS=11349200&RS=11349200 For any query with respect to this article or any other...

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known

Application Number	Ex Parte Re-Exam of 11,349,200
Filing Date	October 12, 2023
First Named Inventor	Puente Baliarda, Carles
Art Unit	
Examiner Name	
Attorney Docket Number	SKAD002

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	Ex. 1011	US- 2004/0134795	01-14-2004	Bolin, Thomas	
	Ex. 1014	US- 2004/0051669	09-25-2003	Rutfors, Tomas	
		US-			
		US-			
		US-			
		US-			
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	Ex. 1012	GB2416625A	02-01-2006	Langley, Richard		
	Ex. 1013	EP1294049A1	03-19-2003	Ollikainen, Jani		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent of Carles Puente Baliarda, *et al.*	§	REQUEST FOR *Ex Parte*
	§	REEXAMINATION
U.S. Patent 11,349,200	§	
	§	Attorney Docket No: SKAD002
Issue Date: May 31, 2022	§	
	§	
Filing Date: April 30, 2021	§	
	§	
For: MULTIPLE-BODY-CONFIGURATION MULTIMEDIA AND SMARTPHONE MULTIFUNCTION WIRELESS DEVICES	§	Real Party in Interest: Unified Patents, LLC

REQUESTER'S POWER OF ATTORNEY PURSUANT TO 37 C.F.R. 1.510(f)

Pursuant to 37 C.F.R. 1.510(f) Requester, **Unified Patents, LLC,** hereby appoints the following Practitioner(s) as its attorney(s) to prosecute and transact all business in the United States Patent and Trademark Office in connection with the above-identified request for *Ex Parte* Reexamination. Please recognize the correspondence address (including any electronic mail address) associated with the attorney(s) listed below for the above-identified *Ex Parte* Reexamination proceeding number to be the address associated with the appointed counsel(s).

Christopher J. Coulson (Reg. # 61,771)

Douglas R. Nemec (Reg. # 41,219)

Skadden, Arps, Slate, Meagher & Flom LLP

One Manhattan West

New York, New York, 10001

Tel.: (212) 735-3785

Fax: (917) 777-3785

chris.coulson@skadden.com

douglas.nemec@skadden.com

The undersigned is authorized to sign this Power of Attorney on behalf of the Requester.

Executed on 10/6/2023.

Unified Patents, LLC

By: Jonathan Stroud

Printed Name: Jonathan Stroud

Title: General Counsel

Claim Chart for Fractus '200 Patent

1. GROUNDS OF UNPATENTABILITY

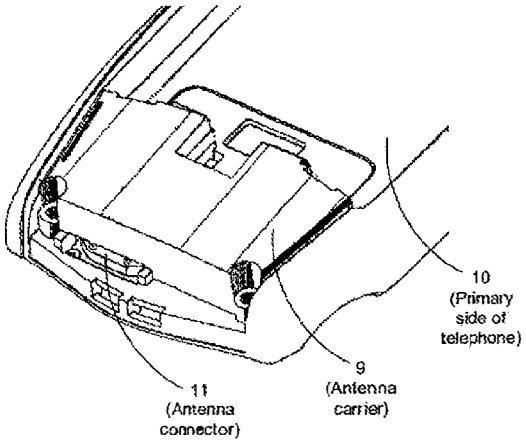
Ground	Claim(s)	Statute(s)	Prior Art
2	Claims 11-12	103	Bolin, Langley, Rutfors

(a) Prior Art Relied Upon

Primary Reference
Ex. 1011 ("Bolin") (U.S. Patent Publication No. 2004/0137950) was filed March 20, 2002 and published July 15, 2004 and is prior art to the '200 Patent under pre-AIA 35 U.S.C. 102(b).
Ex. 1012 ("Langley") (U.K. Patent Publication No. GB2416625) was filed July 22, 2004 and published January 2, 2006 and is prior art to the '200 Patent under pre-AIA 35 U.S.C. 102(b).
Ex. 1013 ("Rutfors") (U.S. Patent Publication No. 2004/0051669) was filed July 10, 2001 an published March 18, 2004 and is prior art to the '200 Patent under pre-AIA 35 U.S.C. 102(b).

(b) Claim Chart

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
Claim 11	
11[pre]. A wireless device comprising:	Claim 11 (and the other claim in this chart) is obvious over the combination of Bolin, Langley, and Rutfors. *See* Request at Section I.E.2. A Person of Ordinary Skill in the Art ("POSITA") would have been motivated to incorporate the antenna of Langley into the wireless device of Bolin because Langley discloses an antenna for use in a wireless device, and because Langley offers the advantage of an antenna that operates on multiple bands (5 bands) and also is compact and efficient. *See* Langley at 1:3-5, 2:21-22; Ex. 1009, ¶¶ 84, 104, 112. A POSITA would have incorporated the multi-band antenna of Langley into the wireless device of Bolin in order to get the benefit of a compact antenna that operates on additional bands and is efficient. Ex. 1009 at ¶¶ 84, 104, 112. Additionally, a POSITA would have been further motivated to add the antenna shielding and antenna system configuration to the wireless device of Bolin/Langley to further improve the isolation between the two antennas and thus improve overall wireless performance of the antenna system while maintaining a compact design. Ex. 1009 at ¶ 126. To the extent 11[pre] is limiting, Bolin discloses element 11[pre].

'200 Patent Claim Language	**Ground 2: Bolin in view of Langley and Rutfors**
	Bolin discloses in Figure 3 a wireless device that includes an antenna system.  Bolin Figure 3 Bolin at [0001]: The "invention relates to…portable communication devices that need… a built-in, multi band, multi antenna system."
[11.1] an antenna system comprising a ground plane and at least two antennas within the wireless device, the antenna system comprising:	Bolin in light of Rutfors discloses element [11.1]; alternatively, any differences would have been obvious to a POSITA. Bolin discloses an antenna system (item 1) in Figure 1 that there are two antennas; a first antenna is the main antenna (item 2 surrounded by dashed lines in Figure 1 of Bolin, which is reproduced below) and the second antenna is a separate Bluetooth antenna (item 3 in Figure 1 of Bolin):

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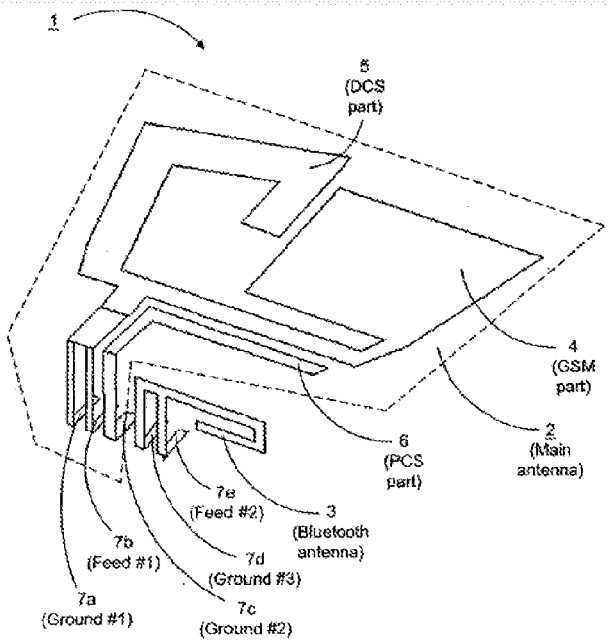
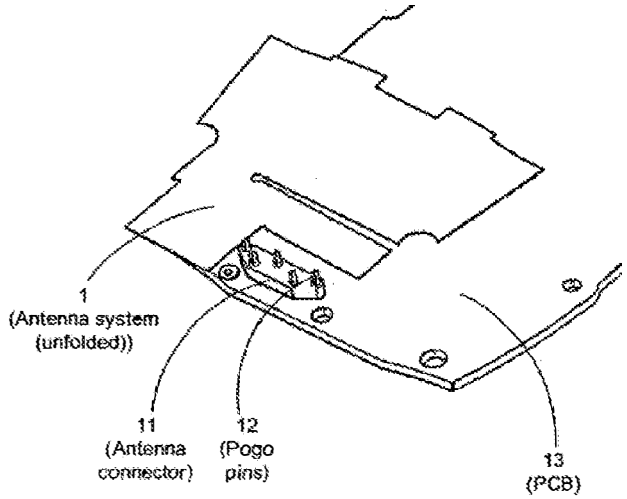


Fig 1

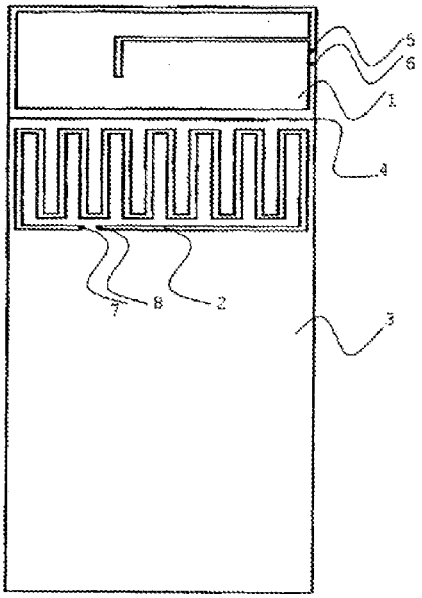
Bolin at [0019]:
"The antenna system has a main antenna 2 for GSM/DCS/PCS and a separate smaller Bluetooth™ antenna 3 positioned very close to the main antenna 2."

"The antenna system 1 has five connection traces…" Bolin at [0025].

Bolin also discloses a ground plane, which is the antenna connector, and the grounding metal to which it is connected. Ex. 1009 at ¶¶ 79-80. The main antenna (2), parasitic part (6) and Bluetooth antenna (3) each have ground traces that connect to the antenna connector (11). Bolin at [0025] ("The antenna system 1 has five connection traces 7a-7e, which all are located in the third plane. Of these connection traces, the main antenna 2 has a ground trace 7a ("Ground #1") and a feed trace 7b ("Feed #1") for the GSM part 4 and the DCS part 5. The parasitic PCS part 6 has only a ground trace 7c ("Ground #2"), whereas the Bluetooth™ antenna 3 has a ground trace 7d ("Ground #3) as well as a feed trace 7e ("Feed #2"), as shown in FIG. 1.")

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	Bolin discloses that various shapes of the main antenna elements may be combined with the PCS part (6) and the Bluetooth antenna (3) that are shown in Figure 1 of Bolin. Ex. 1009 at ¶ 78. These various antenna element shapes are disclosed in Figures 9-12 of Bolin. Bolin at [0034]. Bolin Figure 5 shows the antenna connector (to which the antenna is connected when the system is assembled) and the PCB board to which the antenna connector is attached. The antenna connector has five pins, which match to the five connections shown on Figure 1 of Bolin (above). Therefore, the ground traces are connected through the antenna connector to grounding metal (not further shown in Bolin). Ex. 1009 at ¶¶ 79-80.  Bolin Figure 5 To the extent that Patent Owner argues that Bolin does not disclose a ground plane, a POSITA would have employed the two-antenna and ground plane configuration of Rutfors in order to get the benefit of improved isolation between the two antennas. Rutfors at [0018] – [0019]; Ex. 1009 at ¶¶ 126-144. Rutfors discloses a two-antenna configuration with a ground plane (item 3) in Figures 1-2 of Rutfors. Rutfors at [0013] – [0019]. See Rutfors Figure 1 (showing two antennas and ground plane (3)):

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Rutfors Figure 1

[11.2] a first antenna configured to provide operation in at least three frequency bands being used by 4G communication standards,

Bolin in view of Langley and Rutfors discloses element [11.2]; alternatively, any differences would have been obvious to a POSITA.

A POSITA would have substituted the multi-band antenna of Langley for the multi-band antenna of Bolin (while retaining the Bluetooth antenna of Bolin), for the reasons below. The antenna of Langley employed in the combined device of Bolin/Langley is the first antenna.

Langley discloses an antenna that is configured to provide operation on five frequency bands, which exceeds the required at least three frequency bands. The antenna invention of Langley is the first antenna that is configured to provide operation in at least three frequency bands. A POSITA would have considered it obvious to substitute the antenna of Langley for the main antenna components of Bolin (item 2), while retaining the Bluetooth antenna (item 3) of Bolin, for the reasons explained below.

The multi-band antenna of Bolin operates in three bands (a two-band antenna plus a third parasitic element that covers the third band while also functioning as a high-impedance block). Bolin at [0022] – [0023] and Claim 1. The need for additional bandwidth coverage in

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	wireless devices is disclosed by Bolin. Bolin at [0001]. Langley advantageously offers an antenna that covers five bands, which is more than the three bands covered by the main antenna of Bolin. See Langley at 4:29-32. A POSITA would have understood that coverage of additional wireless bands was advantageous, given the known need at the time of the alleged invention for wireless devices that covered more wireless bands. Ex. 1009 at ¶¶ 104-105. A POSITA would have understood that the multi-band antenna of Langley could be used in place of the main antenna components of the antenna system of Bolin. Ex. 1009 at ¶¶ 127-131. Langley discloses a compact antenna. Langley at 3:4-6. A POSITA would consider it obvious to substitute the antenna of Langley for the main antenna components of Bolin (item 2). Ex. 1009 at ¶¶ 127-131, 138. A POSITA would have considered the substitution of the antenna of Langley for the main antenna of Bolin (item 2 of Figure 1 of Bolin) to be the simple substitution of one known element (the Langley Antenna) for another (the Bolin main antenna) to obtain predictable results of increasing the number of wireless bands that the antenna system covers. Ex. 1009 at ¶ 105. A POSITA would have understood that the elements of the antenna of Langley could be tuned (that is, adjusted) in order to operate in the antenna system of Bolin. Ex. 1009 at ¶ 93. Langley explains that the resonant frequencies of its antenna can be "easily and ***predictably altered*** by changing the thickness if [sic, of] the substrate." Langley at 10:8-10. (The thickness referred to by Langley is the thickness of the printed circuit board substrate, Langley at 6:21-24, and therefore changing this thickness would not affect the dimensions used to calculate complexity factor. Ex. 1009 at ¶ 93. The antenna examples of Langley shown in Figures 2 and 13 are x-y dimensions whereas the thickness is the z dimension. Ex. 1009 at ¶ 93. Langley explains that the antenna invention of Langley operates on five frequency bands. Langley at 4:29-5:7. Therefore these two antenna embodiments each operate on five frequency bands. See Langley at 5:12-6:13. The antennas of Figure 2 (embodiment example 1) and Figure 13 (embodiment example 2) are two examples of the invention of Langley, and therefore these two antennas operate on five frequency bands. See Langley at 5:12-6:13. Ex. 1009 at ¶¶ 102, 104-105.

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The invention of Langley is shown, for example, in Figure 13 of Langley:

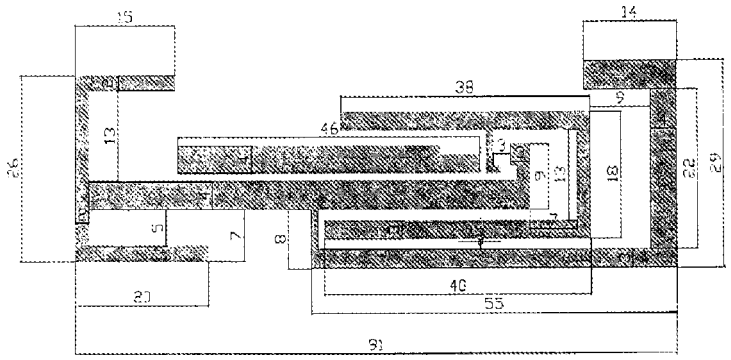


Fig. 13

Langley at [4:29-30]:
"Another aspect of the invention provides an antenna for use with five separate frequency bands, comprising the antenna described above."

Langley explains that the antenna shown in Figure 13 is an example of the invention (which, as described above, the invention is an antenna that operates on five bands). Langley at 5:12-6:13.

Langley discloses the following chart:

System	Frequency Band
GSM 900	890 – 960 MHz
DCS1800	1710 – 1880 MHz
DECT	1900 MHz
UMTS	1920 – 2170 MHz
Bluetooth	2400 – 2483.5 MHz
Hiperlan 1/2	5150– 5725 MHz

Langley at 8:12-13.

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As Langley explains, "Coverage of these commercially useful frequency bands is provided by the Invention within the following three frequency bands, for which the measured return loss is less than -10dB." Langley at 8:14-16. (Generally, as a POSITA would have understood, a return loss of 10 or more on a negative scale for a particular frequency band indicates a commercially useful antenna for that frequency band. Ex. 1009 at ¶¶ 85-57. Langley summarizes the frequency bands covered by the antenna of example 1 as follows:

Frequency band (MHz)	Bandwidth	System covered
885 – 973	88 MHz	GSM900
1530 – 2590	1060 MHz	DCS1800 UMTS Bluetooth DECT
4830 – 5970	1340 MHz	Hiperlan 1 Hiperlan 2

Langley at p.8 (bottom).

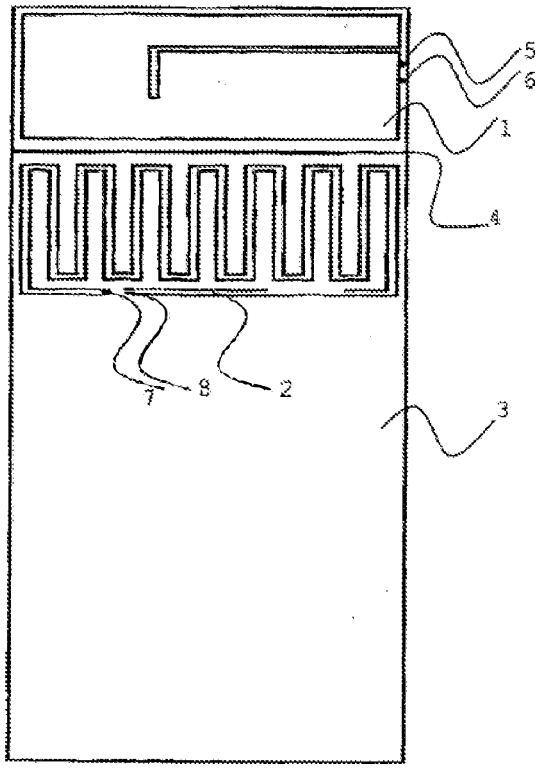
Langley explains that antennas of the invention (of which the antennas of example 1 (shown by Figure 2 of Langley) and example 2 (shown by Figure 13 of Langley are two embodiments) preferably cover "frequencies of 900MHz, 1800MHz, 2000MHz, 2400MHz and 5400MHz." Langley at 4:29-32.

Langley discloses an "antenna configured to provide operation in at least three frequency bands being used by 4G communication standards." Three frequencies in the above charts (Langley p.8 and 8:12-13) fall within the 2-11 GHz range that is identified by the '200 Patent as being used by 4G standards: 1920-2170 Mhz, which overlaps the 2-11 GHz range, and 2400-2483.5 MHz and 5150-5725 MHz, both of which fall within the 2-11 GHz range. Also, based on the disclosure of frequencies in which the antenna invention of Langley preferably operates as disclosed as above, at least three of the wireless bands (2000MHz, 2400MHz and 5400MHz) in which the antenna of Langley operates (as explained above) fall within the range of 2-11 GHz that the '200 Patent explains is a range that is used by 4G communications standards. See Ex. 1001 at 25:14-23. A POSITA would have understood the plain and ordinary meaning of "frequency bands being used by 4G communication standards" to include at least three of the frequency ranges that the antenna of Langley is disclosed to cover. Ex. 1009 at ¶¶ 85-90.

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	Even if a POSITA were to apply post-2006 (that is, after the alleged date of the invention) 4G communications standards, Langley still discloses an antenna configured to provide operation in at least three bands of those communications standards. Ex. 1009 at ¶ 91. The 3GPP Version 8 which formalized the 4G standard includes frequency bands of 900 MHZ (e.g., 880-915 MHz) and between 1805 MHz - 2400 MHz inclusive. Ex. 1016 at 13-14; Ex. 1017 at 32-33; Ex. 1009 at ¶¶ 54-56. Langley discloses that its antenna invention operates in three bands, 900MHz, 2000MHz, 2400MHz, that fall within these ranges. Langley at 4:29-32. To the extent that Patent Owner argues that Langley does not satisfy the claim element of an "antenna configured to provide operation in at least three frequency bands being used by 4G communication standards," it would have been obvious to modify Langley to provide this functionality. Ex. 1009 at ¶ 93. A POSITA would also have understood that the frequency bands of Langley could be readily tuned to provide coverage for 4G wireless standards bands, and a POSITA would have understood that it was advantageous for the wireless device to operate in 4G wireless standards bands. Ex. 1009 at ¶ 93. Langley at [3:15-17]: "[T]he positional relationship between the different conductive elements provides a number of useful frequency bands." Langley at [3:4-5]: "The invention provides a compact and efficient multi-band antenna capable of supporting a variety of frequency bands." Langley also emphasizes the importance of its disclosed five-band antenna invention as it claims this functionality: "[Langley claim] 17. An antenna for use with five separate frequency bands, comprising the antenna of any preceding claim. 'Langley claim] 18. The antenna of claim 17, wherein the five separate frequency bands comprise frequencies of 900MHz, 1800MHz, 2000MHz, 2400MHz and 5400MHz respectively" Langley at 13:7-12. As explained by Langley, "[a] number of antenna designs that are capable of operating in at least two defined frequency bands have been proposed. One approach for providing a multiple band antenna

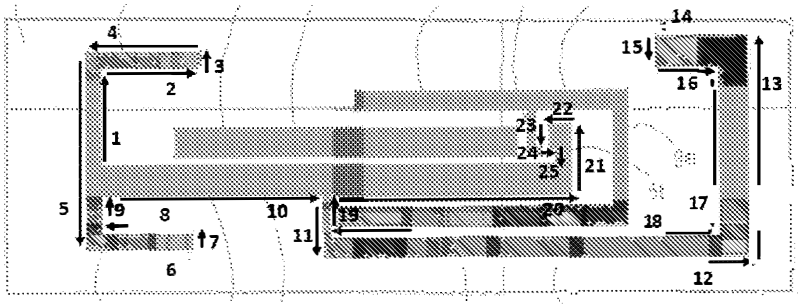
'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	is to use separate antennas, each corresponding to a different frequency band. Another approach is to use a single antenna capable of resonance in a plurality of frequency bands. **However, there remains a need for a compact and efficient multi-band antenna.**" Langley at 2:17-22 (emphasis added). In the Bolin/Langley device of this combination, the multi-band antenna of Langley is substituted for the entire main antenna (item 2). The multi-band antenna of Langley replaces all the antenna elements of the main antenna of Bolin, including replacing the high-impedance blocking element (6) of Bolin that improves isolation between the first main antenna and the second Bluetooth antenna. Ex. 1009 at ¶¶ 126-127. Therefore, as explained below, a POSITA would have been motivated to include the antenna shield of Rutfors in place of the high-impedance blocking element (6) of Bolin to provide isolation between the two antennas (which are the multi-band antenna of Langley and the Bluetooth antenna of Bolin). Ex. 1009 at ¶¶ 126-127. A POSITA would have been motivated to incorporate the antenna shield and two-antenna configuration of Rutfors in the wireless device of Bolin/Langley in order to get the benefit of improved isolation between the two closely-spaced antennas. Ex. 1009 at ¶¶ 126-129. A POSITA would have incorporated the antenna configuration (including the antenna shield) of Rutfors to improve isolation between the antenna of Langley and the Bluetooth antenna of Bolin, for the reasons explained below. Ex. 1009 at ¶¶ 126, 132. Rutfors discloses a shield (item 4 in Figure 1 of Rutfors below) that is positioned between two internal antennas.

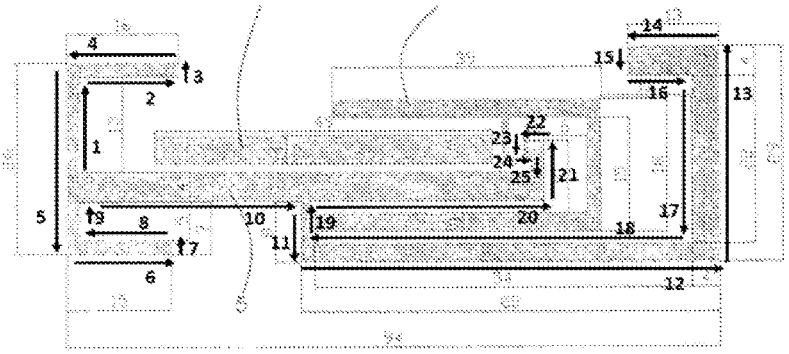
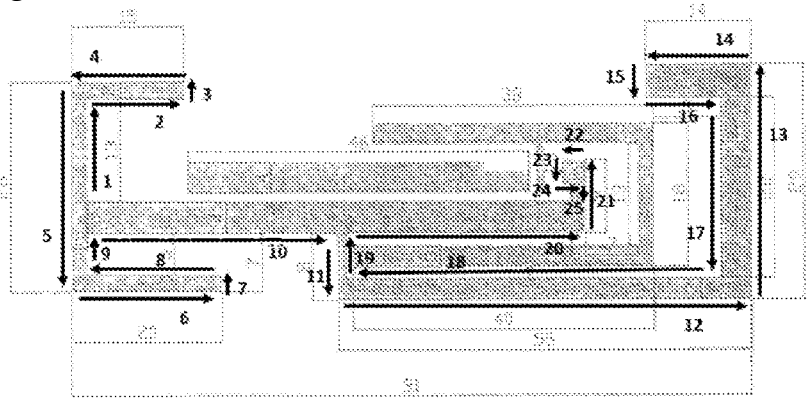
'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors



Rutfors at Figure 1. In the embodiment shown in Figure 1, "The screen 4 [i.e., the shield separating the two antennas] is grounded and elevated over the ground plane device 3, forcing the currents passing it to change direction (up onto the screen). This additionally reduces the amount of current flowing on the PCB from one antenna to the other, thus minimizing the coupling between the antennas." Rutfors at [0018].

Rutfors explains that the shield between its two internal antennas allows for closer placement of the two antennas. "An object of the present invention is to provide an antenna arrangement that offers improved isolation, i.e. decreased coupling, between antennas in a portable radio communication device, such as a mobile telephone. . . . A further object of the present invention is to provide a portable radio communication device, such as a mobile telephone, that offers improved isolation between antennas inside said device. . . . With a shield between internal antennas in a portable radio communication device the coupling between the antennas is reduced and therewith it

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	is possible to place the antennas close to each other. Further, with internal antennas of different types, such as meander antenna and PIFA, the coupling between the antennas are less than with two antennas of the same type, such as PIFA and PIFA. Thus two antennas of different types and separated by a shield can be positioned closer together than two of the same type separated by a shield, still providing the same amount of isolation." *Id*. at [0005], [0007], [0010].
[11.3] the first antenna defining an antenna contour comprising an entire perimeter of the first antenna, the antenna contour comprising at least twenty segments,	Bolin in view of Langley discloses this element [11.3]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that defines an antenna contour comprising its entire perimeter that comprises at least 20 segments. A POSITA would have substituted the antenna of Langley for the main antenna of Bolin for the reasons explained in [11.2]. Langley discloses at least two antenna embodiments that include at least 20 segments. Langley discloses the antenna of example 1 (shown in Figure 2 of Langley) and the antenna of example 2 (shown in Figure 13 of Langley), each of which, when calculations are performed using the procedure set forth in the '200 patent, have a contour with at least 20 segments. See Langley at 5:15-16, 6:12-13, 6:21-7:33, 10:2-4 (generally describing the two embodiments represented by these figures); Ex. 1009 at ¶ 113. The antenna of the embodiment of example 1 of Langley (shown in Figures 1 and 2 of Langley, reproduced below, which have been faded to show annotations) discloses at least 25 segments in the antenna contour, as shown in the annotated versions 1 below. (Figure 2 is Figure 1 with dimensioning).  Langley Figure 1

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	 Langley Figure 2 Likewise, the antenna of example 2 of Langley, as shown in Figure 13 of Langley (faded to show annotations), discloses at least 25 segments in the antenna contour:  Langley Figure 13
[11.4] wherein the antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20	Bolin in view of Langley discloses element [11.4]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that has an antenna contour with a level of complexity defined by a complexity factor F21 having a value of at least 1.20. A POSITA would have substituted the antenna of Langley for the main antenna of Bolin for the reasons explained in [11.2]. Langley discloses at least two antenna embodiments that have an antenna contour with a complexity factor F21 with a value of at least 1.20. Langley discloses the antenna of example 1 (shown in Figure 2 of Langley) and the antenna of example 2 (shown in Figure 13 of

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors

Langley), each of which, when calculations are performed using the procedure set forth in the '200 patent, have an F21 value of at least 1.20. See Langley at 5:15-16, 6:12-13, 6:21-7:33, 10:2-4 (generally describing the two embodiments represented by these figures).

As shown in the appendix to this chart below at page 38-41, the antenna embodiment of example 1 (shown in Figure 2 of Langley) has an F21 value of at least 1.38 when F21 is calculated according to the procedure set forth in the '200 Patent. For avoidance of doubt, the calculation was performed using all four corners of the antenna box as a feed corner, and also, the calculation was performed both including and excluding "close call" boxes of the respective grids, and the lowest calculated value is reported.

As shown in the appendix to this chart below at pages 43-46, the example antenna of Figure 13 of Langley has an F21 value of at least 1.32. The calculation was performed using the same procedure described above for the antenna of Figure 2 of Langley.

As shown in the appendix to this chart below at pages 38-41, 43-46:

Calculation for Antenna Example 1 (Figure 2 of Langley):

When using N2 = 26 and N1 = 10, we get the following:

$$F21 = -\frac{\log(26)-\log(10)}{\log(0.5)} = 1.378512 = 1.38$$

Calculation for Antenna Example 2 (Figure 13 of Langley):
When using N2 = 26 and N1 = 10, we get the following:

$$F21 = -\frac{\log(26)-\log(10)}{\log(0.5)} = 1.378512 = 1.38$$

When using N2 = 26 and N1 = 9, we get the following:

$$F21 = -\frac{\log(26)-\log(9)}{\log(0.5)} = 1.530515 = 1.53$$

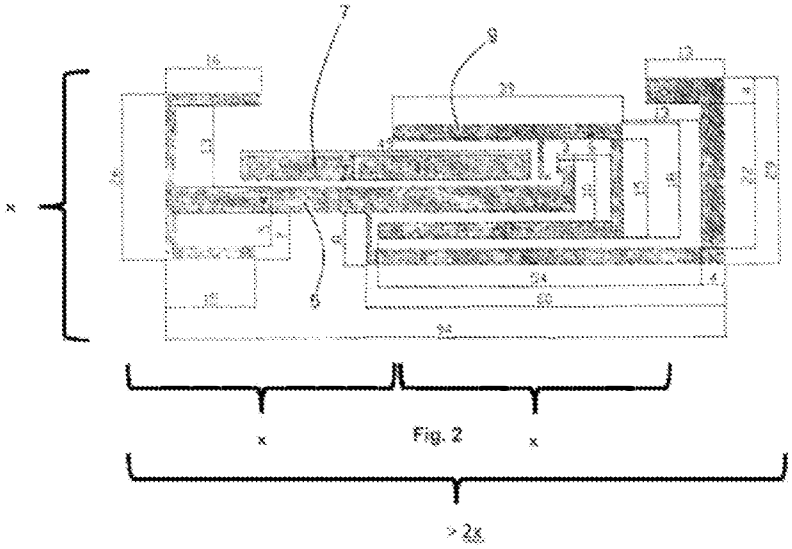
When using N2 = 25 and N1 = 10, we get the following:

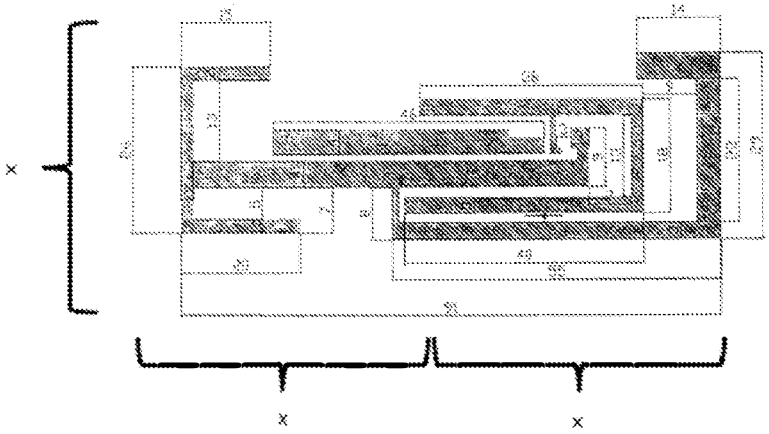
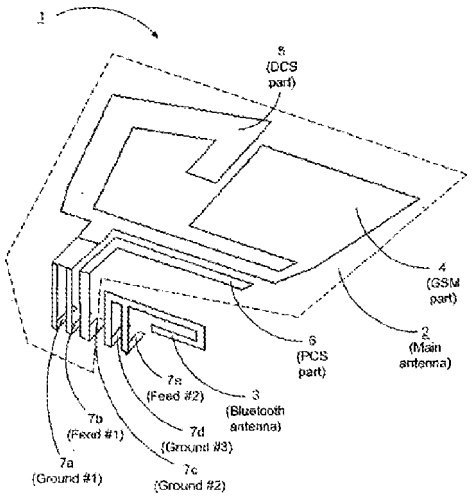
$$F21 = -\frac{\log(25)-\log(10)}{\log(0.5)} = 1.321928 = 1.32$$

Finally, when using N2 = 25 and N1 = 9, we get the following:

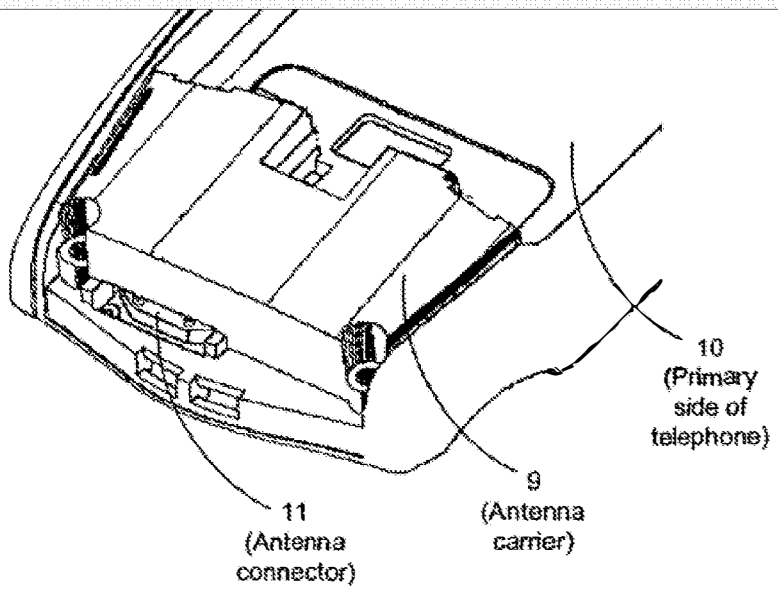
'200 Patent Claim Language	**Ground 2: Bolin in view of Langley and Rutfors**
	$F21 = -\frac{\log(25)-\log(9)}{\log(0.5)} = 1.473931 = 1.47$
[11.5] and complexity factor F32 having a value of at least 1.35,	Bolin in view of Langley discloses element [11.5]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that has an antenna contour with a level of complexity defined by a complexity factor F32 having a value of at least 1.35. A POSITA would have substituted the antenna of Langley for the main antenna of Bolin for the reasons explained in [11.2]. As shown in the appendix to this chart below at page 40-41, the example 1 antenna of Langley, shown in Figure 2 of Langley has an F32 value of at least 1.58 when F32 is calculated according to the procedure set forth in the '200 Patent. For avoidance of doubt, the calculation was performed using all four corners of the antenna box as a feed corner, and also, the calculation was performed both including and excluding "close call" boxes of the respective grids, and the lowest calculated value is reported. As shown in the appendix to this chart below at page 42-43, the example 2 antenna of Langley, shown in Figure 13 of Langley has an F32 value of at least 1.55. The calculation was performed using the same procedure described above for the antenna of Figure 2 of Langley. As shown in the appendix to this chart below at pages 40-43: **Calculation for Antenna Example 1 (Figure 2 of Langley):** *When using N3 = 76 and N2 = 26, we get the following:* $F32 = -\frac{\log(78)-\log(26)}{\log(0.5)} = 1.584963 = 1.58$ **Calculation for Antenna Example 2 (Figure 13 of Langley):** *When using N3 = 76 and N2 = 26, we get the following:*

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	$F32 = -\frac{\log(76)-\log(26)}{\log(0.5)} = 1.547488 = 1.55$ *When using N3 = 76 and N2 = 25, we get the following:* $F32 = -\frac{\log(76)-\log(25)}{\log(0.5)} = 1.604071 = 1.60$ *When using N3 = 78 and N2 = 26, we get the following:* $F32 = -\frac{\log(78)-\log(26)}{\log(0.5)} = 1.584963 = 1.58$ *Finally, when using N3 = 78 and N2 = 25, we get the following:* $F32 = -\frac{\log(78)-\log(25)}{\log(0.5)} = 1.641546 = 1.64$
[11.6] and wherein the first antenna defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna, an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining an antenna rectangle, an aspect ratio of the antenna rectangle being defined as a	Bolin in view of Langley discloses element [11.6]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna, an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining an antenna rectangle, an aspect ratio of the antenna rectangle being defined as a ratio between a width and a height of the antenna rectangle, wherein the aspect ratio has a value of at least 2. A POSITA would have substituted the antenna of Langley for the main antenna of Bolin for the reasons explained in [11.2]. The rectangle that is the outer perimeter of the grid G2 shown in the appendix to this chart at pages 32 (for Langley example 1 shown in Figure 2 of Langley) and 26 (for Langley example 2 shown in Figure 13 of Langley) is the antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna, an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining an antenna rectangle.

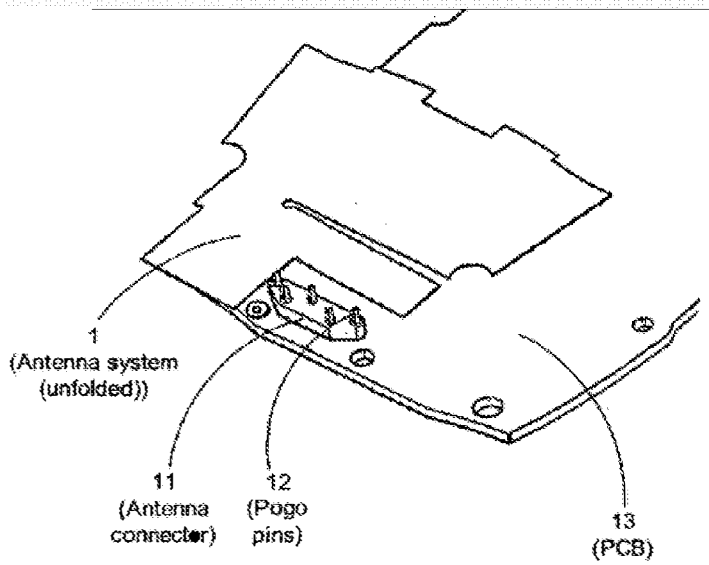
'200 Patent Claim Language	**Ground 2: Bolin in view of Langley and Rutfors**
ratio between a width and a height of the antenna rectangle, wherein the aspect ratio has a value of at least 2; and	The aspect ratio of the antenna rectangle is the ratio between the width and height of that rectangle that is the outer perimeter of the grid G2 shown in the appendix to this chart at pages 28 (for Langley example 1 shown in Figure 2 of Langley) and 22 (for Langley example 2 shown in Figure 13 of Langley). Langley discloses a width to height ratio of at least 2 for the example antennas disclosed in Figure 2 (example 1 embodiment, see Langley at 5:15-16, 6:21-7:33) and Figure 13 (example 2 embodiment, see Langley at 6:12-13, 10:2-4), as shown in the annotated diagrams below. Langley provides dimensions for the antennas of Figures 2 and 13 that are the same as the dimensions of the antenna rectangle discussed above. As shown in Figure 2 of Langley, the width is 94 and the height is 29. The ratio is **94 / 29, or 3.24**, which is at least 2. Langley at Figure 2 (annotations added):  Fig. 2 As shown in Figure 13 of Langley, the width is 94 and the height is 29. The ratio is **94 / 29, or 3.24**, which is at least 2. Langley at Figure 13 (annotations added):

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	
[11.7] a second antenna configured to provide operation in a first wireless service,	Bolin discloses element [11.7]; alternatively, any differences would have been obvious to a POSITA. The second antenna configured to provide operation in a first wireless service is the separate Bluetooth antenna that is disclosed by Bolin. See Ex. 1009 at ¶¶ 102-103. Bolin discloses at Figure 1 the location of the Bluetooth antenna 3, which lies outside the rectangular dotted line that encloses the first antenna. "[T]he second antenna (3) is a Bluetooth™ antenna." See Bolin Claim 4.  *Fig 1*

'200 Patent Claim Language	**Ground 2: Bolin in view of Langley and Rutfors**
	The first wireless service for which the second antenna (item 3 in Figure 1 of Bolin as shown above) is Bluetooth. See Ex. 1009 at ¶¶ 102-103. Figure 1 shows how "[t]he main antenna 2 is a built-in patch with parasitic element, whereas the smaller Bluetooth™ antenna 3 is a PIFA, however folded a little bit to fit the small space available." Bolin at [0020]. "The combination of the antennas, their individual positions, and the folding together with the electrical connection are noteworthy features." *Id.*
[11.8] the second antenna being proximate to a side of a ground plane rectangle enclosing the ground plane.	Bolin in view of Rutfors discloses element [11.8]; alternatively, any differences would have been obvious to a POSITA. The second antenna (which is the Bluetooth antenna, item 3 of Figure 1 of Bolin) is proximate to a side of a ground plane rectangle enclosing the ground plane. Ex. 1009 at ¶¶ 78-80. To the extent that Patent Owner argues that Bolin does not disclose a ground plane rectangle enclosing the ground plane, Rutfors discloses this and a POSITA would have employed the ground plan configuration of Rutfors, for the reasons explained below. Bolin discloses that the Bluetooth antenna (item 3 in Figure 1 of Bolin) is connected to the antenna connector (11) to the PCB board (13), as shown in Figures 3-5 of Bolin. "As seen in FIG. 2, the antenna system 1 is connected to radio circuitry on a printed circuit board 13 (FIG. 5) through electrical feeding 8. As appears from FIGS. 3-5, the electrical feeding 8 is implemented as an antenna connector 11, which is mounted to the printed circuit board 13 and comprises a group of five pogo pins 12 (one for each connection trace 7a-7e)." Bolin at [0026] Bolin Figure 3 shows the antenna carrier (that encloses the antenna system) and the antenna connector):

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors
	 Bolin Figure 3. Bolin Figure 5 shows the antenna connector (to which the antenna is connected when the system is assembled) and the PCB board to which the antenna connector is attached:

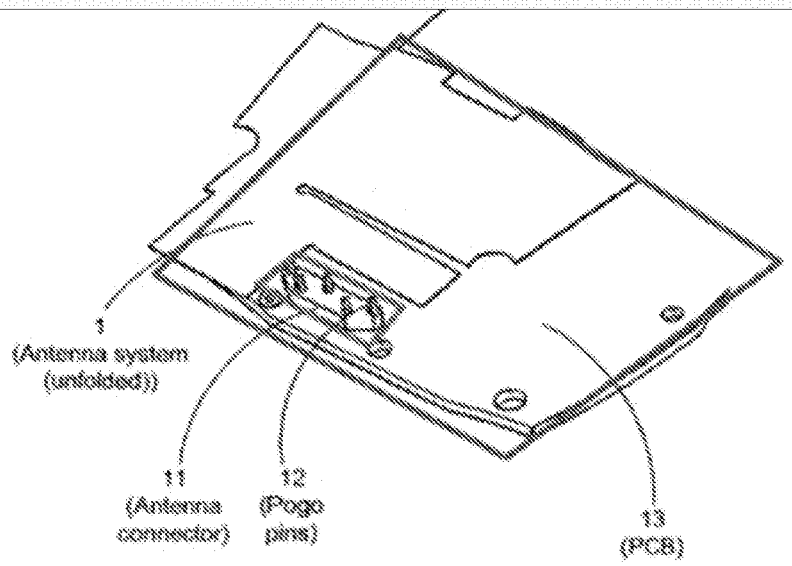
'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors



Bolin at Figure 5.

As drawn in the below figure, whether the ground plane rectangle is substantially drawn around the antenna connector (small box), or whether it is drawn around the PCB board (including the antenna connector area, large box), in either case a side of the ground plane will be proximate to the second Bluetooth antenna. Ex. 1009 at ¶¶ 78-80. This is because the Bluetooth antenna that is disclosed by Bolin is located near the bottom edge of the wireless device, as shown in Figures 3-5 of Bolin.

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors



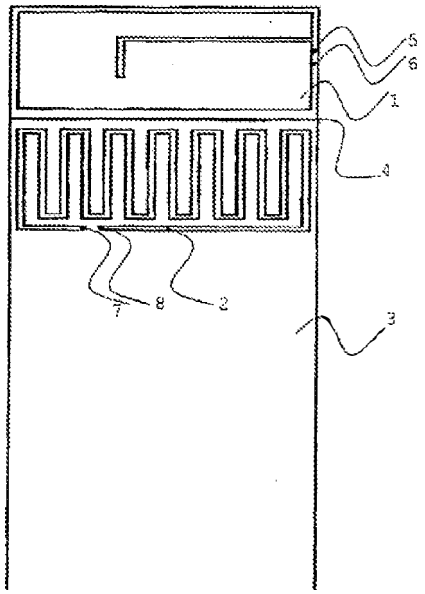
Bolin at Figure 5 (annotations added).

The ground plane disclosed by Bolin is the antenna connector and any grounding metal to which it is connected. Ex. 1009 at ¶¶ 78-80. Because the second antenna (the Bluetooth antenna) is proximate to the bottom of the PCB and of the wireless device, however the grounding metal extends from the antenna connector, the second antenna will be proximate to a side of a rectangle enclosing the ground plane, as shown in the two example ground plane rectangles drawn to annotate Bolin Figure 5 above. Ex. 1009 at ¶¶ 78-80.

To the extent that the Patent Owner alleges that the combination of Bolin and Langley does not disclose a "second antenna . . . proximate to a side of a ground plane rectangle enclosing the ground plane," a POSITA would have included the teachings of Rutfors and modified the Bolin/Langley device to include the placement of the multi-antenna system of Rutfors that is located proximate to the side of the ground plane rectangle. Ex. 1009 at ¶¶ 79-80, 128, 132. A POSITA would have understood that Rutfors improves the Bolin/Rutfors device by enabling improved antenna isolation in the multi-antenna system of Bolin and additionally enabling a compact antenna system design. Ex. 1009 at ¶ 132.

'200 Patent Claim Language	Ground 2: Bolin in view of Langley and Rutfors

Rutfors discloses a ground plane and discloses a configuration in Figures 1 and 2 in which the second antenna is proximate to the side of the rectangle that encloses the ground plane. Ex. 1009 at ¶¶ 119-121. Rutfors discloses at Figures 1 and 2 two antennas located near the top edge and side edges of the ground plane. For example, Figure 1 of Rutfors shows:



Rutfors Figure 1

Rutfors at [0016]:
The "first and a second antenna element 1, 2 are connected to a ground plane device 3, i.e. the PCB of a portable radio communication device, such as a mobile telephone."

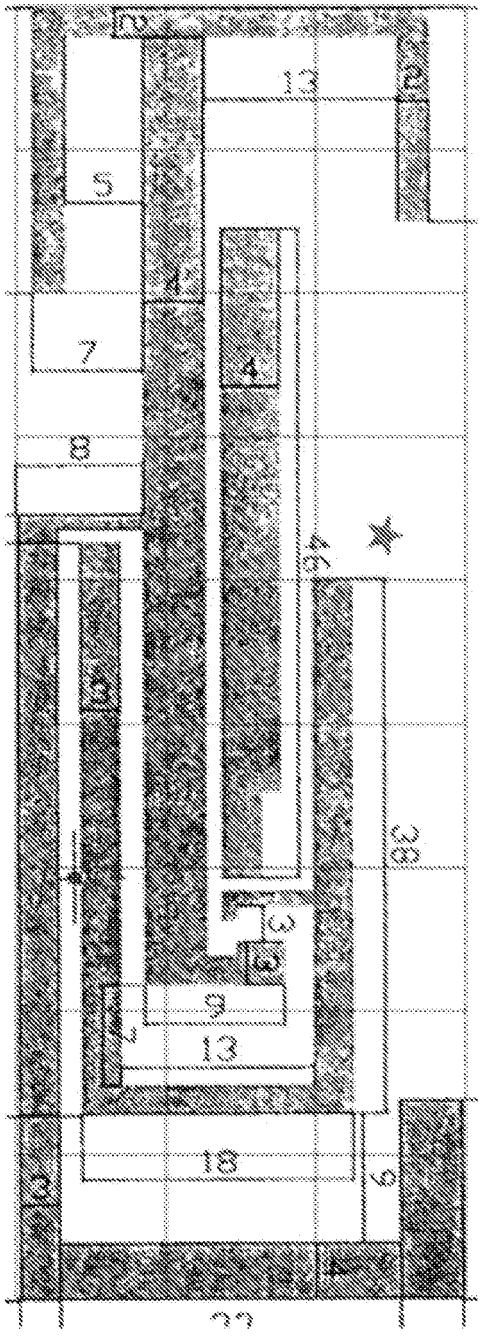
A POSITA would have recognized that the placement of the second antenna in the arrangement disclosed by Rutfors would result in an antenna system proximate to a side of a ground plane rectangle, which is a proxy for the edges of the ground plane. Ex. 1009 at ¶¶ 119-121, 135, 137. Bolin discloses how such a design is conducive to a compact antenna system with good isolation between the two antennas, while Rutfors discloses how such a design provides "greater functionality and better radio channel quality." Bolin at [0032]; Rutfors at [0002].

'200 Patent Claim Language	**Ground 2: Bolin in view of Langley and Rutfors**
Claim 12	
12. The wireless device of claim 11, wherein the first antenna is configured to support at least four frequency bands.	Bolin in view of Langley discloses [12]; alternatively, any differences would have been obvious to a POSITA. Langley discloses an antenna invention that is configured to support five bands, which satisfies the "at least four" frequency bands requirement. Langley at 4:29-30. Ex. 1009 at ¶¶ 66, 84, 153. See [11.2], above.

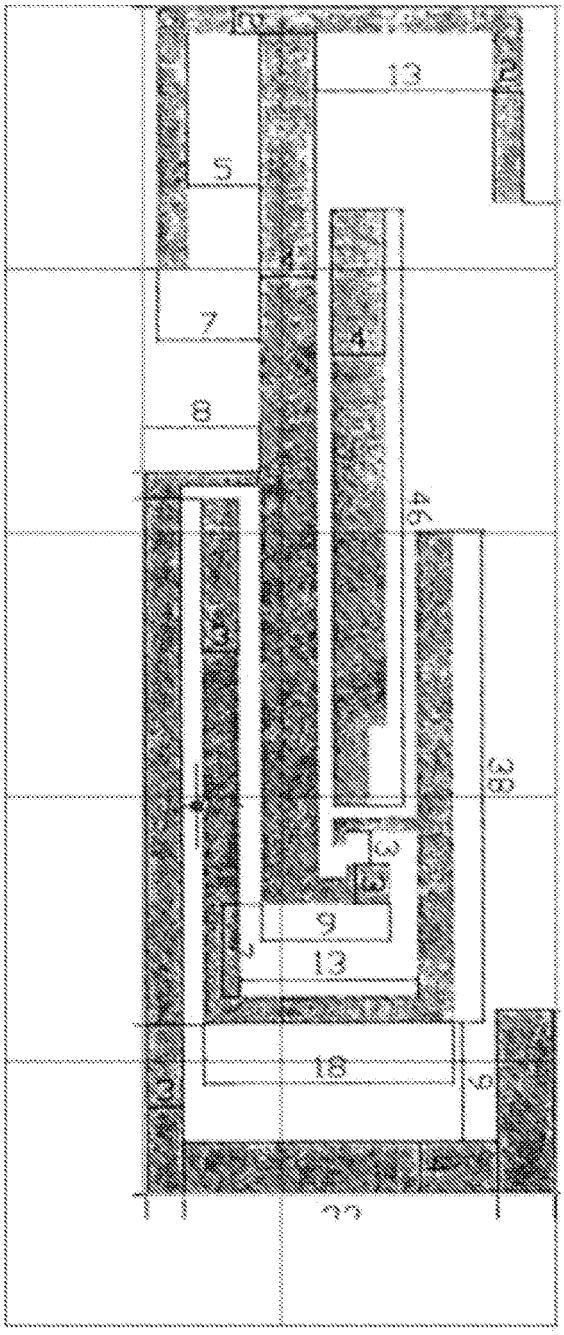
APPENDIX TO CLAIM CHARTS FOR FRACTUS '200 PATENT

COMPLEXITY FACTOR CALCULATION FOR TWO EMBODIMENTS OF LANGLEY (the antennas of examples 1 and 2, as reflected in Figures 2 and 13 of Langley respectively)

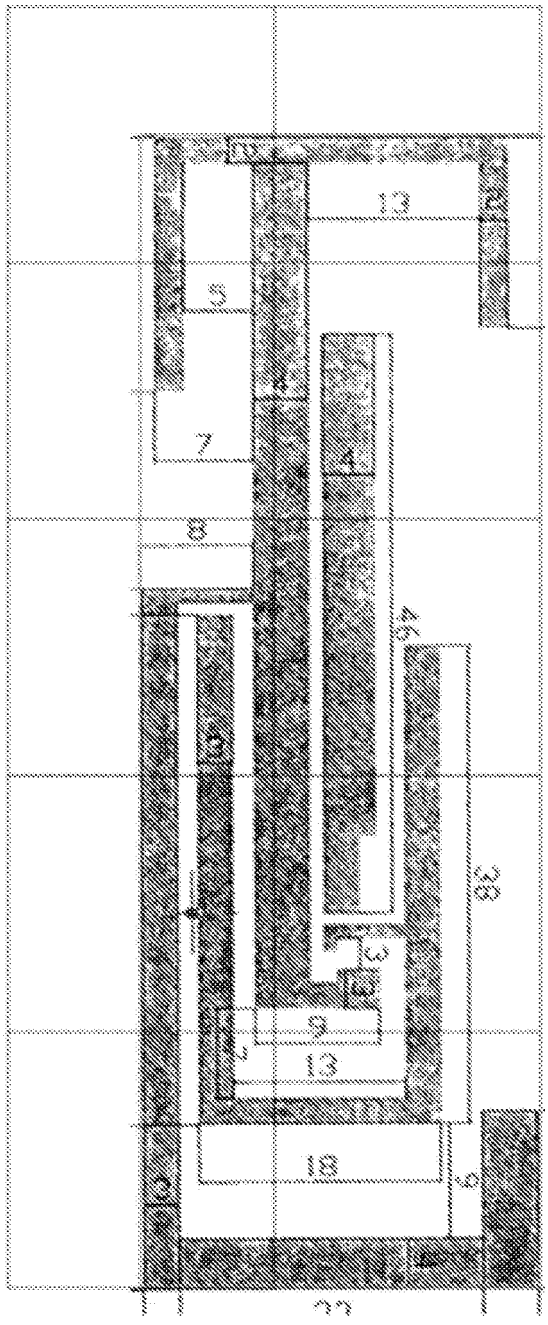
Langley Fig. 13 –G2



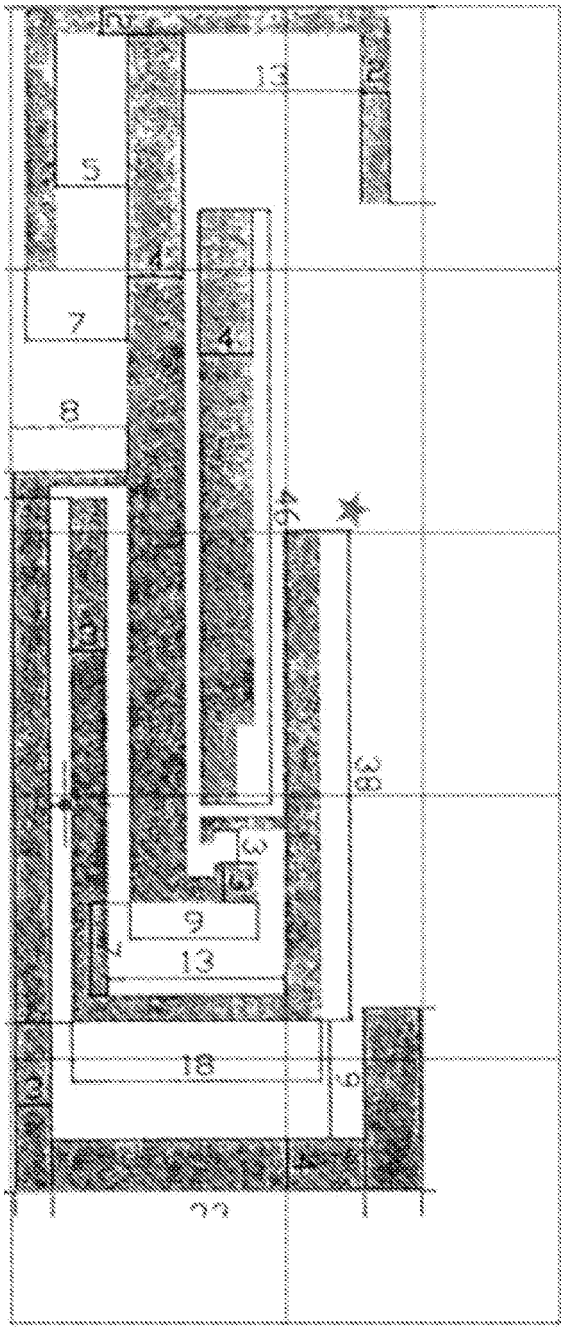
Langley Fig. 13 – G1, Upper Left Feeding Corner



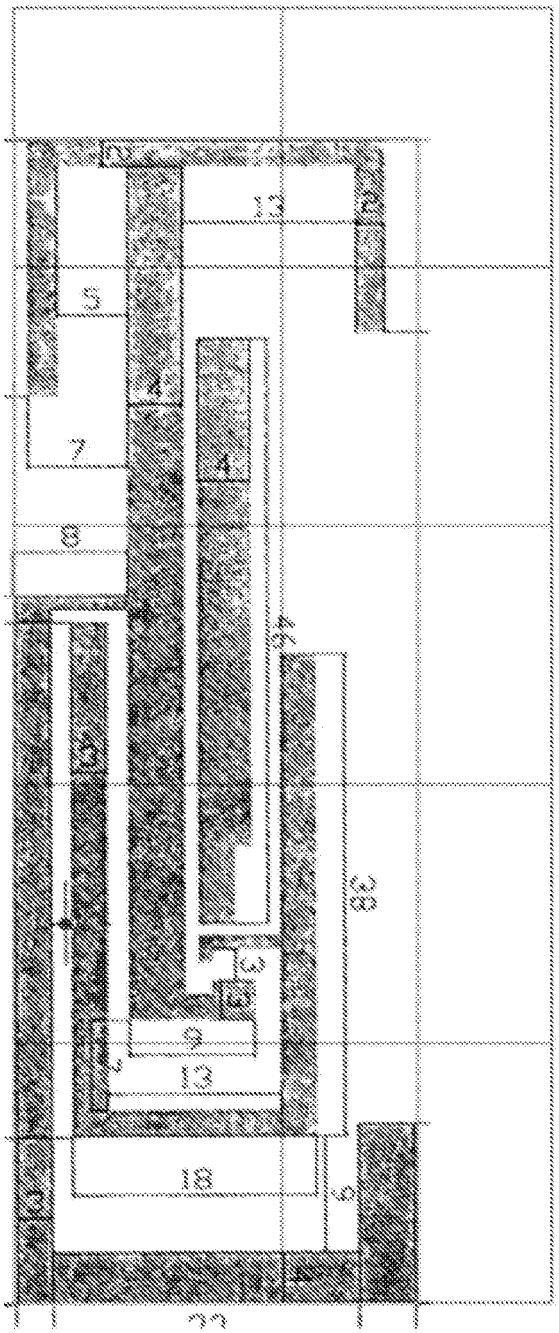
Langley Fig. 13 – G1, Upper Right Feeding Corner



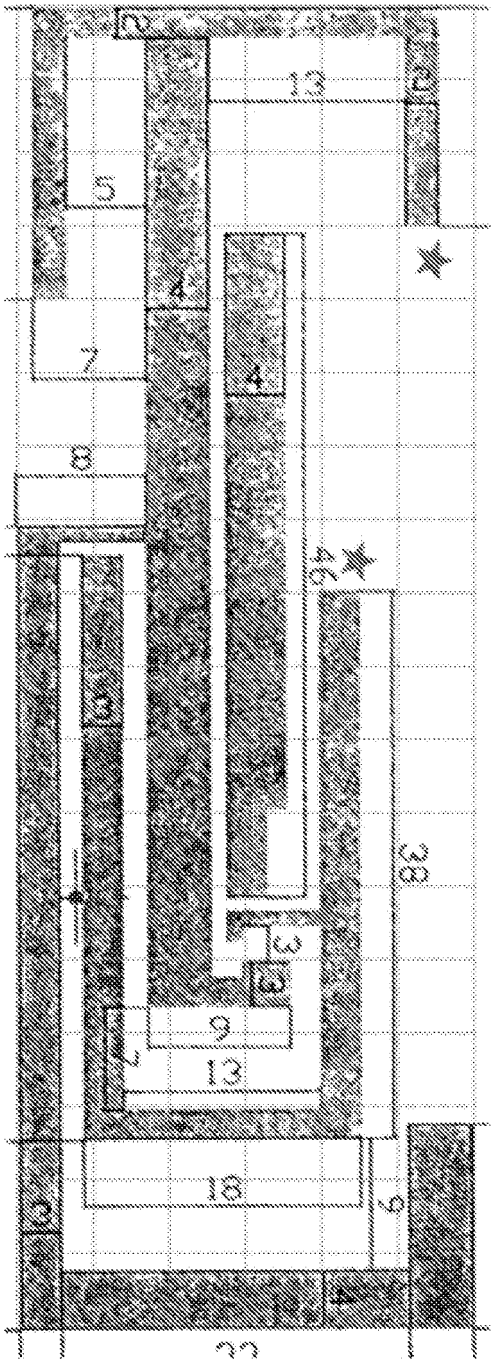
Langley Fig. 13 – G1, Bottom Left Feeding Corner



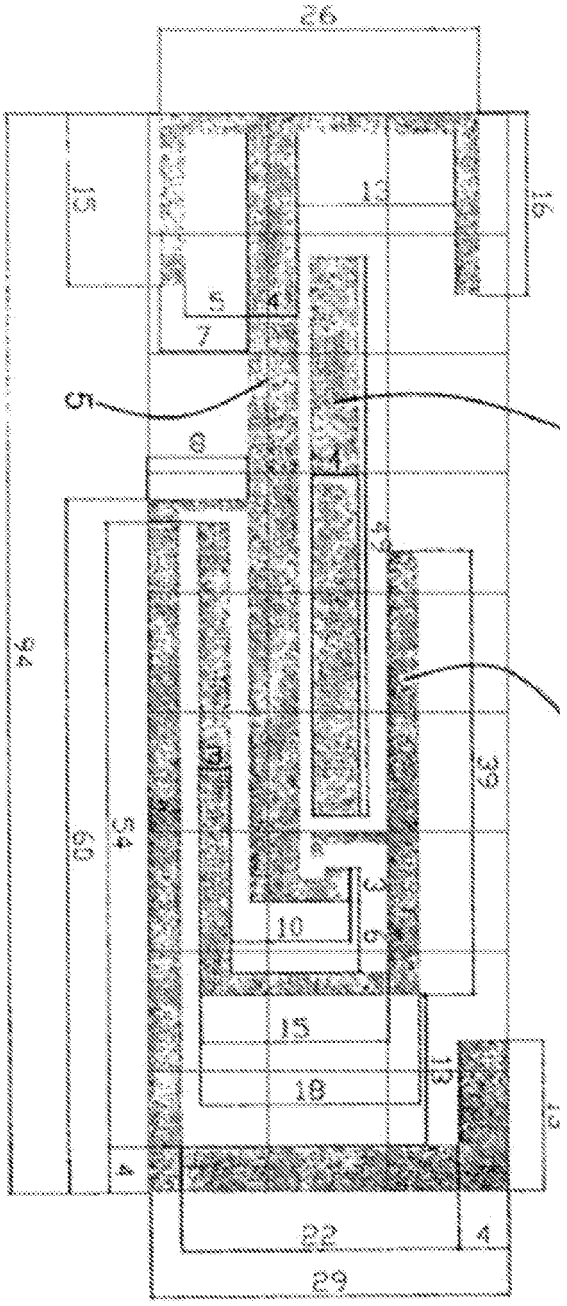
Langley Fig. 13 – G1, Bottom Right Feeding Corner



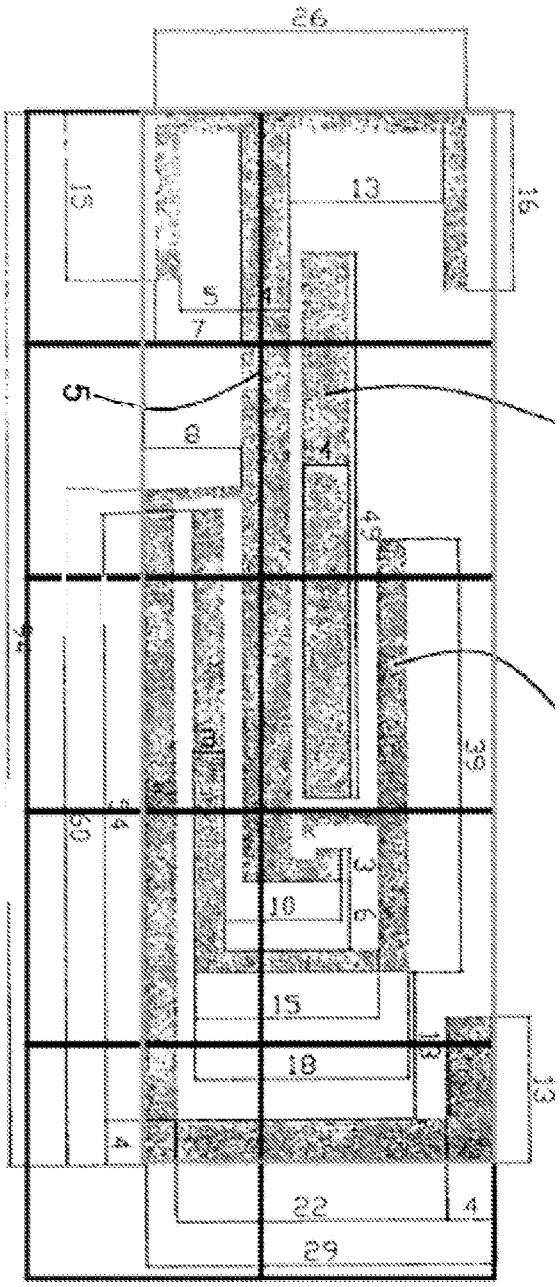
Langley Fig. 13 – G3



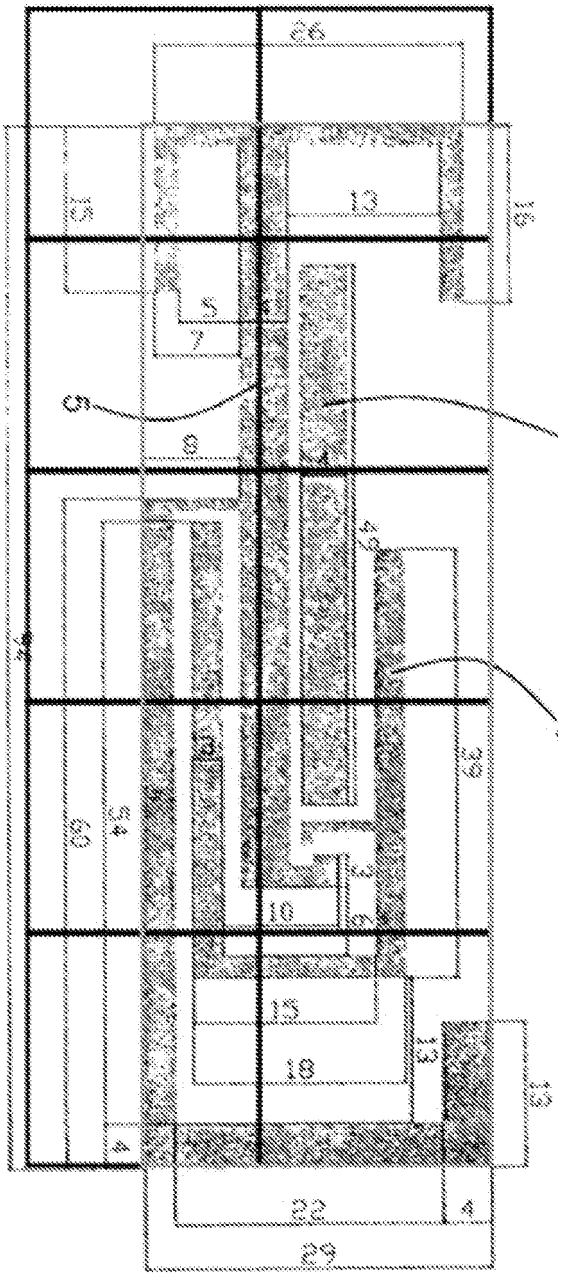
Langley Fig. 2 – G2



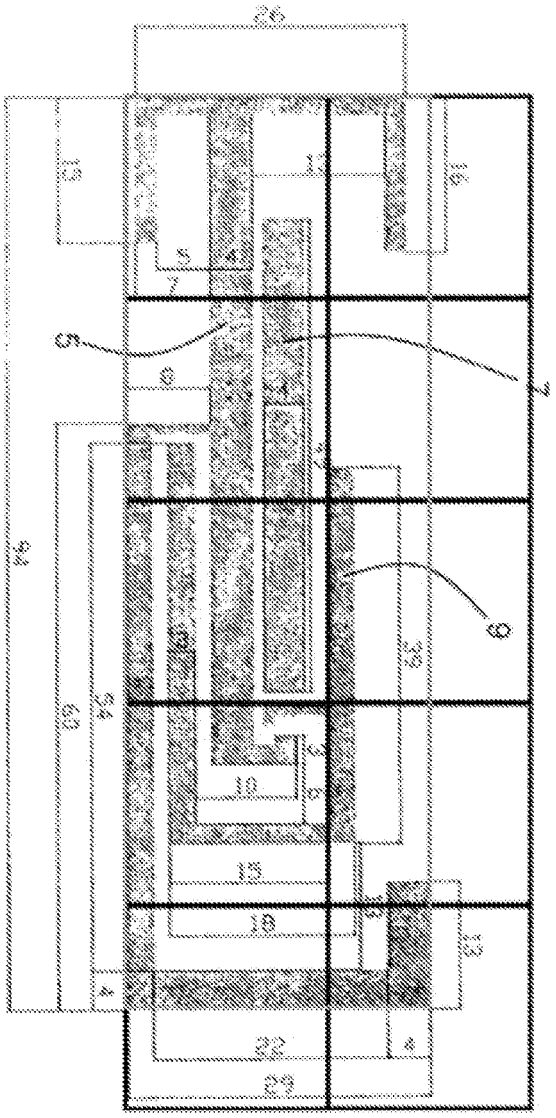
Langley Fig. 2 – G1, Upper Left



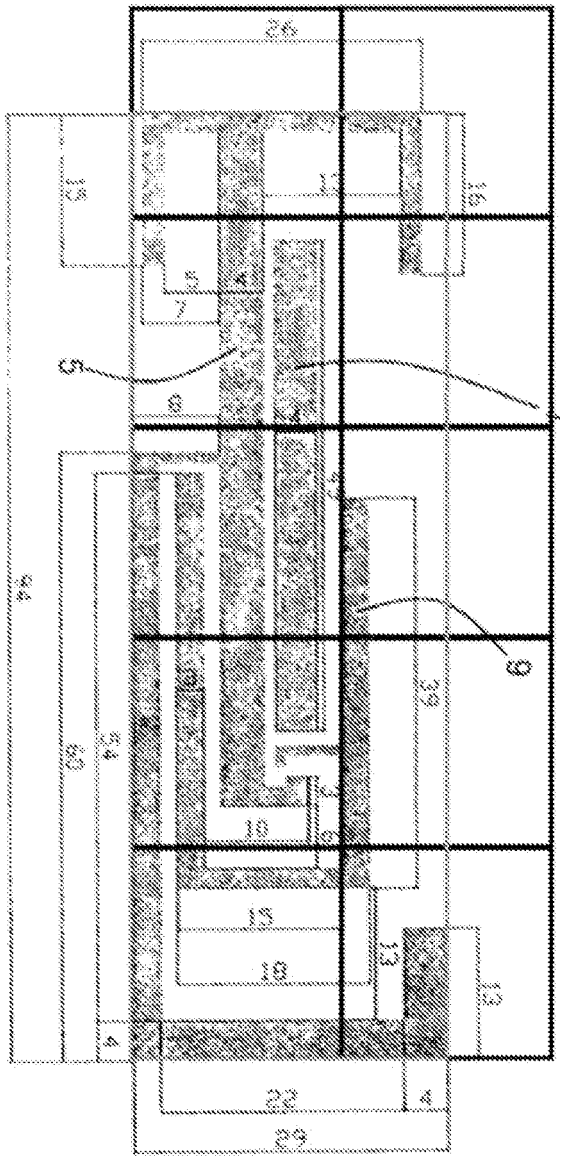
Langley Fig. 2 – G1, Upper Right



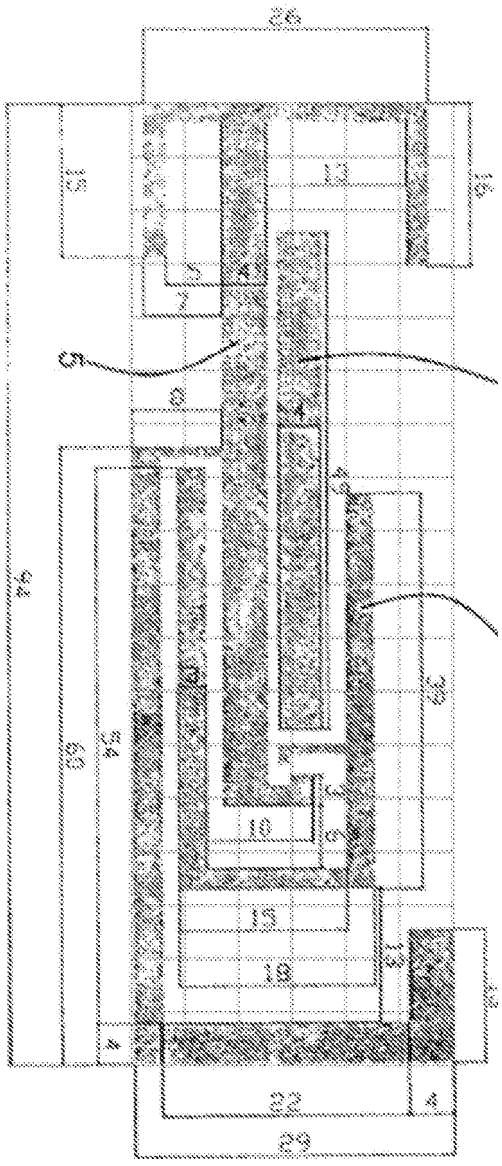
Langley Fig. 2 – G1, Bottom Left



Langley Fig. 2 – G1, Bottom Right



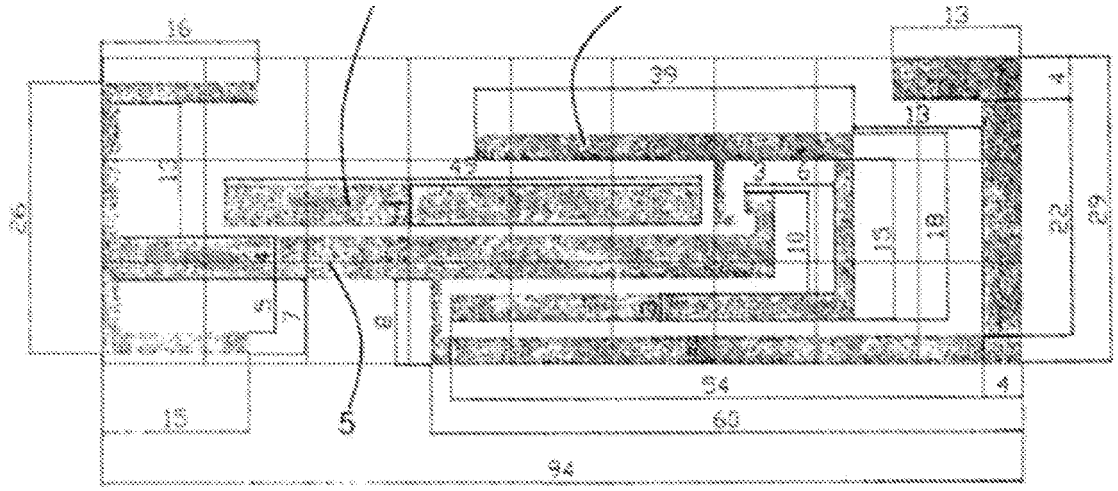
Langley Fig. 2 – G3



CALCULATION FOR LANGLEY FIGURE 2

The F21 value for Langley Figure 2 is 1.38. It is calculated using the N2 and N1 values.

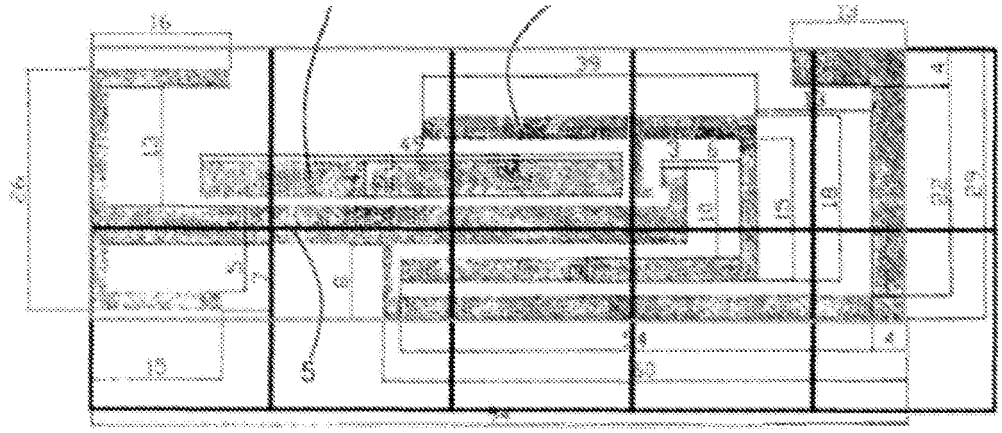
The N2 value is found by counting the number of cells that intercept a part of the antenna contour as seen below:



G2 for Langley Figure 2

The boxes above are the G2 cells. **There are 26 cells that intercept some part of the antenna** contour (then antenna elements are represented by dark shading). **N2 is therefore 26**.

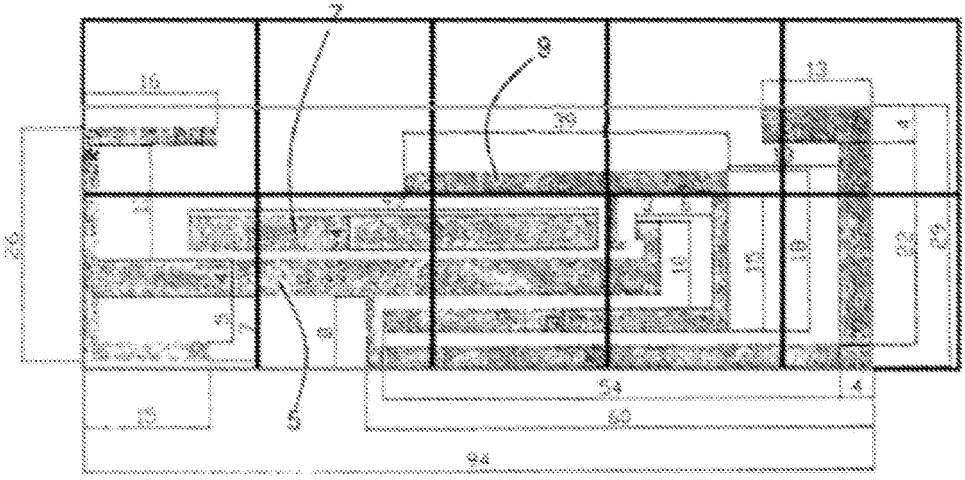
The N1 value is found with the same method as N2. The cells we count, however, are now four times larger than the G2 cells. See below the new cells:



G1 for Langley Figure 2

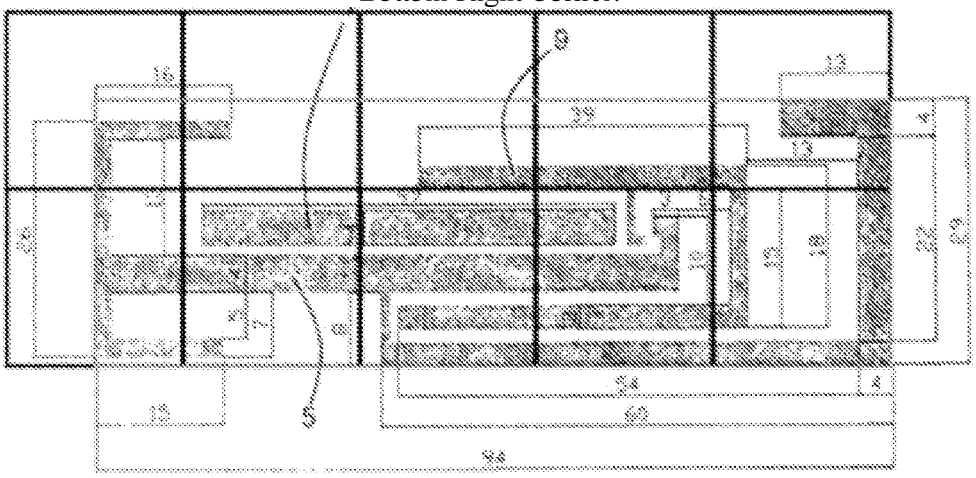
There are 10 cells that touch a part of the antenna contour. N1 is therefore 10.
Note that N1 is 10 no matter if the grid starts at the bottom left, right, or upper right corner of the antenna rectangle:

Bottom Left Corner:

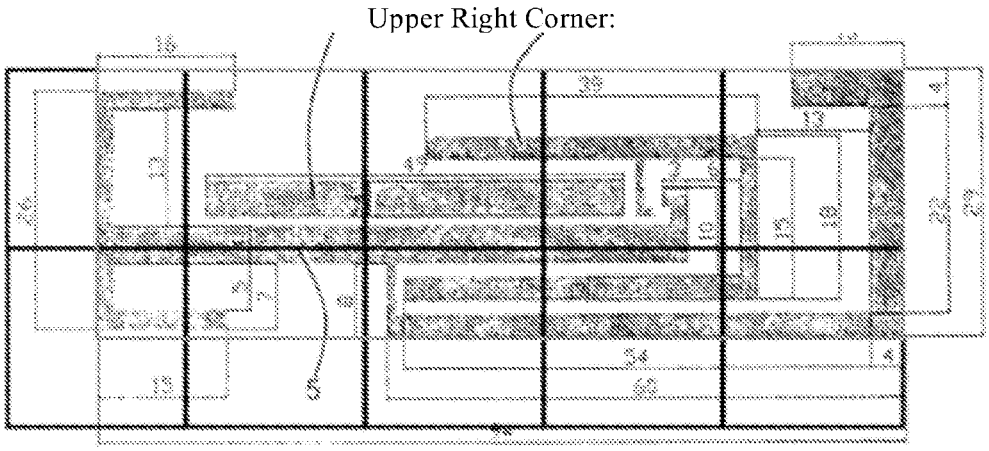


G1 with Alternative Starting Corner for Langley Figure 2

Bottom Right Corner:



G1 with Alternative Starting Corner for Langley Figure 2



G1 with Alternative Starting Corner for Langley Figure 2

Plug in the N2 and N1 values into the following equation:

$$F21 = -\frac{\log(N2) - \log(N1)}{\log(0.5)}$$

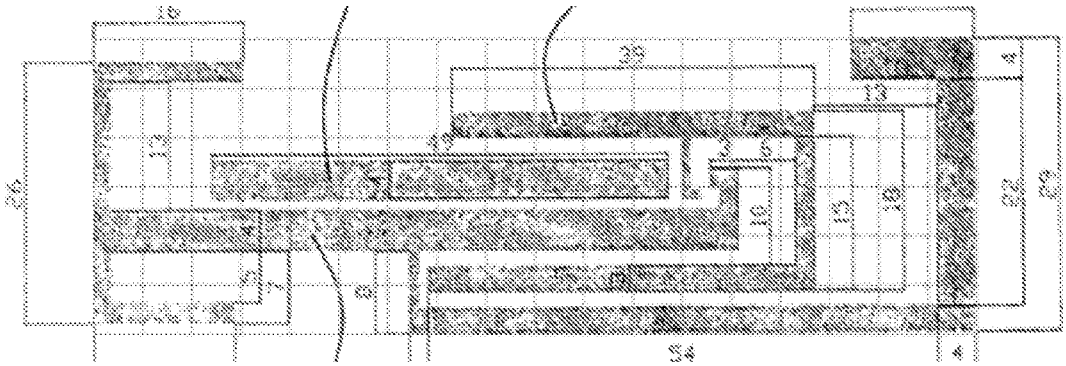
$$F21 = -\frac{\log(26) - \log(10)}{\log(0.5)}$$

$$F21 = 1.378512 = 1.38$$

For Figure 2, based on the above calculation, **the lowest complexity factor F21 by any calculation (including and excluding close call cells, and using all possible feed point corners) is 1.38. This number is greater than the threshold of 1.20 that is required by Claim 11.**

The F32 value for Langley Figure 2 is 1.58. It is calculated using the N2 and N3 values.

The N3 values are found in the same way as N1 and N2, except the cells we count are four times smaller than the original N2 cells. See below:



G3 for Langley Figure 2

There are 78 N3 cells that intercept the antenna contour. **N3 is therefore 78.**

Plug in the N3 and N2 values into the following equation:

$$F32 = -\frac{\log(N3) - \log(N2)}{\log(0.5)}$$

$$F232 -\frac{\log(78) - \log(26)}{\log(0.5)}$$

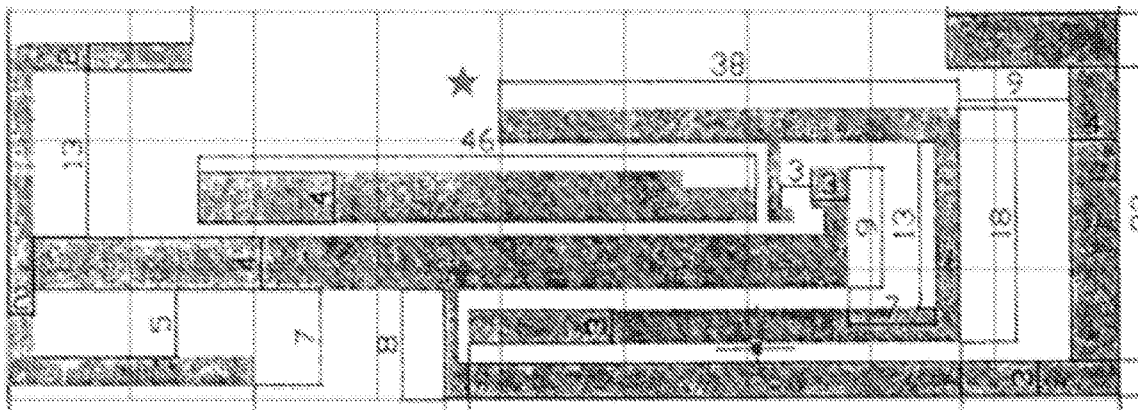
$$F32 = 1.584963 = 1.58$$

Based on the above calculation for Figure 2, **the lowest complexity factor F32 is 1.58. This number is greater than the threshold of 1.35 that is required by Claim 11.**

CALCULATION FOR LANGLEY FIGURE 13

The F32 values for Langley Figure 13 ranges from 1.55 to 1.64. They are calculated using various N2 and N3 values.

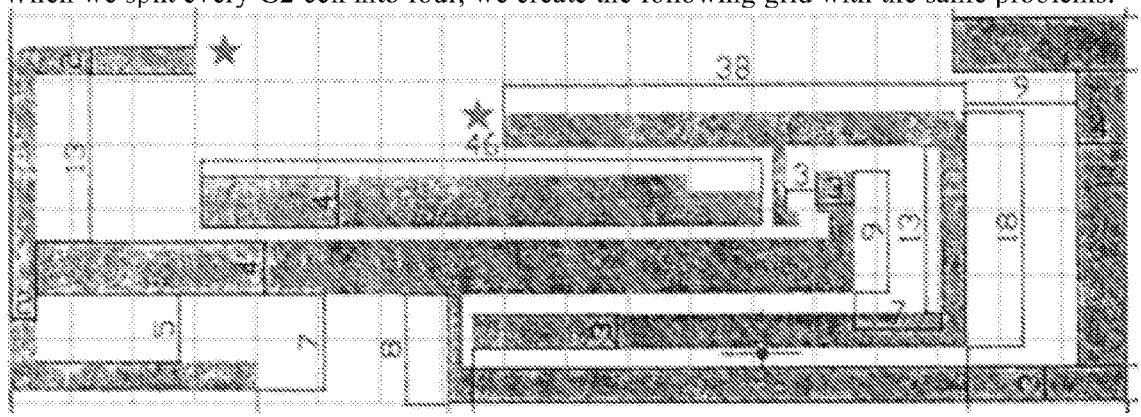
The antenna in Figure 13 is slightly different in shape from the one in Figure 2. This causes some differences in N2 and N3 values. Note that in order to be conservative in calculating the complexity factor value, we separately count cells that could be considered close calls in terms of whether the contour intersects the cell. See below:



G2 for Langley Figure 13

The cell with a star is an example where a cell barely intercepts the antenna contour. To be conservative, we calculate the N value with and without these cells included. **When we count the starred cell, N2 is 26. When we don't count the starred cell, N2 is 25.**

When we split every G2 cell into four, we create the following grid with the same problems:



G3 for Langley Figure 13

There are two starred cells barely intercept the antenna contour. To be conservative, we calculate the N value with and without these cells. **When we count the starred cells, N3 is 78. When we don't count the starred cells, N3 is 76.**

Thus, F32 can be calculated using **N2 = 25 or 26, and N3 = 76 or 78.**

When using N3 = 76 and N2 = 26, we get the following:

$$F32 = -\frac{\log(76) - \log(26)}{\log(0.5)}$$

$$F32 = 1.547488 = 1.55$$

When using N3 = 76 and N2 = 25, we get the following:

$$F32 = -\frac{\log(76) - \log(25)}{\log(0.5)}$$

$$F32 = 1.604071 = 1.60$$

When using N3 = 78 and N2 = 26, we get the following:

$$F32 = -\frac{\log(78) - \log(26)}{\log(0.5)}$$

$$F32 = 1.584963 = 1.58$$

Finally, when using N3 = 78 and N2 = 25, we get the following:

$$F32 = -\frac{\log(78) - \log(25)}{\log(0.5)}$$

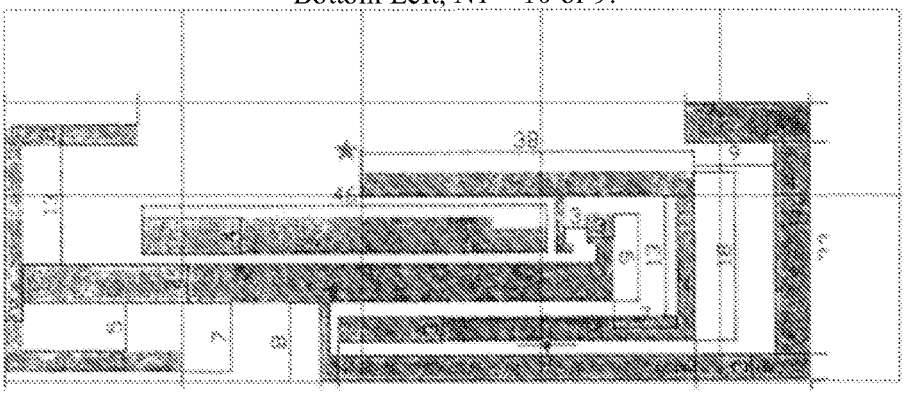
$$F32 = 1.641546 = 1.64$$

For Figure 13, based on the above calculation, **the lowest complexity factor F32 by any method is 1.64. This number is greater than the threshold of 1.35 that is required by Claim 11.**

The same principles apply to F21 values for Langley Figure 13. F21 values for Langley Figure 13 vary between 1.32 to 1.53.

N1 for Figure 13 depends on which corner of the blue rectangle the grid starts. The bottom left corner could be **N1 = 10 or N1 = 9:**

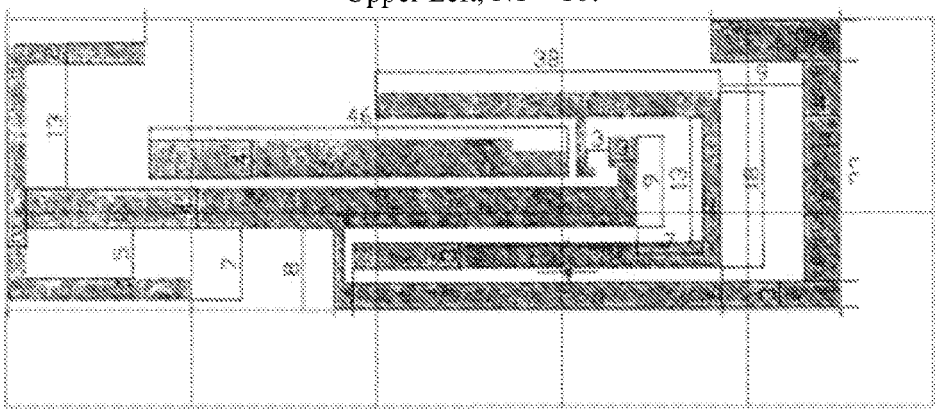
Bottom Left, N1 = 10 or 9:



G1 for Langley Figure 13

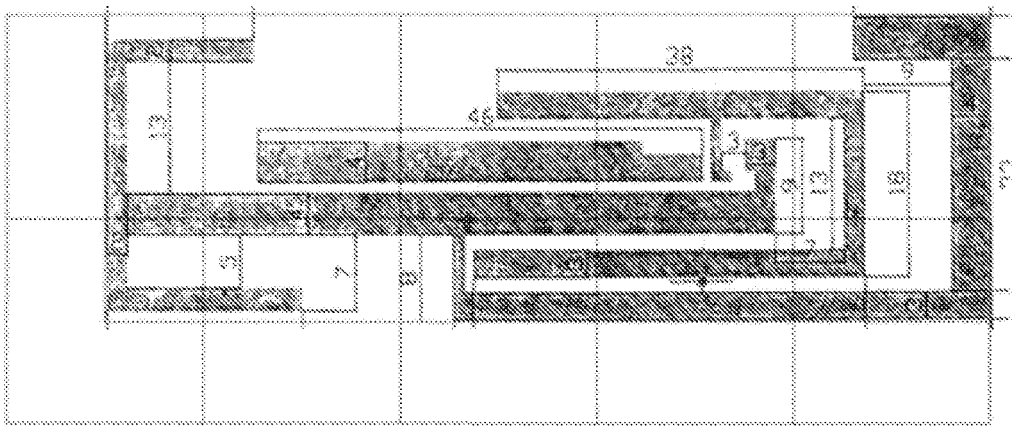
All other grids for Figure 13 have a value of N1 = 10.

Upper Left, N1 = 10:

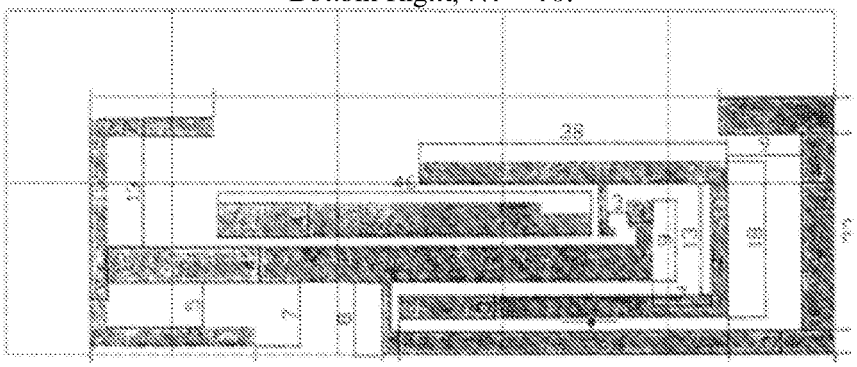


G1 with Alternative Starting Corner for Langley Figure 13

Upper Right, N1 = 10:



G1 with Alternative Starting Corner for Langley Figure 13
Bottom Right, N1 = 10:



G1 with Alternative Starting Corner for Langley Figure 13

F21 can therefore be calculated using values **N1 = 9 or 10, and N2 = 26 or 25.**

When using N2 = 26 and N1 = 10, we get the following:

$$F21 = -\frac{\log(26) - \log(10)}{\log(0.5)}$$

$$F21 = 1.378512 = 1.38$$

When using N2 = 26 and N1 = 9, we get the following:

$$F21 = -\frac{\log(26) - \log(9)}{\log(0.5)}$$

$$F21 = 1.530515 = 1.53$$

When using N2 = 25 and N1 = 10, we get the following:

$$F21 = -\frac{\log(25) - \log(10)}{\log(0.5)}$$

$$F21 = 1.321928 = 1.32$$

Finally, when using N2 = 25 and N1 = 9, we get the following:

$$F21 = -\frac{\log(25) - \log(9)}{\log(0.5)}$$

$$F21 = 1.473931 = 1.47$$

For Figure 13, based on the above calculation, **the lowest complexity factor F21 by any calculation (including and excluding close call cells, and using all possible feed point corners) is 1.32. This is greater than the threshold of 1.20 that is required by Claim 11.**

EXHIBIT 1010
CV OF MANOS M. TENTZERIS, PH.D.

MANOS (EMMANOUIL) M. TENTZERIS
Ken Byers Professor
Georgia Institute of Technology,
School of Electrical and Computer Engineering
24 June 2023

I: EARNED DEGREES

• Ph.D., University of Michigan, Ann Arbor, 1998 (Graduate Advisor: Prof. Linda P.B.Katehi)
• M.Sc., University of Michigan, Ann Arbor, 1994
• B.S.E.E. (Diploma-"Summa Cum Laude") National Technical University of Athens, GREECE, 1992

II: EMPLOYMENT HISTORY

- Ken Byers Professor in flexible electronics, School of Electrical and Computer Engineering, Georgia Tech, 2016-present
- Professor, School of Electrical and Computer Engineering, Georgia Tech, 2009-2016
- Humboldt Guest Professor, FAU, Nuremberg, GERMANY, 8/19-12/19.
- MediaTek Visiting Professor, NTU, Singapore, 1/18-12/18.
- Finland Distinguished Professor (Fi.Di.Pro.), TUT, 8/12-12/16
- Distinguished Visiting Professor, LAAS, Toulouse, 5/12-8/12
- Visiting Professor, GTRI-Ireland, Athlone, Ireland, 5/09-7/09
- Associate Professor, School of Electrical and Computer Engineering, Georgia Tech, 2004-2009
- Invited Professor, School of Electrical and Computer Engineering, Technical University of Munich, Germany, 5/02-8/02
- Assistant Professor, School of Electrical and Computer Engineering, Georgia Tech, 1998-2004
- Research Assistant, Radiation Laboratory, University of Michigan, Ann Arbor, MI, 1992-1998
- Research Assistant, Microwave Lab, National Technical University of Athens, Greece, 1991-1992

III: HONORS AND AWARDS

- IEEE Fellow
- IEEE MTT-S Distinguished Microwave Lecturer (2010-2012)
- Origami RF research was featured in a publication in the Proceedings of National Academy of Science (PNAS) in November 2018.
- Listed among the Top-25 Downloaded IEEE Sensor Papers in November 2013 and in December 2011.
- Listed among the 99th percentile of Scientific Reports with 109,000+ article accesses by 12/1/21.
- Listed among the 25 featured "Science@Microsoft" Technologies highlighting the most significant achievements of Microsoft Reseach over its 20 years of activities [http://www.microsoft.com/en-us/researchconnections/science/stories/anti-counterfeit.aspx]

- “5G as a Wireless Grid Technology” was listed among the Top 10 emerging technologies of 2021 published by Scientific American and The World Economic Forum [https://www.scientificamerican.com/page/contributors-to-top-10-emerging-technologies-of-2021/]

- 2023-2027 IEEE EPS Distinguished Lecturer

- 2023 IEEE Wireless Power Technology Conference & Expo (WPTCE) Second Best Contibution Award
- 2022 Georgia Tech Outstanding Doctoral Thesis Advisor Award
- 2021 IEEE Antennas and Propagation Symposium (APS) Best Student Paper Award
- 2019 Humboldt Research Prize
- 2016-2022 IEEE CRFID (RFID Council) Distinguished Lecturer
- 2018 IEEE ECTC Intel Best Student Paper Award
- 2018 ISAP Second Best Paper Award
- 2017 IMAPS Best Student Paper Award
- 2017 SRC TECHCON Best-in-Session Award
- 2017 Georgia Tech Outstanding Achievement in Research Program Development Award
- 2017 Archimedes IP Salon Gold Medal
- 2016 Bell Labs Prize Third Award
- 2016 GOMACTech Best Poster Paper Award
- 2016 Georgia Tech Capstone Design Expo Best Overall Project ECE, December 2016
- 2015 IET Microwaves, Antennas and Propagation Premium Award
- 2014 Georgia Tech ECE Distinguished Faculty Achievement Award
- 2014 IEEE RFID-TA Best Student Paper Award
- 2013 IET Microwaves, Antennas and Propagation Premium Award
- 2013 IEEE Wireless Power Transfer Conference (WPTC) Second Best Paper Award
- 2012 FiDiPro [Finland Distinguished Professor] Award from the Academy of Finland
- 2012 iCMG Architecture Award of Excellence
- Selected by NSF to represent US as a member of a team of 5 US prominent researchers, that participated in the US-Ireland R&D Partnership Telecommunications Workshop, hold in 11/2011 in Dublin, Ireland, and focusing on Millimeter-wave and sub-THz communication systems.
- Prof. Tentzeris’ research activity in electromagnetic energy scavenging has been highlighted in CBS, NSF Homepage, MSNBC, CNN, Yahoo, Discovery Channel, Boston Globe, IEEE The Institute and 500+ top High-Tech sites (e.g. engagdget.com) as well as in numerous international newspapers (e.g. Asahi Shibun, Vima, Kathimerini, …) as one of the major technical inventions of 2011.
- Selected by SRC and NSF to be part of the 25-member US team to participate in the SRC/NSF/SFI Forum on Integrated Sensors for Cybersystems (FISC-2030) that took place in Ireland in 3/2012 aiming in identifying the critical ultra-low-power (low-frequency, UHF, RF and millimeter-wave) sensor technologies by 2030 and define global guidelines.

- Member of the first Oustanding U.S. Alumni Class of Alexander von Humboldt Foundation/German Research Foundation (DFG)
- 2011 International Workshop on Structural Health Monitoring Best Student Paper Award
- 2010 IEEE Antennas and Propagation Society Piergorgio L. E. Uslenghi Letters Prize Paper Award
- 2010 Georgia Tech Senior Faculty Outstanding Undergraduate Research Mentor Award
- 2010 World-Wide Distinguished Professor Award from the State Administration of Foreign Experts Affairs of China
- 2009 IEEE Transactions on Components and Packaging Technologies Best Paper Award
- 2009 IEEE Antennas and Propagation Symposium (APS) Second Best Student Paper Award
- 2009 E.T.S. Walton Award from Science Foundation Ireland (SFI)
- 2000 NSF CAREER Award
- 2008 IEEE International Microwave Symposium (IMS) Honorable Mention Student Paper Award.
- 2007 IEEE Antennas and Propagation Symposium (APS) Best Student Paper Award.
- 2007 IEEE International Microwave Symposium (IMS) Third Best Student Paper Award.
- 2007 IEEE International Symposium on Antennas and Propagation (ISAP) Poster Presentation Award.
- 2006 Asian-Pacific Microwave Conference (APMC) Award.
- 2006 IEEE Microwave Theory and Techniques (MTT) Society Outstanding Young Engineer Award.
- 2003 IEEE Components, Packaging and Materials' Technology (CPMT) Society Outstanding Young Engineer Award.
- 2004 IBA International Educator of the Year Award.
- 2004 IEEE Transactions on Advanced Packaging Commendable Paper Award.
- 2003 NASA Godfrey "Art" Anzic Collaborative Distinguished Publication Award.
- Best Paper Award by the International Symposium in Microwave and Millimeter-Wave Technology, Beijing, CHINA, August 2002.
- 2002 Outstanding Junior Faculty Award, School of ECE, Georgia Tech.
- Best Paper Award by the Advanced Computational Electromagnetics Society (ACES), ACES Conference, Monterey, CA, March 2001.
- • Listed at "Who-is-Who in America", Marquis Eds., 2002-2011 and at "Who-is-Who in the World", Marquis Eds.,2003-2011.
- Best Paper Award by the International Hybrid Microelectronics and Packaging Society, ISHM, Philadelphia, PA, October 1997.
- Greek Government Academic Excellence Fellowships, 1988-1992.
- Papastavridios Greek Mathematics Excellence Fellowship, 1989.

TEACHING

III.A : INDIVIDUAL STUDENT GUIDANCE

III.A.1. Research Personnel

1. R.Li, Research Scientist II, "Design and Optimization of Compact/Multiband Antennas for Broadband Wireless Applications (PCS, GSM,WLAN, LMDS, UWB, mm-wave)", Period of Collaboration: Summer 2001 – Fall 2011.

2. Y.Fang, Research Scientist, "Nanotechnology-Based Gas, Chemical and Biological Wireless Sensors", Period of Collaboration: 2014 – now.
3. Xiaoqiang Zhang, 'Railway applications of RFID's", Visiting Professor, Period of Collaboration: Spring 2010-Spring 2011
4. Min Jin, "Smart skin configurations", Visiting Professor, Period of Collaboration: Spring 2010-Spring 2011
5. D.Staiculescu, Research Engineer II, "Design and Optimization of SOP Multilayer Wireless Modules Using Statistical and Genetic Algorithms for Biosensing Applications", Period of Collaboration: Fall 2003 - 2009.
6. G.Jin, "Inkjet-Printed Wideband Baluns for Wearable RF Modules", Visiting Professor, Period of Collaboration: Summer 2011-Summer 2012.
7. Y.Kawahara, "RF Power Scavenging Modules for Internet of Things Applications", Visiting Professor, Period of Collaboration: Fall 2011-Fall 2013.
8. H.R.Ahn, "Broadband Couplers for Arbitrarily High Coupling Ratios", Visiting Scientist, Period of Collaboration: Summer 2015-Summer 2016.

III.A.2. Postdoctoral Fellows

1. N.Bushyager, "Application of Fluid-Dynamics Computational Techniques to the Design of Compact Wireless Modules", Period of Collaboration: Spring 2005 - Spring 2006.
2. C.You, "Hybrid Electromagnetic/Mechanical Modeling, Design and Optimization of Antenna Arrays on Composite Materials", Period of Collaboration: Fall 2005 - Fall 2007.
3. D.Anagnostou, "Design of Large Antenna Arrays on Flexible Organics for Space Applications", Period of Collaboration: Fall 2005 - Fall 2006.

III.A.3. Ph.D. Students

III.A.3.1. Graduated Ph.D. Students

1. N.Bushyager, "Novel Adaptive Time-Domain Techniques for the Analysis and Design of Complex RF and Wireless Structures", Period Advised: Fall 1999 - Fall 2004, GRADUATED: December 2004, Current Employer: Northrop-Grumman.
2. D.Thompson, "Novel Microwave Structures on Organic and Liquid Crystal Polymer (LCP) Substrates", (Main advisor; co-advisor: Prof. J.Papapolymerou), Period Advised: Fall 2002 – Spring 2006, GRADUATED: April 2006, Current Employer: Ansoft.
3. G.DeJean, "Multilayer Multiband Compact Antennas for Wireless/WLAN Applications", Period Advised: Fall 2001 - Fall 2006, GRADUATED: January 2007, Current Employer: Microsoft Research Center.
4. I.-K.Kim, "Design of Fractal-based Filters and Compact Endfire Antennas in Organic and Ceramic Multilayer Technologies", Period Advised: Spring 2004 - Spring 2006, GRADUATED: April 2006. (Yonsei University, KOREA, co-advisor: Prof. J.-G.Yook), Current Employer: Samsung. Dr.Kim spent significant amount of time (aggregate of 2 years) at GEDC covering the 80% of the design and all fabrication and experiments for his Ph.D. Thesis; the effort culminated in 2 Journal and 3 Conference Publications

5. J.H.Lee, "Hybrid EM and Circuit Optimization of RF Devices Built on Si, GaAs and Multilayer Ceramic (LTCC) and Organic Substrates", Period Advised: Fall 2001 - Fall 2006, GRADUATED: June 2007, Current Employer: Skyworks.
6. S.Nikolaou, "UWB Antennas and Integrated Modules on Silicon Substrates", (Main advisor; coadvisor: Prof. J.Papapolymerou), Period Advised: Fall 2003 - Summer 2007, GRADUATED: June 2007, Current Employer: Frederick University (Cyprus).
7. L.Martin, "Nanomagnetic Materials for Miniaturized UHF/VHF Antennas", (Main advisor; coadvisor: Prof. C.P.Wong), Period Advised: Fall 2003 - Spring 2008, GRADUATED: March 2008, Current Employer: Motorola.
8. Bo Pan, "Ultrawideband Antennas and Ultra-Low-Loss Transitions on Micromachined Silicon and Glass Substrates for Millimeter-Wave Applications", (Equal advising load with co-advisor: Prof. J.Papapolymerou), Period Advised: Fall 03 - Spring 2008, GRADUATED: Spring 2008, Current Employer: Wionics.
9. V.Palazzari, "Design of Novel Filters in LCP Multilayer Structures", Period Advised: Spring 2003 -Fall 2003, Ph.D.; GRADUATED: 11/2003 (University of Perugia, ITALY; Equal advising load with co-advisor: Prof. L.Roselli), Current Employer: W.I.S. (Italy) Dr. Palazzari spent the 11-month period from January-November 2003 in GEDC putting together the last 2 chapters of her PhD Thesis and performing most of the experimental work required for her PhD Thesis; Prof. Tentzeris started co-advising her during his trip to University of Perugia in September 2001; the effort culminated in 2 Journal and 2 Conference Publications.
10. Li Yang, "Inkjet-Printed Paper-Based RFID's", Period Advised: Fall 2005-Fall 2009, Ph.D., GRADUATED: 9/2009, Current Employer: Texas Instruments.
11. A.Rida, "Multiband and Wideband Antennas for Applications up to mmW", Period Advised: Fall 2006-Spring 2011, GRADUATED: 3/2011, Current Employer: Northrop Gruman.
12. T.Wu, "Integrated Antennas for Communication and Sensing Applications", Period Advised: Fall 2006-Spring 2011, GRADUATED: 4/2011, Current Employer: Direct TV
13. S.Kim, "Energy-Optimized Design Techniques for Wireless Communication and Ubiquitous Sensing Nodes", Period Advised: Fall 2009-Fall 2011, PhD Proposal: 1/2011, GRADUATED: 11/2011, Current Employer: Intel.
14. S.Beck, "An Interference-Cancellation Receiver for Multi-Band and Multi-Standard Wireless Communication Systems", Period Advised: Fall 2009-Summer 2011, PhD Proposal Exam: 9/2010, GRADUATED: 6/2011, Current Employer: Texas Instruments..
15. V.Lakafosis, "A hardware-Enabled Certificate of Authenticity System with Intrinsically High Entropy", Period Advised: Fall 2007 -Present, passed Preliminary Exam: Fall 2007, GRADUATED: Spring 2013, Current Employer: CISCO.
16. H.Lee, "Inkjet-printed RF Modules for Sensing and Communication Applications", period Advised: Fall 2009-Present, GRADUATED: Summer 2013, Current Employer: Southern Polytechnic State University (SPSU)
17. T.Thai, "Design and Development of Novel RF Sensors based on Far-Field and Near-Field Principles", Period Advised: Spring 2007-Present, passed Preliminary Exam: Fall 2008, PhD Proposal Exam: Spring 2013, GRADUATED: Fall 2013, Current Employer: GE Global Research *Microsoft Fellowship Recipient*

18. R.Vyas, "An Embedded Wireless Energy Harvesting Platform (E-WEHP) for Powering Sensors using Existing Ambient Wireless Signals", Period Advised: Fall 2006-Present, Passed Preliminary Exam: Fall 2007, Ph.D.Proposal: Spring 2013, GRADUATED: Spring 2014, Current Employer: University of Calgary, CANADA
19. J.Cooper, "A Novel Topology for Wireless Sensors Incorporating an Isotropic Radiator on an EBG Material", Period Advised: Summer 2010-Present, Passed Preliminary Exam: Spring 2011, Ph.D.Proposal: Summer 2013, Expected GRADUATED: Spring 2014, Current Employer: Curo Corporation ***NSF Graduate Fellowship Recipient***
20. S.Kim, "Integrated Inkjet-Printed Sensors and Via-Enabled Structures for WSN and RFID-based Autonomous Wireless Sensor Platforms", Period Advised: Fall 2010-Present, Passed Preliminary Exam: Fall 2010, Ph.D.Proposal: Fall 2013, GRADUATED: Fall 2014, Current Employer: Qualcomm
21. A.Traille, "Inkjet-Printed Ground-Penetrating Radar Systems", Period Advised: Fall 2011-Present (LAAS-CNRS, France; Co-Advisor: Prof. H.Aubert), GRADUATED: Fall 2014.
22. B.Cook, "Vertical Integration of Inkjet-Printed RF Circuits and Systems", Period Advised: Spring 2012-Present, Ph.D.Proposal: Fall 2013, GRADUATED: Summer 2014, Current Employer: Texas Instruments-Kilby Labs
23. T.Le, "Inkjet-Printed Graphene/CNT-Based Ultrasensitive Wireless Gas Sensors", Period Advised: Spring 2012-Present, Passed Preliminary Exam: Fall 2013, GRADUATED: Fall 2016.
24. J.Bito, "Energy Harvesting and Wireless Power Transfer Systems", Period Advised: Fall 2013 – Fall 2017, Passed Preliminary Exam: Spring 2014, Expected GRADUATED: Fall 2017, Current Employer: Texas Instruments-Kilby Labs.
25. J.Kimionis, "Software-Defined-Radio Readers for RFID Applications", Period Advised: Fall 2013-Fall 2017,GRADUATED: Fall 2017, Current Employer: Bell Labs.
26. W.Su, "Inkjet-Printed Microfluidic-Enabled Tunable RF Structures and Sensors", Period Advised: Fall 2013 – Spring 2018, Passed Preliminary Exam: Spring 2014, GRADUATED: Spring 2018, Current Employer: Google.
27. J.Hester, "Low-Cost Printed, Flexible and Energy Autonomous Van Atta and Carbon Nanotubes Based mm-Wave RFID Gas Sensors for Ultra-Long Range Ubiquitous IoT and 5G Implementations", Period Advised: Fall 2013 – Summer 2019, Passed Preliminary Exam: Spring 2015, GRADUATED: Summer 2019, Current Employer: Atheraxon (Founder).
28. A.Nauroze, "Origami-Inspired Tunable RF Structures", Period Advised: Fall 2014-Fall 2019, GRADUATED: Fall 2019, Current Employer: Amazon.
29. S.Alotaibi, "3D Printed Wireless Sensors for Strain and Stress Monitoring in Smart Skin Applications", Period Advised: Spring 2016-2020, GRADUATED: February 2020, Current Employer: Aramco.
30. S.Jeong, "Load-Reconfigurable Wireless Power Transfer Systems and Machine Learning Optimization", Period Advised: Fall 2014-2020, GRADUATED: April 2020, Current Employer: Qorvo.
31. Tong-Hong Lin, "Wearable Zero-Power Sensors and Microfluidics for 5G Applications", Period Advised: Spring 2016-2020, GRADUATED: September 2020, Current Employer: Apple.

32. B.Tehrani, “Additive Manufacturing Solutions for Application-specific Millimeter-Wave Wireless System Design and Packaging”, Period Advised: Summer 2013-2020, GRADUATED: December 2020, Current Employer: Analog Devices.
33. R.Bahr, “3D-Printed RF Circuits”, Period Advised: Spring 2015-2020, GRADUATED: December 2020, Current Employer: Dujud.
34. Xuanke He, “Additively Manufactured RF Components, Packaging, Modules and Flexible Modular Phased Arrays enabling widespread massively scalable mmWave/5G Applications”, Period Advised: Spring 2017-2021, GRADUATED: July 2021, Current Employer: Skyworks.
35. E.M.Jung, “FM and UHF Energy Harvesting Systems”, Period Advised: Fall 2018-2021, GRADUATED: December 2021, Current Employer: PowerCast.
36. A.Eid, “3D printed Novel Lenses, Energy Harvesters and Active Devices for IoT Applications”, GRADUATED: December 2021, Current Employer: MIT-Media Lab.
37. A.Alreshaid, “MM-wave Reconfigurable Antenna Systems for 5G Applications”, GRADUATED: January 2022, Current Employer: KFUPM (Assistant Professor)
38. Y.Cui, “Additively Manufactured Shape-changing RF Devices Enabled by Origami-inspired Structures”, GRADUATED: August 2022, Current Employer: Apple.
39. A.Adeyeye, “Novel RFID Systems and Techniques for Localization, Positioning and Sensing Applications”, GRADUATED: August 2022, Current Employer: Apple.

*. H.Kim, “CMOS Radio-Frequency Power Amplifiers for Multi-Standard Wireless Communications”, Period Advised: Spring 2010-Summer 2011, GRADUATED: 5/2011. [Academic Advisor]
*. K.-H.Lee, “Design of Signal Integrity Enhancement Circuits”, Period Advised: Summer 2010-Fall 2010, GRADUATED: 11/2010. [Academic Advisor]
*. S.Woo, “Low Noise RF CMOS Receiver Integrated Circuits”, Period Advised:Summer 2010-Fall 2010, GRADUATED: 10/2010. [Academic Advisor]
*. J.Cha, “A CMOS Radio-Frequency Front-End for Multi-Standatd Wireless Communications”, Period Advised: Summer 2010, GRADUATED: 8/2010. [Academic Advisor]
*. J.Choi, “Fully-Integrated DLL/PLL-Based CMOS Frequency Snthesizer for Wireless Systems”, Period Advised: Summer 2010, GRADUATED: 7/2010. [Academic Advisor]
*. H.-W.Kim, “CMOS RF Transmitter Front-End Module for High-Power Mobile Applications “, Period Advised: Spring 2010-Present, PhD Proposal Exam: 8/2011, GRADUATED: Spring 2012 [Academic Advisor], Current Employer: RFMD

III.A.3.2. Current Ph.D. Students

1. C.Lynch, “Additively Manufactured Wireless Sensors for Smart Agriculture and Smart Biomonitoring Applications”, Period Advised: Fall 2019-Present, Expected Graduation: Fall 2023.
2. K.Hu, “Additively Manufactured RF Structures for 5G and mmW Applications”, Period Advised: Spring 2020-Present, Expected Graduation: Spring 2024.
3. G.S.V.Angulo, “Printed Wireless Sensors for Space and Gas Detection Applications”, Period Advised: Fall 2021-Present, Expected Graduation: Fall 2025.

4. L.Smith, “Origami Reconfigurable Energy Harvesters”, Period Advised: Fall 2021-Present, Expected Graduation: Fall 2025.
5. I.-T.Chen, “Wireless Power Transfer and Zero-Power RF Components for Reconfigurable Intelligent Surfaces”, Period Advised: Fall 2021-Present, Expected Graduation: Fall 2025.
6. H.Al Jamal, “Self-Calibrated Tile-Based Antenna Arrays Using Computer Vision Techniques”, Period Advised: Fall 2022-Present, Expected Graduation: Fall 2026.
7. M.Joshi, “Multiband flexible RF enhanced-accuracy localization systems”, Period Advised: Fall 2022-Present, Expected Graduation: Fall 2026.
8. W.Callis, “Additively manufactured wireless bio/chemical sensors”, Period Advised: Fall 2022-Present, Expected Graduation: Fall 2026.

III.A.4. M.Sc. Students

III.A.4.1. Graduated M.Sc. Students

1. B.McGarvey, “Efficient Numerical Coupling of FDTD and Solid-State Equations for 1D-circuits”, Period Advised: Summer 2002 - Fall 2007, Graduation Date: Fall 2007, Current Employer: DoD-NSA.
2. S.Bassat, “Design and Optimization of RFID Compact Antennas”, Period Advised: Fall 2003- Fall 2006, GRADUATED: Fall 06, Current Employer: Motorola.
3. N.Tavassolian, “UWB Antennas and Integrated Modules for Breast Cancer Detection Applications”, Period Advised: Fall 2006-Summer 2007.
4. B.Kim, “Reconfigurable Multiband Antennas for mm-wave Applications”, Period Advised: Summer 2005 - Fall 2006, Graduation Date: Fall 06 (Korea University, KOREA), Current Employer: Samsung.
5. L.Ward, “FDTD Modeling of the Crosstalk between Closely Spaced Microstrip Lines on Silicon Substrates”, Period Advised: Summer 2000 - Winter 2000, Graduation Date: Winter 2000, Current Employer: Argon Labs.
6. E.Tsai, “Adaptive Modeling of Novel Micromachined Antennas on High-Resistivity Si Substrates”, Period Advised: Spring 2001 - Fall 2002, Graduation Date: Fall 2002, Current Employer: Northrop-Grumman Corporation.
7. Y.Zhang, “Dual-Band Antenna Arrays for Conformal Space Applications”, Period Advised: Fall 2007-Fall 2009 (UoLille/France; co-advisor: Prof.Pavlidis).
8. N. Chaisilwattana, “Novel UHF RFID Antennas for Automotive and Container Applications”, Period Advised: Fall 2007-Fall 2009.
9. C.Kruesi, “3D Conformal Antennas for Supply-Chain and Inventory Tracking Applications”, Period Advised: Fall 2007-Spring 2009.
10. J.Pan, “Compact RFID’s on Metallic Structures”, Period: Fall 2008-Fall 2009.
11. S.Mukala, “Wearable antennas integration with smart clothing”, Period Advised: Fall 2009-Fall 2010.
12. A.Harrabi, “Novel RFID’s for Agricultural Applications”, Period Advised: Fall 2010-Fall 2011 (Faculty of Sciences in Tunis, Tunisia; co-advisor: Prof.Gharsallah)
13. Diapa Sanogo, “Broadband Harvesting Systems”, Period Advised: Fall 2011
14. Guillaume Caillet, “RF Characterization of inkjet-printed CNT films and transmission lines”, Thesis MSc Visiting Student from UoLille, FRANCE, Period Advised: Spring 2011-Fall 2011

15. Sebastien Mauzole, "Doubler implementations on ultralow-cost flexible materials for wireless crack detection", Thesis MSc Visiting Student from UoLille, FRANCE, Period Advised: Spring 2011-Fall 2011
16. S.Palacios, "Inkjet Printed Smart Wireless Integrated Modules (SWIM)", Period Advised: Fall 2012-Fall 2013
17. R.Herre, "Novel Inkjet printed Humidity Sensors", Period Advised: Summer 2013-Fall 2013 (performed his MS Thesis Research as an Exchange Student from University of Erlangen-Nuremberg)
18. C.Saintsing, "Origami Foldable Structures for RF Sensing Applications", Period Advised: Fall 2013-Fall 2014.

III.A.4.2 Visiting/Current M.Sc. Students

1. R.Bahr, "Inkjet Printed Wearable Motion Sensors", Period Advised: Summer 2014-Present
2. K.Nate, "3D Printed Origami Antennas", Period Advised: 2014-Present

III.A.5. M.Sc./Ph.D. Special Problems Students

1. N.Vasiloglou, "Fractal Antennas for WiFi Modules", Period Advised: Summer 2003 - Summer 2004.
2. F.Caliskan, "MPI Parallelization of FEM Algorithms", Period Advised: Spring 2001.
3. K.Madidmanana, "Survey of Carbon Nanotube Fabrication Techniques for Semiconductive and Metal Surfaces", Period Advised: Fall 2006 - Summer 2007.
4. U.Onyewuchi, "Development of WiMax Miniaturized Antenna Arrays for Base Stations", Advised: Fall 2006 - Spring 2007

III.A.6. Undergraduate UROP/Special Problems Students

1. B.McGarvey, "Numerical Modeling of Cascaded Transmission Line Interfaces through the Use of Bounce Diagrams", Period Advised: Winter 1999 - Fall 1999, UROP, Graduation Date: Fall 1999.
2. M.Delwar, "Numerical Modeling of Wire Antennas Using FDTD", Period: Winter 1999 – Spring 1999, UROP, Graduation Date: Summer 1999.
3. T.Owens, "Numerical Design of a Coupled-Line Planar Filter", Period: Winter 1999, UROP, Graduation Date: N/A.
4. M.Rutledge, "Study of Crosstalk Effects in Planar Transmission Lines", Period: Winter 1999, UROP, Graduation Date: N/A.
5. M.Fisher, "Numerical Design of Interdigitated Filters", Period: Fall 1998 - Summer 1999, UROP, Graduation Date: Fall 1999.
6. L.Compton, "Planar Antennas Analysis Using FDTD", Period: Fall 1998 -Winter 1999, Independent Research, Graduation Date: Spring 1999.
7. Q.Yasser, "Review of Commonly Used High-Frequency Packaging Geometries", Period: Winter 1999, Special Topics, Graduation Date: Spring 1999.
8. D.Gauthier, "Review of Amplifier Topologies Used in Wireless Communication Systems", Period: Winter 1999, Special Topics, Graduation Date: Spring 1999.
9. K.Browse, "Preliminary Models of Finite-Ground Coplanar Waveguides", Period: Fall 1999, Special Topics, Graduation Date: Summer 2000.

10. A. Awa, "Estimation of Health Effects Caused by Radiation of Handheld Unit Antennas", Period: Fall 1999 - Summer 2000, Special Topics, Graduation Date: Summer 2000.
11. D.Feren, "Preliminary Design of a PCB for Monitoring the Beowulf Cluster", Period: Spring 2000 -Summer 2000, Special Topics.
12. R.Myers, "Benchmarking of a Beowulf Cluster Using LINUX with MPI/PVM Interfaces", Period: Fall 1999 - Fall 2000, Special Topics..
13. W.Frishe, "Development of GUIs for Commercial EM Simulators in Time-Domain", Period: Spring 1999 - Fall 2001, UROP.
14. R.Cicconetti, C.Pearson, B.Moudry and S.McCord, "Development of Monitoring and Geometry Acquisition Tools and Parallelization of ATHENA Adaptive EM Simulation Tool using a BEOWULF Cluster", Period: Summer 1999 - Fall 2001, Special Topics, Graduation Date: N/A.
15. S.Owens, "Gridding and Modeling of a Novel Wideband Vialess CPW-to-Mstrip Transition", Period: Fall 2001, Special Topics, Graduation Date: Spring 2002.
16. S.Bassat, "Design Rules for the Minimization of Crosstalk for Finite-Ground Microstrip Lines in Space Applications", Period: Spring 2002 - Fall 2003, Special Topics, Graduation Date: Fall 2003, ***President's Undergraduate Research Award (PURA) recipient, School of ECE Undergraduate Research 2nd Place***.
17. S.Kulkarni, "Study of Nonsymmetrical Coplanar Waveguides that Are Embedded in Low-Resistivity Si Layers", Period: Spring 2002 - Spring 2003, Special Topics, Graduation Date: Spring 2003, ***President's Undergraduate Research Award (PURA) recipient.***
18. J.Vickers, "Design and Modeling of LTCC Vertically-integrated Baluns in Microstrip and CPW Configurations", Period: Spring 2002 - Fall 2002, Special Topics, Graduation Date: Fall 2002.
19. T.Cervantes, "Code Optimization for RF-MEMS Numerical Hubrid Simulators", Period: Fall 2002 -Spring 2003, Special Topics, Graduation Date: Fall 2003.
20. G.Schumann, Anya Traille, C.Sanders, B.-C.Nguyen, "Setup of a new anechoic chamber up to 40 GHz/Modeling of Metamaterial-Based Circuits", Period: Fall 2003-Spring 2004, Special Topics.
21. G.Doney, "Fabrication of 3D Metamaterial Structures", Period: Spring 2005, Special Topics.
22. A.Rida, "Modeling of Micromachined Monopole Antennas", Period: Spring 2005-Summer 2006, Special Topics, ***2006 IEEE MTT-S Undergraduate/Pre-graduate Scholarship Recipient.***
23. L.Nisonov, "Modeling and Design of Metamaterial/Loaded Transmission Lines", Period: Spring 2005, Special Topics.
24. Q.Xu, "Development of RFID Antennas for Embedded Tire Applications", Period: Spring 2005, Special Topics.
25. A.Sharpe, "60GHz Filters Using 3D resonators in LTCC Technologies", Period: Spring 2005, Special Topics.
26. E.Tsai, "60GHz Yagi-Uda Antennas and Integration with Nanostructures", Period: Summer 2005 -Fall 2005, Special Topics.
27. T.Ferrer, "HF and UHF RFID Characterization", Period: Fall 2005 - Fall 2006, Special Topics, ***President's Undergraduate Research Award (PURA) recipient.***

28. F.Falcon, "RFID's for Container Tracking Applications", Period: Fall 2005 - Fall 2006, Special Topics.
29. M.Pichkhadze, "Authentication Algorithms for RFIDs", Period: Spring 2007, Special Topics.
30. D.Compston, "Modeling of Carbon-NanoTube Ultrasensitive Chemical Sensors", Period: Spring 2007-Fall 2007, Special Topics.
31. T.Thai, "Nanoengineering Thermal Solutions on Graphene", Period: Fall 2006-Fall 2007, Special Topics, ***President's Undergraduate Research Award (PURA) recipient, 2007 Georgia Tech School of ECE Undergraduate Research Award recipient, 2007 IEEE MTT-S Undergraduate/Pre-graduate Scholarship recipient, 2007 SAIC Student Paper Award recipient.***
32. R.Moussounda, "Adhesives for Paper-Printed Electronics", Period: Spring 2008-Fall 2008, Special Topics.
33. J.Pan, "Compact RFID's on Metallic Structures", Period: Spring 2008, Special Topics.
34. N.Gorheski, "Automotive Passive RFID's with Enhanced Range", Period: Spring 2008, Special Topics.
35. S.Travis, "Miniaturized Wideband/Dual-Band UHF Antennas", Period: Fall 2007-Spring 2008, Special Topics.
36. J.Ratner, "Nanotechnology and Plasmonis RF Applications", Period: Fall 2008-Spring 2009, Special Topics
37. Dora Ahbe, "Miniaturized Antennas for Smart-Skin Sensing Applications", Period: Spring 2011-Summer 2011, ***Diploma Visiting Student*** from TU Karlsruhe, GERMANY
38. A.Amaya, "Inkjet-printed CNT-based Wireless Sensors", Period: Fall 2009-Summer 2010, ORS/Special Topics**, *President's Undergraduate Research Award (PURA) recipient.***
39. S.Palacios, "Conformal Automotive Radars", Period: Fall 2009-Present, ORS/ Special Topics**, *President's Undergraduate Research Award (PURA) recipient, 2012 Georgia Tech School of ECE Undergraduate Research Award recipient, 2012 Georgia Tech College of Engineering Undergraduate Research Award recipient.***
40. S.Y.Lee, "Inkjet-printed Antennas for Power scavenging applications", Period: Summer 2011-Present.
41. W.J.Hwang, " Circuit design for doublers and scavenging modules", Period" Summer 2011-Present
42. R.Roca, "Inkjet-Printed CNT-based Gas Sensors", Period: Fall 2010-Present, GT-ORS, ***IEEE MTT-S Undergraduate/Pre-Graduate Fellowship***
43. S.Elia, "Inkjet-Printed Integrated Wireless Sensor Modules", Period: Summer 2011-2012, GT-ORS Student.
44. J.T.Brock, "Zero-Power Wireless Sensors", Period: Fall 2011-2012.
45. S.Wilson, "Investigation of Chemical Mechanisms for the Ultrasensitive Gas Detection", Period: Summer 2011-2012, GT-ORS Student.
46. Aisha Jackson, "Sense for Cents", Period: 2015-Present, GT-ORS Student
47. Emily Pitts, "Sense for Cents", Period: 2015-Present, GT-ORS Student
48. Eric Rafalovsky, "Sense for Cents", Period: 2015-Present, GT-ORS Student
49. Hans Webster, "Sense for Cents", Period: 2015-Present, GT-ORS Student

III.B: OTHER TEACHING ACTIVITIES

1. Development of home pages for EE3310 [Electromagnetics II], ECE3065 [Electromagnetic Applications] (http://www.ece.gatech.edu/ etentze/3065f08.html), ECE4390 [Radar and Electromagnetic Sensing], ECE6261 [Numerical Methods for Electromagnetics] and ECE6380 [Numerical Methods for Electromagnetics] (http:// www.ece.gatech.edu/ etentze/6380f08.html) Courses. Through the use of these home pages (Summer 1998-Fall 2010), undergraduate and graduate students can obtain previous homeworks and solutions, as well as important information concerning textbook typos and deadlines. Additional examples have been added in .pdf format and an easy-to-use Course Schedule is available.
2. Development of a Preliminary Graphical User Interface (GUI) for the full-wave FDTD modeling of Transmission Lines, Filters and Antennas. This CAD tool could be used as a means for a comprehensive demonstration and the visualization of high-frequency effect in the semester format Electromagnetics courses (ECE3025 [Electromagnetics], ECE3065 [Electromagnetic Applications]).
3. Development of a Beowulf Parallel-Processor Cluster with 8 dual nodes, that is currently extended to 24 dual nodes. This cluster could be used as a testbed for the demonstration of the principles of code parallelization for the simulations of complex wireless structures (ECE6380 [Numerical Techniques for Electromagnetics]).
4. Development of a new senior-level course on RFID Technologies (ECE4803A) in collaboration with Prof. Durgin. This proposal was approved from the Electromagnetics-TIG and School of ECE and the course has been already taught twice (Spring 2009, Spring 2010).

IV.:SCHOLARLY ACCOMPLISHMENTS

IV.A: PUBLISHED BOOKS AND PARTS OF BOOKS

1. L.P.B.Katehi, J.F.Harvey and E.Tentzeris, "Time-Domain Analysis Using Multiresolution Expansions", Chapter in the book: Advances in Computational Electrodynamics, edited by A.Taflove, pp.111-162, Artech House, 1998.
2. E.M.Tentzeris, "Numerical Techniques in RF and Microwave Design", Section for the Book: The RF and Microwave Handbook, edited by M.Golio, pp.8.13-8.34, CRC Press, 2000.
3. J.Laskar, E.M.Tentzeris, J.Schutt-Aine and R.Tummala, "Fundamentals of RF Packaging", Chapter in the book: Fundamentals of Microsystems Packaging, edited by R.Tummala, pp.500-541, McGraw- Hill, 2001.
4. E.M.Tentzeris, "Full-Wave Methods for the Analysis, Modeling and Design of RF and Microwave Geometries", Section for the Book: The RF/Microwave Applications: Challenges and Solutions, edited by M.Golio, pp.18.1-18.32, CRC Press, June 2003.
5. E.M.Tentzeris and N.Bushyager, "Electromagnetics: Time-Domain Techniques," Chapter for the Book: Encyclopedia of RF and Microwave Engineering, edited by K.Chang, Wiley Eds., June 2004.
6. E.M.Tentzeris, K.Lim, S.Pinel and J.Laskar, "RF/Wireless Packaging," Chapter for the Book: Encyclopedia of RF and Microwave Engineering, edited by K.Chang, Wiley Eds., June 2004.
7. J.Goswami, E.M.Tentzeris and N.Bushyager, "Application of Wavelets to Electromagnetics," Chapter for the Book: Encyclopedia of RF and Microwave Engineering, edited by K.Chang, Wiley Eds., June 2004.

8. E.M.Tentzeris and R.L.Li, "Wideband Antennas on Silicon," Chapter for the Book: The Silicon Heterostructure Handbook, edited by J.D.Cressler, pp.1099-1118, Marcel-Dekker Eds., December 2005.
9. N.Bushyager and M.M.Tentzeris, "MRTD (MultiResolution Time-Domain) Method in Electromagnetics", Synthesis Lectures on Computational Electromagnetics, Morgan and Claypool Editions, November 2005.
10. E.M.Tentzeris,L.Yang, A.Rida and S.Basat "RFID: Beyond the Basics", Chapter for the Book: RFID Applied, edited by J.Banks, D.Hanny, M.Pachano and L.Thompson, pp.95-123, J.Wiley and Sons Eds., June 2007.
11. E.M.Tentzeris,L.Yang, A.Rida and S.Basat "RFID: Issues of Security and Privacy", Chapter for the Book: RFID Applied, edited by J.Banks, D.Hanny, M.Pachano and L.Thompson, pp.269-296, J.Wiley and Sons Eds., June 2007.
12. J.-H.Lee and M.M.Tentzeris, "Three-Dimensional Integration and Modeling: A Revolution in RF and Wireless Packaging", Synthesis Lectures on Computational Electromagnetics, Morgan and Claypool Editions, December 2007.
13. E.M.Tentzeris, "Numerical Techniques for the Analysis and Design of RF/ Microwave Structures", Section for the Book: RF and Microwave Circuits, Measurements and Modeling, edited by M.Golio, pp.28.1-28.34, CRC Press, January 2008.
14. B.Pan, J.Papapolymerou and E.M.Tentzeris, "MEMS for Antennas", Chapter for the Book: Modern Antenna Handbook, edited by C.Balanis, pp.829-865, J.Wiley and Sons Eds., July 2008.
15. M.M.Tentzeris, B.Pan and R.L.Li, "Multiband Planar Wire Antennas", Chapter for the Book: Multiband Integrated Antennas for 4G Terminals, edited by D.Sanchez-Hernandez, pp.53-94, Artech House Eds., August 2008.
16. J.Papapolymerou, M.M.Tentzeris, J.Laskar and S.Bhattacharya, "Radio-Frequency System-on-Package (RF SOP)", Chapter for the Book: Introduction to System-On-Package (SOP): Miniaturization of the Entire System, edited by R.R.Tummala and M.Swaminathan, McGraw-Hill, August 2008.
17. S.Chakraborty, J.Laskar and E.M.Tentzeris, "Mixed-Signal Design and Packaging of RF and Wireless Microsystems", J.Wiley and Sons Eds., January 2009.
18. L.Yang, A.Rida and M.M.Tentzeris, "Design and Development of RFID's and RFID-enabled Sensors on Flexible Low-Cost Substrates", Synthesis Lectures on Computational Electromagnetics, Morgan and Claypool Editions, June 2009.
19. V.Lakafosis, R.Vyas and M.M.Tentzeris, "Enabling Localization Services in Single- and Multihop Wireless Networks", Chapter for the Book: Handbook on Smart Antennas for RFID Systems, edited by N. Karmakar, Wiley Eds., July 2010.
20. A.Rida, L.Yang and M.M.Tentzeris, "RFID-Enabled Sensor Design and Applications", Artech House Publishers, February 2010.
21. M.M.Tentzeris, L.Yang, A.Traille and A.Rida, " "Green" Inkjet-Printed Wireless Sensor Nodes on Low-Cost Paper, Liquid and Flexible Organic Substrates", Chapter for the Book: Electromagnetics and Network Theory and Their Microwave Technology Applications: A Tribute to Peter Russer, edited by S.Lindenmeier and R.Weigel, Springer Eds., July 2011.

22. V.Lakafosis, R.Vyas, C.Mariotti, T.Le and M.M.Tentzeris, "Integrating Tiny RFID and NFC Based Sensors With the Internet", Chapter for the Book: Green RFID Systems, Cambridge University Press, 2014.
23. M.M.Tentzeris, S.Kim, A.Traille, B.S.Cook and T.Le, "Materials for Substrates", Chapter for the Book: Green RFID Systems, Cambridge University Press, 2014.
24. M.M.Tentzeris, R.Vyas, W.Wei, Y.Kawahara, L.Yang, S.Georgakopoulos, V.Lakafosis, S.Kim, H.Lee, T.Le, S.Mukala and A.Traille, "Power Issues in Biomedical Telemetry", Chapter in Handbook of Biomedical Telemetry, edited by K.S.Nikita, Wiley-IEEE Press, August 2014.
25. M.M.Tentzeris, S.Kim, V.Lakafosis, H.Lee, T.Le, R.Vyas, S.Mukala and A.Traille, "Advanced Material-Based Sensing Structures", Chapter in Handbook of Biomedical Telemetry, edited by K.S.Nikita, Wiley-IEEE Press, August 2014.
26. B.S.Cook, B.Tehrani, J.R.Cooper, S.Kim and M.M.Tentzeris, "Inkjet Printing Technology for 2D/3D Flexible Electronic Systems", Chapter in Handbook of Flexible Organic Electronics, Materials, Manufacturing and Applications, edited by S.Logothetidis, Woodhead Publishing, December 2014.
27. S.Kim, B.Cook, J.Cooper and M.M.Tentzeris, "Inkjet-Printed Artificial Magnetic Conductor (AMC) Plane for Wearable Antennas", Chapter for the Book: Innovation in Wearable and Flexible Antennas, edited by H.Khaleel, WIT Press, 2015.
28. J.Kimionis, B.Tehrani, J.G.D.Hester, W.Su, J.Bito and M.M.Tentzeris, "Inkjet-Printed Wearable "Smart Skins" ", Chapter for the Book: Electromagnetics of Body-Area Networks: Antennas, Propagation and RF Systems, edited by D.Werner and Z.Jiang, Wiley Eds. 2015.
29. B.K.Tehrani, J.Hester, J.Bito, W.Su, R.Bahr, B.S.Cook and M.M.Tentzeris, "Advanced Antenna Fabrication Processes (MEMS/LTCC/LCP/Printing)", Chapter for the Book: Handbook of Antenna Technologies, edited by Z.N.Chen, D.Liu, H.Nakano, X.Qing and Th.Zwick, Springer Eds., 2016.
30. M.M.Tentzeris, A.Eid, T.-H.Lin, J.G.D.Hester, Y.Cui, A.Adeyeye, B.Tehrani and S.A.Nauroze, "Inkjet-/3D-/4D-Printed Nanotechnology-Enabled Radar, Sensing, and RFID Modules for Internet of Things, "Smart Skin," and "Zero Power" Medical Applications", Chapter for the Book: Antenna and Sensor Technologies in Modern Medical Applications, edited by Y.Rahmat-Samii and E.Topsakal, Wiley – IEEE Press, 2021.
31. A.Georgiadis, A.Collado and M.M.Tentzeris, "Enery Harvesting: Technologies, Systems and Challenges", Cambridge University Press, 2021.
32. Y.Cui, E.Min Jung, A.Adeyeye, C.Lynch, X.He and M.Tentzeris, "Additively Manufactured RF Devices for 5G, IoT, RFID, WSN and Smart City Applications", Chapter for the Book: "Nanotechnology for Electronics, Biosensors, Additive Manufacturing and Emerging Systems Application", edited by C.Broadbridge, F.C.Jain, H.Tang and M.Gherasimova, World Scientific Publishing Company, 2021.
33. Y.Cui, S.A.Nauroze and M.M.Tentzeris, "Origami-inspired 4D tunable RF and wireless structures and modules", Chapter for the Book: Smart Materials in Additive Manufacturing, Vol.2: 4D Printing mechanics, modeling and advanced engineering applications", edited by M.Bodaghi and A.Zolfagharian, Elsevier Press, 2022.

IV.B: REFEREED PUBLICATIONS [Google Scholar h-factor=80 / 26,648 citations]

IV.B.1. Refereed Journal Publications

1. G.Ponchak, E.Tentzeris and L.P.B.Katehi, "Characterization of Finite Ground Coplanar Waveguide with Narrow Ground Planes", Int. Journ. of Microcircuits and Electronic Packaging, Vol. 20, No. 2, pp. 167-173, Second Quarter, 1997.
2. G.Ponchak, E.Tentzeris and L.P.B.Katehi, "Characterization of the Coupling Between Adjacent Finite Ground Coplanar (FGC) Waveguides", Int. Journ. of Microcircuits and Electronic Packaging, Vol. 20, No. 4, pp. 587-592, Fourth Quarter, 1997.
3. T.P.Budka, E.Tentzeris, S.Waclawik, N.Dib, L.P.B.Katehi and G.M.Rebeiz, "Near-Field Mapping Above a Coupled-Line Filter and a MMIC", Microwave Journal, Vol.41, No.3, pp.94-106, March 1998.
4. E.Tentzeris, M.Krumpholz, N.Dib, J.-G.Yook and L.P.B.Katehi, "FDTD Characterization of Waveguide Probe Structures", IEEE Transactions on Microwave Theory and Techniques, Vol.46, No.10, pp.1452-1460, October 1998.
5. R.L.Robertson, E.Tentzeris and L.P.B.Katehi, "Modelling of Dielectric-Loaded Cavities using MRTD", Int. Journal of Numerical Modeling, Special Issue on Wavelets in Electromagnetics, Vol.11, pp.55-68, 1998.
6. E.Tentzeris, J.Harvey and L.P.B.Katehi, "Time Adaptive Time-Domain Techniques for the Design of Microwave Circuits", IEEE Microwave and Guided Wave Letters, Vol.9, No.3, pp.96-98, 1999.
7. E.Tentzeris, R.Robertson, J.Harvey and L.P.B.Katehi, "Stability and Dispersion Analysis of Battle-Lemarie Based MRTD Schemes", IEEE Transactions on Microwave Theory and Techniques, Vol.47, No.7, pp.1004-1013, July 1999.
8. E.Tentzeris, R.Robertson, J.Harvey and L.P.B.Katehi, "Application of the PML Absorber to MRTD Battle-Lemarie Schemes", IEEE Transactions on Antennas and Propagation, Vol.47, No.11, pp.1709-1715, November 1999.
9. D.Staciulescu, J.Laskar and E.M.Tentzeris, "Design Rule Development for Microwave Flip-Chip Applications", IEEE Transactions on Microwave Theory and Techniques, Vol.48, No.9, pp.1476-1481, September 2000.
10. A.Sutono, G.Cafaro, J.Laskar and M.Tentzeris, "Experimental modeling, repeatability investigation and optimization of microwave bond wire interconnects", IEEE Transactions on Advanced Packaging, Vol.24, No.2, pp.595-603, November 2001.
11. M.Tentzeris, "3G/4G Wireless Systems: Challenges of the Future" (in Greek), " Pyrforos" National Technical Review of National Technical University of Athens, Vol.12 (2001), No.4, pp.24-40, November 2001.
12. E.Tentzeris, A.Cangellaris, L.P.B.Katehi and J.Harvey "Multiresolution Time-Domain (MRTD) Adaptive Schemes Using Arbitrary Resolutions of Wavelets", IEEE Transactions on Microwave Theory and Techniques, Vol.50, No.2, pp.501-516, February 2002.
13. K.Lim, S.Pinel, M.Davis, A.Sutono, C.-H.Lee, D.Heo, A.Obateyinbo, J.Laskar, E.M.Tentzeris and R.Tummala, "RF-System-On-Package (SOP) for Wireless Communications", IEEE Microwave Magazine, Vol.3, No.1, pp.88-99, March 2002.
14. N.Bushyager, B.McGarvey and E.M.Tentzeris, "Introduction of an Adaptive Modeling Technique for the Simulation of RF Structures Requiring the Coupling of Maxwell's, Mechanical and Solid-State Equations", Applied Computational Electromagnetics Society Journal, Vol.17, No.1, pp.104-111, March 2002.

15. M.F.Davis, A.Sutono, S.-W.Yoon, S.Mandal, N.Bushyager, C.-H.Lee, L.Lim, S.Pinel, M.Maeng, A.Obatoyinbo, S.Chakraborty, J.Laskar, M.Tentzeris, T.Nonaka and R.R.Tummala, "Integrated RF Architectures in Fully-Organic SOP Technology", IEEE Transactions on Advanced Packaging, Vol.25, No.2, pp.136-142, May 2002.
16. R.Li, E.M.Tentzeris, J.Laskar, V.F.Fusco and R.Cahill,"Broadband Loop Antenna for DCS-1800/IMT-2000 Mobile Phone Handsets", IEEE Microwave and Wireless Components Letters, Vol.12, No.8, pp.305-307, August 2002.
17. G.Ponchak and E.M.Tentzeris, "Finite Ground Coplanar Waveguide (FGC) Low Loss, Low Coupling 90-Degree Crossover Junctions", IEEE Transactions on Advanced Packaging, Vol.25 No.3, pp.385-392, August 2002.
18. C.H.Lee, A.Sutono, S.Han, K.Lim, S.Pinel, J.Laskar and E.M.Tentzeris, "A Compact LTCC-based Ku-band Transmitter Module", IEEE Transactions of Advanced Packaging, Vol.25 No.3, pp.374-384, August 2002.
19. D.Staiculescu, J.Laskar and E.M.Tentzeris, "Design of Experiments Technique (DOE) for Microwave/Millimeter Wave Flip-Chip Optimization", International Journal of Numerical Modeling, Vol.16, pp.97-103, January 2003.
20. G.Zheng, J.Papapolymerou and M.M.Tentzeris, "Wideband Coplanar Waveguide RF Probe Pad to Microstrip Transitions without Via Holes", IEEE Microwave and Wireless Components Letters, pp.544-546, December 2003.
21. G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Coupling Between Microstrip Lines Embedded in Polyimide Layers for 3D-MMIC's on Si", IEE Proceedings, H Microwaves, Antennas, and Propagation, Vol. 150, No. 5, pp.344-350, October 2003.
22. K.Kawano, N.Miura, M.Kuroda and M.M.Tentzeris, "A Novel Numerical Approach for the Analysis of MEMS-Based Variable Capacitors with Moving Metallic Plates"-in Japanese, The IEICE Transaction on Electronics, Vol. J87-C, No.1, pp32-38, January 2004.
23. R.L.Li, G.DeJean, J.Laskar and M.M.Tentzeris, "Development and Analysis of a Folded Shorted-Patch Antenna with Reduced Size", IEEE Transactions on Antennas and Propagation, Vol.52, No.2, pp.555-562, February 2004.
24. R.L.Li, G.DeJean, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "FDTD Analysis of Microstrip Patch Antennas and Arrays on High Dielectric-Constant Substrate Surrounded by a Soft-and-Hard Surface", IEEE Transactions on Magnetics, Vol.40, No.2, pp.1444-1447, March 2004.
25. M.Kuroda, N.Miura and M.M.Tentzeris, "A Novel Numerical Approach for the Analysis of 2D MEMS-Based Variable Capacitors Including the Effect of Arbitrary Motions", Applied Computational Electromagnetics (ACES) Society Journal, Vol.19, No.1b, pp.133-138, March 2004.
26. J.Papapolymerou, G.Ponchak, E.Dalton, A.Bacon and M.M.Tentzeris, "Crosstalk Between Finite Ground Coplanar Waveguides over Polyimide Layers for 3D-MMIC's on Si Substrates", IEEE Transactions on Microwave Theory and Techniques, Vol.52, No.4, pp.1292-1301, April 2004.
27. D.C.Thompson, O.Tantot, H.Jallageas, G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Characterization of Liquid Crystal Polymer (LCP) Material and Transmission Lines on LCP Substrates from 30-110 GHz", IEEE Transactions on Microwave Theory and Techniques, Vol.52, No.4, pp.1343-1352, April 2004.

28. M.M.Tentzeris, J.Laskar, J.Papapolymerou, D.Thompson, S.Pinel, R.L.Li, J.H.Lee, G.DeJean, S.Sarkar, R.Pratap, R.Bairavasubramanian and N.Papageorgiou, "RF SoP for Multi-band RF and Millimeter-wave Systems", Advanced Packaging Magazine, pp.15-16, April 2004.
29. N.Bushyager, E.Dalton and M.M.Tentzeris, "Modeling of Complex RF/Wireless Structures Using Computationally Optimized Time-Domain Techniques", International Journal of Numerical Modeling, Vol.17, No.3, pp.223-236, May 2004.
30. R.R.Tummala, M.Swaminathan, M.M.Tentzeris, J.Laskar, G.-K.Chang, S.Sitaraman, D.Keezer, D.Guidotti, Z.Huang, K.Lim, L.Wan, S.K.Bhattacharya, V.Sundaram, F.Liu and P.M.Raj, "The SOP for Miniaturized, Mixed-Signal Computing, Communication and Consumer Systems of the Next Decade", IEEE Transactions on Advanced Packaging, Vol.27 No.2, pp.250-267, May 2004.
31. M.M.Tentzeris, J.Laskar, J.Papapolymerou, S.Pinel, V.Palazzari, R.Li, G.DeJean, N.Papageorgiou, D.Thompson, R.Bairavasubramanian, S.Sarkar and J.-H.Lee, "3D Integrated RF and Millimeter-Wave Functions and Modules Using Liquid Crystal Polymer (LCP) System-on-Package Technology", IEEE Transactions on Advanced Packaging, Vol.27 No.2, pp.332-340, May 2004.
32. J.-H.Lee, N.Bushyager and M.M.Tentzeris, "Comparative Evaluation of DSP Techniques Coupled with EM Time-Domain Simulators for the Efficient Modeling and Design of Highly Resonant RF-MEMS Structures", IEEE Microwave and Wireless Components Letters, Vol.14, No.7, pp.361-363, July 2004.
33. R.L.Li, G.DeJean, K.Lim, M.M.Tentzeris and J.Laskar, "Design of Compact Stacked-Patch Antennas in LTCC Multilayer Packaging Modules for Wireless Applications", IEEE Transactions on Advanced Packaging, Vol.27, No.4, pp.581-589, November 2004.
34. R.L.Li, G.DeJean, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "Radiation-Pattern Improvement of Patch Antennas on a Large-Size Substrate Using a Compact Soft Surface Structure and its Realization on LTCC Multilayer Technology", IEEE Transactions on Antennas and Propagation, Vol.53, No.1, pp.200-208, January 2005.
35. G.DeJean, R.Bairavasubramanian, D.Thompson, G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Liquid Crystal Polymer (LCP): A New Organic Material for the Development of Multilayer Dual Frequency/Dual Polarization Flexible Antenna Arrays", IEEE Antennas and Wireless Propagation Letters, Vol.4, No.1, pp.22-26, January 2005.
36. R.L.Li, D.Thompson, M.M.Tentzeris, J.Laskar and J.Papapolymerou, "Development of a Wideband Short Backfire Antenna Excited by an Unbalance-Fed H-Shaped Slot", IEEE Transactions on Antennas and Propagation, Vol.53, No.2, pp.662-671, February 2005.
37. G.E.Ponchak, J.Papapolymerou and M.M.Tentzeris, "Excitation of Coupled Slotline Mode in Finite-Ground CPW with Unequal Ground-Plane Widths", IEEE Transactions on Microwave Theory and Techniques, Vol.53, No.2, pp.713-717, February 2005.
38. V.Palazzari, S.Pinel, J.Laskar, L.Roselli and M.M.Tentzeris, "Asymmetrical Dual-Band WLAN Filter in Liquid Crystal Polymer System-on-Package Technology", IEEE Microwave and Wireless Components Letters, Vol.15, No.3, pp.165-167, March 2005.

39. G.E.Ponchak, E.Dalton, M.M.Tentzeris and J.Papapolymerou, "Coupling Between Microstrip Lines with Finite Width Ground Plane Embedded in Thin Film Circuits", IEEE Transactions on Advanced Packaging, Vol.28, No.2, pp.320-327, May 2005.
40. D.Staiculescu, N.Bushyager, A.Obatoyinbo, L.Martin and M.M.Tentzeris, "Design and Optimization of 3D Compact Stripline and Microstrip Bluetooth/WLAN Balun Architectures using the Design of Experiments Technique", IEEE Transactions on Antennas and Propagation, Vol.53, No.5, pp.1805-1812, May 2005.
41. J.-H.Lee, G.DeJean, S.Sarkar, S.Pinel, K.Lim, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "Highly Integrated Millimeter-Wave Passive Components Using 3-D LTCC System-on-Package (SOP) Technology", IEEE Transactions on Microwave Theory and Techniques, Vol.53, No.6, pp.2220-2229, June 2005.
42. J.-H.Lee, L.Marcaccioli, G.DeJean, C.Lugo, S.Pinel, J.Papapolymerou, J.Laskar, R.Sorrentino and M.M.Tentzeris, "Advanced System-on-Package (SOP) Front-End Passive Solutions for RF and Millimeter-Wave Wireless Systems", European Microwave Association Magazine, Vol.1, No.2, pp.130-139, June 2005.
43. R.L.Li, D.Thompson, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "A New Excitation Technique for Wideband Short Backfire Antennas", IEEE Transactions on Antennas and Propagation, Vol.53, No.7, pp.2313-2320, July 2005.
44. N.Bushyager, J.Papapolymerou and M.M.Tentzeris, "A Composite-Cell Multiresolution Time-Domain Technique for the Design of Antenna Systems Including Electromagnetic Band Gap and Via-Array Structures", IEEE Transactions on Antennas and Propagation, Vol.53, No.8, Part 2, pp.2700-2710, August 2005.
45. I.-K.Kim, N.Kingsley, M.Morton, R.Bairavasubramanian, J.Papapolymerou, M.M.Tentzeris and J.-G.Yook, "Fractal Shaped Microstrip Coupled Line Bandpass Filters for Suppression of the 2nd Harmonic", IEEE Transactions on Microwave Theory and Techniques, Vol.53, No.9, pp.2943-2948, September 2005.
46. D.C.Thompson, J.Papapolymerou and M.M.Tentzeris, "High Temperature Dielectric Stability of Liquid Crystal Polymer at mm-Wave Frequencies", IEEE Microwave and Wireless Components Letters, Vol.15, No.9, pp.561-563, September 2005.
47. R.L.Li, J.Laskar and M.M.Tentzeris, "Wideband Probe-Fed Circularly Polarized Circular Loop Antennas", Electronics Letters, Vol.41, No.18, pp.997-999, September 2005.
48. A.Raghavan, E.Gebara, M.M.Tentzeris and J.Laskar, "Analysis and Design of an Interference Canceller for Collocated Radios", IEEE Transactions on Microwave Theory and Techniques, Vol.53, No.11, pp.3498-3508, November 2005.
49. R.L.Li, G.DeJean, J.Laskar and M.M.Tentzeris, "Investigation of Circularly Polarized Loop Antennas with a Parasitic Element for Bandwidth Enhancement", IEEE Transactions on Antennas and Propagation, Vol.53, No.12, pp.3930-3939, December 2005.
50. R.L.Li, N.A.Bushyager, J.Laskar and M.M.Tentzeris, "Determination of Reactance Loading for Circularly-Polarized Circular-Loop Antennas with a Uniform Travelling-Wave Current Distribution", IEEE Transactions on Antennas and Propagation, Vol.53, No.12, pp.3920-3929, December 2005.

51. J.-H.Lee, S.Pinel, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "Low-Loss LTCC Cavity Filters Using System-on-Package Technology at 60 GHz", IEEE Transactions on Microwave Theory and Techniques, Vol.53, No.12, pp.3817-3824, December 2005.
52. J.-H.Lee, B.G.Perumana, S.Nikolaou, Y. Park, R. Mukhopadhay, C.-H. Lee, K. Lim, J.Laskar and M.M.Tentzeris, "Advanced Integrated RF Front-End Solutions for Low-Power and UWB Wireless Systems", European Microwave Association Magazine, Vol.1, No.4, pp.272-280, December 2005.
53. R.L.Li, J.Laskar and M.M.Tentzeris, "Broadband Circularly Polarized Rectangular Loop Antenna with Impedance Matching", IEEE Microwave and Wireless Components Letters, Vol.16, No.1, pp.52-54, January 2006.
54. S.Nikolaou, R.Bairavasubramanian, C.Lugo, I.Carasquillo, D.Thompson, G.E.Ponchak, J.Papapolymerou, and M.M.Tentzeris, "Pattern and Frequency Reconfigurable Annular Slot Antenna using PIN Diodes", IEEE Transactions on Antennas and Propagation, Vol.54, No.2-I, pp.439-448, February 2006.
55. R.L.Li, D.Thompson, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "A Circularly Polarized Short Backfire Antenna Excited by an Unbalance-Fed Cross Aperture", IEEE Transactions on Antennas and Propagation, Vol.54, No.3, pp.852-859, March 2006.
56. S.Nikolaou, G.Ponchak, J.Papapolymerou, and M.M.Tentzeris, "Conformal Double Exponentially Tapered Slot Antenna (DETSA) on LCP for UWB Applications", IEEE Transactions on Antennas and Propagation, Vol.54, No.6, pp.1663-1669, June 2006.
57. R.L.Li, S.Basat, A.Traille, J.Laskar and M.M.Tentzeris, "Development of Wideband Circularly Polarized Square- and Rectangular-Loop Antennas", IEE Proc. Microwave, Antennas and Propagation, Vol.153, No.3, pp.293-300, June 2006.
58. J.-H.Lee, N.Kidera, G.DeJean, S.Pinel, J.Laskar, and M.M.Tentzeris, "A V-Band Front-End with 3D Integrated Cavity Filters/Duplexers and Antenna in LTCC Technologies", IEEE Transactions on Microwave Theory and Techniques, Vol.54, No.7, pp.2925-2936, July 2006.
59. D.C.Thompson, M.M.Tentzeris and J.Papapolymerou, "Packaging of MMIC's in Multilayer LCP Substrates", IEEE Microwave and Wireless Components Letters, Vol.16, No.7, pp.410-412, July 2006.
60. I.-K.Kim, N.Kidera, S.Pinel, J.Papapolymerou, J.Laskar, J.-G.Yook, and M.M.Tentzeris, "Linear Tapered Cavity-Backed Slot Antenna for millimeter-wave LTCC Modules", IEEE Antennas and Wireless Propagation Letters, Vol.5, pp.175-178, December 2006.
61. R.L.Li, A.Traille, J.Laskar and M.M.Tentzeris, "Bandwidth and Gain Improvement of a Circularly Polarized Dual-Rhombic Loop Antenna", IEEE Antennas and Wireless Propagation Letters, Vol.5, pp.84-87, December 2006.
62. B.Pan, Y.-K.Yoon, G.E.Ponchak, M.G.Allen, J.Papapolymerou and M.M.Tentzeris, "Analysis and Characterization of a High Performance Ka-Band Surface Micromachined Elevated Patch Antenna", IEEE Antennas and Wireless Propagation Letters, Vol.5, pp.511-514, December 2006.
63. I.-K.Kim, N.Kingsley, M.A.Morton, S.Pinel, J.Papapolymerou, M.M.Tentzeris, J.Laskar, J.-G.Yook, "Koch Fractal Shape Microstrip Bandpass Filters on High Resistivity Silicon for the Suppression of the 2nd Harmonic" [Abstract in Korean],

Journal of the Korean Electromagnetic Engineering Society, Vol.6, No.4, December 2006.
64. J.-H.Lee, N.Kidera, S.Pinel, J.Papapolymerou, J.Laskar, and M.M.Tentzeris, "Comparative Study of Feeding Techniques for 3D Cavity Resonators", IEEE Transactions on Advanced Packaging, Vol.30, No.1, pp.115-123, February 2007.
65. G.DeJean and M.M.Tentzeris, "A New High-Gain Microstrip Yagi Antenna Array with a High Front-to-Back (F/B) Ratio for WLAN and Millimeter-Wave Applications", IEEE Transactions on Antennas and Propagation, Vol.55, No.2, pp.298-304, February 2007.
66. C.You, M.M.Tentzeris and W.Hwang, "Multilayer Effects on Microstrip Antennas for their Integration with Mechanical Structures", IEEE Transactions on Antennas and Propagation, Vol.55, No.4, pp.1051-1058, April 2007.
67. R.L.Li, B.Pan, J.Laskar and M.M.Tentzeris, "A Compact Broadband Planar Antenna for GPS, DCS-1800, IMT-2000, and WLAN Applications", IEEE Antennas and Wireless Propagation Letters, Vol.6, pp.25-27, April 2007.
68. J.H.Lee, N.Kidera, S.Pinel, J.Laskar and M.M.Tentzeris, "Fully Integrated Passive Front-End Solutions for a V-band LTCC Wireless Systems", IEEE Antennas and Wireless Propagation Letters, Vol.6, pp.285-288, April 2007.
69. G.DeJean, T.T.Thai, S.Nikolaou and M.M.Tentzeris, "Design and Analysis of Microstrip Bi-Yagi and Quad-Yagi Antenna Arrays for WLAN Applications", IEEE Antennas and Wireless Propagation Letters, Vol.6, pp.244-248, April 2007.
70. R.L.Li, B.Pan, J.Papapolymerou, J.Laskar, M.M.Tentzeris, "Broadand Low-profile Antennas for Wireless Applications", IET Microwaves, Antennas and Propagation, Vol.1, No.2, pp.396-400, April 2007.
71. R.L.Li, B.Pan, J.Laskar, M.M.Tentzeris, "A Very-Low-Profile Broadband Planar Antenna for DCS-1800 and IMT-2000 Applications", Microwave and Optical Technology Letters, Wiley Eds., Vol.49, No.7, pp.1679-1681, July 2007.
72. R.L.Li, B.Pan, J.Laskar, M.M.Tentzeris, "A Low-Profile Broadband Planar Antenna for DVB-H Terminals", Microwave and Optical Technology Letters, Wiley Eds., Vol.49, No.7, pp.1630-1633, July 2007.
73. R.L.Li, G.DeJean, M.M.Tentzeris and J.Laskar, "Development of Multi-Broadband Planar Wire Antennas for Wireless Applications", Wireless Personal Communications, Springer Eds., Vol.42, pp.1-11, 2007.
74. B.Pan, Y.Li, M.M.Tentzeris and J.Papapolymerou, "A High-Q Millimeter-Wave Air-Lifted Cavity Resonator on Lossy Substrates", IEEE Microwave and Wireless Components Letters, Vol.17, No.8, pp.571-573, August 2007.
75. D.C.Thompson, M.M.Tentzeris and J.Papapolymerou, "Experimental Analysis of the Water Absorption Effects on RF/mm-wave Active/Passive Circuits Packaged in Multilayer Organic Substrates", IEEE Transactions on Advanced Packaging, Vol.30, No.3, pp.pp.551-557, August 2007.
76. J.-H.Lee, S.Pinel, J.Laskar, and M.M.Tentzeris, "Design and Development of Advanced Cavity-Based Dual-Mode Filters Using Low-Temperature Co-Fired Ceramic Technology for V-band Gigabit Wireless Systems", IEEE Transactions on Microwave Theory and Techniques, Vol.55, No.9, pp.1869-1879, September 2007.
77. G.DeJean and M.M.Tentzeris, "The Application of Lumped Element Equivalent Circuits Approach to the Design of Single-Port Microstrip Antennas", IEEE

Transactions on Antennas and Propagation, Vol.55, No.9, pp.2468-2472, September 2007.
78. N.Kingsley, D.E.Anagnostou, M.M.Tentzeris and J.Papapolymerou, "RF MEMS Sequentially Reconfigurable Sierpinski Antenna on a Flexible Organic Substrate With Novel DC-Biasing Tuning", IEEE Journal of Microelectromechanical Systems, Vol.16, No.5, pp.1185-1192, October 2007.
79. S.Horst, R.Bairavasubramanian, M.M.Tentzeris and J.Papapolymerou, "Modified Wilkinson Power Dividers for Millimeter-Wave Integrated Circuits", IEEE Transactions on Microwave Theory and Techniques, Vol.55, No.11, pp.2439-2446, November 2007.
80. Y.Li, B.Pan, C.Lugo, M.M.Tentzeris and J.Papapolymerou, "Design and Characterization of a W-Band Transition from CPW Feeding Lines", IEEE Transactions on Microwave Theory and Techniques, Vol.55, No.12, Part 2, pp.2902-2910, December 2007.
81. L.Yang, A.Rida, R.Vyas and M.M.Tentzeris, "RFID Tag and RF Structures on Paper Substrates using Inkjet-Printing Technology", IEEE Transactions on Microwave Theory and Techniques, Vol.55, No.12, Part 2, pp.2894-2901, December 2007.
82. A.Rida, L.Yang, R.Vyas, D.Staiculescu and M.M.Tentzeris, "Novel Miniaturized Inkjet-printed Paper-Based UHF Components for RFID Applications", European Microwave Association Magazine, Special Issue on RFID's, Vol.3, No.4, pp.336-340, December 2007.
83. R.L.Li, B.Pan, A.Traille, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "Development of a Cavity-Backed Broadband Circularly Polarized Slot/Strip Loop Antenna with a Simple Feeding Structure", IEEE Transactions on Antennas and Propagation, Vol.56, No.2, pp.312-318, February 2008.
84. B.Kim, B.Pan, S.Nikolaou, Y.-S.Kim, J.Papapolymerou and M.M.Tentzeris, "A Novel Single-Feed Circular Microstrip Antenna with Reconfigurable Polarization Capability", IEEE Transactions on Antennas and Propagation, Vol.56, No.3, pp.630-638, March 2008.
85. R.L.Li, B.Pan, J.Laskar and M.M.Tentzeris, "A Novel Low-Profile Broadband Dual-Frequency Planar Antenna for Wireless Handsets", IEEE Transactions on Antennas and Propagation, Vol.56, No.4, pp.1155-1162, April 2008.
86. B.Pan, Y.Li, M.M.Tentzeris and J.Papapolymerou, "Surface Micromachining Polymer-Core-Conductor Approach for High-Performance Millimeter-Wave Air-Cavity Filters Integration", IEEE Transactions on Antennas and Propagation, Vol.56, No.4, pp.959-970, April 2008.
87. T.T.Thai, G.R.DeJean and M.M.Tentzeris, "Design and Development of a Novel Compact Soft-Surface Structure for the Front-to-Back Ratio Improvement and Size Reduction of a Microstrip Yagi Array Antenna", IEEE Antennas and Wireless Propagation Letters, Vol.7, pp.369-373, June 2008.
88. D.E.Anagnostou, J.Papapolymerou, M.M.Tentzeris and C.G.Christodoulou, "A Printed Log-Periodic Koch-Dipole Array (LPKDA)", IEEE Antennas and Wireless Propagation Letters, Vol.7, pp.456-460, June 2008
89. B.Pan, Y.Li, G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "A Low-Loss Substrate-Independent Approach for 60-GHz Transceiver Front-End Integration Using Micromachining Technologies", IEEE Transactions on Microwave Theory and Techniques, Vol.56, No.12-1, pp.2779-2788, December 2008.

90. J.Laskar and M.M.Tentzeris, "Guest Editorial", IEEE Transactions on Microwave Theory and Techniques, Vol.56, No.12-2, pp.3015-3015, December 2008.
91. L.Yang, L.J.Martin, D.Staiculescu, C.P.Wong and M.M.Tentzeris, "Conformal Magnetic Composite RFID for Wearable RF and Bio-Monitoring Applications", IEEE Transactions on Microwave Theory and Techniques, Vol.56, No.12-2, pp.3223-3230, December 2008.
92. B.Pan, Y.Li, G.E.Ponchak, J.Papapolymerou and M.M.Tentzeris, "A 60-GHz CPW-Fed High-Gain and Broadband Integrated Horn Antenna", IEEE Transactions on Antennas and Propagation, Vol.57, No.4-II, pp.1050-1056, April 2009.
93. M.M.Tentzeris, H.Witschnig and E.Leitgeb, "Guest Editorial – Special Issue on RFID Technologies", IEEE Transactions on Microwave Theory and Techniques, Vol.57, No.5-II, pp.1265-1267, May 2009.
94. R.Vyas, V.Lakafosis, A.Rida, N.Chaisilwattana, S.Travis, J.Pan and M.M.Tentzeris, "Paper-Based RFID-Enabled Wireless Platforms for Sensing Applications", IEEE Transactions on Microwave Theory and techniques, Vol.57, No.5-II, pp.1370-1382, May 2009.
95. A.Rida, L.Yang, R.Vyas and M.M.Tentzeris, "Conductive Inkjet-Printed Antennas on Flexible Low-Cost Paper-Based Substrates for RFID and WSN Applications", IEEE Antennas and Propagation Magazine, Vol.51, No.3, pp.13-23, June 2009.
96. A.Rida, L.Yang, R.Vyas, D.Staiculescu and M.M.Tentzeris, "UHF RFID Antennas on Ultra Low-Cost Paper-Based Substrates", accepted for publication to the International Journal on Wireless and Optical Communications on 5/3/08.
97. L.Martin, L.Yang, D.Staiculescu, H.Li, S.L.Ooi, C.P.Wong and M.M.Tentzeris, "Investigation of the Impact of Magnetic Permeability and Loss of Magnetic Composite Materials on RFID Miniaturization for Conformal Medical Applications", accepted for publication to the International Journal on Numerical Modeling on 5/11/08.
98. L.Yang, R.Zhang, D.Staiculescu, C.P.Wong and M.M.Tentzeris, "A Novel Conformal RFID-Enabled Module Utilizing Inkjet-Printed Antennas and Carbon Nanotubes for Gas Detection Applications", IEEE Antennas and Wireless Propagation Letters, Vol.8, pp.653-656, June 2009. ***2010 IEEE Antennas and Propagation Society Piergiorgio L. E. Uslenghi Letters Prize Paper Award***
99. X.He, S.Hong, H.Xiong, Q.Zhang and M.M.Tentzeris, "Design of a Novel High-Gain Dual-Band Antenna for WLAN Applications", IEEE Antennas and Wireless Propagation Letters, Vol.8, pp.798-801, June 2009.
100. R.L.Li, T.Wu, B.Pan, K.Lim, J.Laskar and M.M.Tentzeris, "Equivalent-Circuit Analysis of a Broadband Printed Dipole with Adjusted Integrated Balun and an Array for Base Station Applications', IEEE Transactions on Antennas and Propagation, Vol.57, No.7, pp.2180-2184, July 2009.
101. S.Nikolaou, N.D.Kingsley, G.E.Ponchak, J.Papapolymerou and M.M.Tentzeris, "UWB Elliptical Monopoles with a Reconfigurable Band Notch Using MEMS Switches Activated without Bias Lines", IEEE Transactions on Antennas and Propagation, Vol.57, No.8, pp.2242-2251, August 2009.
102. C.M.Kruesi, R.J.Vyas and M.M.Tentzeris, "Design and Development of a Novel 3D Cubic Antenna for Wireless Sensor Networks (WSNs) and RFID Applications", IEEE Transactions on Antennas and Propagation, Vol.57, No.10-II, pp.3293-3299, October 2009.

103.A.H.Rida, L.Yang, S.Basat, A.Ferrer-Vidal, S.Nikolaou and M.M.Tentzeris, "Design, Development and Integration of Novel Antennas for Miniaturized UHF RFID Tags", IEEE Transactions on Antennas and Propagation, Vol.57, No.11, pp.3450-3457, November 2009.

104.L.J.Martin, S.OOi, D.Staiculescu, M.D.Hill, C.P.Wong and M.M.Tentzeris, "Effect of Permittivity and Permeability of a Flexible Magnetic Composite Material on the Performance and miniaturization Capability of Planar Antennas for RFID and Wearable Wireless Applications", IEEE Transactions on Components and Pakaging Technologies, Vol.32, No.4, pp.849-858, December 2009. ***2009 IEEE Transactions on Components and Packaging Technologies Best Paper Award***

105.V.Lakafosis and M.M.Tentzeris, "From Single- to Multi-hop: The Status of Wireless Localization', IEEE Microwave Magazine, Vol.10, No.7-Supplement, pp.34-41, December 2009.

106.T.Wu, R.L.Li, S.Y.Eom, S.S.Myoung, K.Lim, J.Laskar, S.I.Jeon and M.M.Tentzeris, "Switchable Quad-band Antennas for Cognitive Radio Base Station Applications", IEEE Transactions on Antennas and Propagation, Vol.58, No.5, pp.1468-1476, May 2010.

107.V.Lakafosis, A.Rida, R.Vyas, L.Yang, S.Nikolaou and M.M.Tentzeris, "Progress Towards the First Wireless Sensor Networks Consisting of Inkjet-Printed Paper-Based RFID-Enabled Sensor Tags", Proceedings of the IEEE, Vol.98, No.9, pp.1601-1609, September 2010.

108.A.Rida, A.Margomenos, J.S.Lee, P.Schmalenberg, S.Nikolaou and M.M.Tentzeris, "Integrated Wideband 2D and 3D Transitions for Millimeter-Wave RF Front-Ends", IEEE Antennas and Wireless Propagation Letters (AWPL), Vol.9, pp.1080-1083, June 2010.

109.Y.Qi, J.Miao, S.Hong and M.M.Tentzeris, "Characterization of Extraordinary Transmission for a Single Subwavelength Slit: A Fabry-Perot-Like Formula Model", IEEE Transactions on Microwave Theory and Techniques, Vol.58, No.12-1, pp.3657-3665, December 2010.

110.V.Lakafosis, A.Traille, H.Lee, E.Gebara, M.M.Tentzeris, G.R.DeJean and D.Kirovski, "RF Fingerprinting Physical Objects for Anticounterfeiting Applications", IEEE Transactions on Microwave Theory and Techniques, Vol.59, No.2, pp.504-514, February 2011.

111.F.Alimenti, M.Virili, G.Orecchini, P.Mezzanotte, V.Palazzari, M.M.Tentzeris and L.Roselli, "A New Contactless Assembly Method for Paper Substrate Antennas and UHF RFID Chips", IEEE Transactions on Microwave Theory and Techniques, Vol.59, No.3, pp.627-637, March 2011.

112.T.T.Thai, L.Yang, G.DeJean and M.M.Tentzeris, "Nanotechnology Enables Wireless Gas Sensing", IEEE Microwave Magazine, Vol.12, No.4, pp.84-95, April 2011.

113.T.Wu, R.L.Li and M.M.Tentzeris, "A Scalable Solar Antenna for Autonomous Integrated Wireless Sensor Nodes", IEEE Antennas and Wireless Propagation Letters (AWPL), Vol.10, pp.510-513, June 2011.

114.G.Shaker, S.Safavi-Naeini, N.Sangary and M.M.Tentzeris, " Inkjet Printing of Ultrawideband (UWB) Antennas on Paper-Based Substrates", IEEE Antennas and Wireless Propagation Letters (AWPL), Vol.10, pp.111-114, June 2011.

115.G.Orecchini, F.Alimenti, V.Palazzari, A.Rida, M.M.Tentzeris and L.Roselli, "Design and Fabrication of Ultra-Low-Cost Radio Frequency Identification Antennas and Tags Exploiting Paper Substrates and Inkjet Printing Technology", IET Microwaves, Antennas and Propagation, Vol.5, No.8, pp.993-1001, August 2011.

116.T.Zhang, R.L.Li, G.Jin, G.Wei and M.M.Tentzeris, "A Novel Multiband Planar Antenna for GSM/UMTS/LTE/Zigbee/RFID Mobile Devices, IEEE Transactions on Antennas and Propagation, Vol.59, No.11, pp.4209-4214, November 2011.

117.C.Occhiuzzi, A.Rida, G.Marrocco and M.M.Tentzeris, " A Novel RFID Passive Gas Sensor Integrating Carbon Nanotubes", IEEE Transactions on Microwave Theory and Techniques, Vol.59, No.10-II, pp.2674-2684, October 2011, **Special Issue on Nanotechnology**.

118.H.Lee, G.Shaker, K.Naishadham, X.Song, M.McKinley, B.Wagner and M.M.Tentzeris,, "Carbon-Nanotube Loaded Antenna-Based Ammonia Gas Sensor", IEEE Transactions on Microwave Theory and Techniques, Vol.59, No.10-II, pp.2665-2673, October 2011, **Special Issue on Nanotechnology**.

119.S.T.Kim, J.Choi, K.Chae, S.Beck, S.-H.Kim, F.Bien, C.-H.Lee, K.Lim, J.Laskar and M.M.Tentzeris, "A Non-Interruptive Link-Variation Monitoring Circuit for Wireless Sensor Applications", IEEE Microwave and Wireless Components Letters, Vol.21, No.12, pp.691-693, December 2011.

120.R.Vyas, V.Lakafosis, H.Lee, G.Shaker, L.Yang, G.Orecchini, A.Traille, M.M.Tentzeris and L.Roselli, "Inkjet-Printed Self-Powered Wireless Sensors for Environmental, Gas and Authentication Based Sensing", IEEE Journal on Sensors, Vol.11, No.12, pp.3139-3152, **10th Anniversary Special Issue**, ***Listed among the Top-25 IEEE Sensors Downloaded Papers in December 2011***.

121.D.Ahbe, S.Beer, T.Zwick, Y.Wang and M.M.Tentzeris, ``Dual-Band Antennas for Frequency-Doubler-Based Wireless Strain Sensing", IEEE Antennas and Wireless Propagation Letters, Vol.11, pp.216-219, 2012.

122.X.L.Quan, R.L.Lin, Y.H.Cui and M.M.Tentzeris, ``Analysis and Design of a Compact Dual-Band Directional Antenna", IEEE Antennas and Wireless Propagation Letters, Vol.11, pp.547-550, 2012.

123.J.R.Cooper, S.Kim, and M.M.Tentzeris, ``A Novel Polarization-Independent, Free-Space, Microwave Beam Splitter Utilizing an Inkjet-Printed, 2-D Array Frequency Selective Surface", IEEE Antennas and Wireless Propagation Letters, Vol.11, pp.686-688, 2012.

124.S.Kim, Y.-J.Ren, H.Lee, A.Rida, S.Nikolaou and M.M.Tentzeris, ``Monopole Antenna With Inkjet-Printed EBG Array on Paper Substrate for Wearable Applications", IEEE Antennas and Wireless Propagation Letters, Vol.11, pp.663-666, 2012.

125.C.-P.Deng, X.-Y.Liu, Z.-K.Zhang and M.M.Tentzeris, ``A Miniascape-Like Triple-Band Monopole Antenna for WBAN Applications", IEEE Antennas and Wireless propagation Letters, Vol.11, pp.1330-1333, 2012.

126.O.Jonah, S.V.Georgakopoulos and M.M.Tentzeris, ``Optimal Design Parameters for Wireless Power Transfer for Magnetic Resonance", IEEE Antennas and Wireless Propagation Letters, Vol.11, pp.1390-1393, 2012.

127.S.Bouaziz, F.Chebila, A.Traille, P.Pons, H.Aubert and M.M.Tentzeris, ``Novel Micro-fluidic Structures for Wireless Passive Temperature Telemetry Medical Systems Using Radar Interrogation Techniques in Ka-band", IEEE Antennas and Wireless Propagation Letters, Vol.11, pp.1706-1709, 2012.

128.R.L.Li, X.L.Quan, Y.H.Cui and M.M.Tentzeris, ``Directional Triple-Band Planar Antenna for WLAN/WiMax Access Points", Electronics Letters, Vol.48, No.6, pp.305-306, June 2012.

129.T.T.Thai, J.M.Mehdi, F.Chebila, H.Aubert, P.Pons, G.R.DeJean, M.M.Tentzeris and P.Plana, ``Design and Development of a Novel Passive Wireless Ultrasensitive RF Temperature Transducer for Remote Sensing", IEEE Sensors Journal, Vol.12, No.9, pp.2756-2766, September 2012.

130.B.S.Cook, A.Shamim and M.M.Tentzeris, ``Passive Low-Cost Inkjet-Printed Smart Skin Sensor for Structural Health Monitoring", Vol.6, No.14, pp.1536-1541, IET Microwaves, Antennas and Propagation, November 2012.

131.S.Kim, A.Georgiadis, A.Collado and M.M.Tentzeris, ``An Inkjet-Printed Solar-Powered Wireless Beacon on Paper for Identification and Wireless Power Transmission Applications", IEEE Transactions on Microwave Theory and Techniques, Vol.60, No.12-2, pp.4178-4186, December 2012.

132.K.Naishadham, R.L.Li, L.Yang, T.Wu, W.Hunsicker and M.Tentzeris, ``A Shared-Aperture Dual-Band Planar Array with Self-Similar Printed Folded Dipoles", IEEE Transactions on Antennas and Propagation, Vol.61, No.2, pp.606-613, February 2013.

133.T.T.Thai, H.Aubert, P.Pons, G.DeJean, M.M.Tentzeris and R.Plana, ``Novel Design of a Highly Sensitive RF Strain Transducer for Passive and Remote Sensing in Two Dimensions", IEEE Transactions on Microwave Theory and Techniques, Vol.61, No.3, pp.1385-1396, March 2013.

134.X.Quan, R.L.Li, G.Jin and M.M.Tentzeris, ``Development of a Directional Dual-Band Planar Antenna for Wireless Applications", IET Transactions on Microwaves, Antennas and Propagation, Vol.7, No.4, pp.245-250, April 2013.

135. X.Quan, R.L.Li and M.M.Tentzeris, ``A Broadband Omnidirectional Circularly Polarized Antenna", IEEE Transactions on Antennas and Propagation, Vol.61, No.5, pp.2363-2370, May 2013.

136.B.S.Cook, T.Le, S.Palacios, A.Traille and M.M.Tentzeris, ``Only Skin Deep: Inkjet-printed Zero-Power Sensors for Large-Scale RFID-Integrated Smart Skins", IEEE Microwave Magazine, Vol.14, No.3, pp.103-114, May 2013.

137.J.Virtanen, J.Virkki, L.Sudanheimo, M.Tentzeris and L.Ukkonen, ``Automated Identification of Plywood Using Embedded Inkjet-Printed Passive UHF RFID Tags", IEEE Transactions on Automation Science and Engineering, Vol.10, No.3, pp.796-806, March 2013.

138.B.S.Cook, Y.Fang, S.Kim, T.Le, B.Goodwin, K.H.Sandhage and M.M.Tentzeris, ``Inkjet Catalyst Printing and Electroless Copper Deposition for Low-Cost Patterned Microwave Passive Devices on Paper", Electronic Materials Letters, accepted for publication.

139. R.Shigeta, T.Sasaki, M.Quan, Y.Kawahara, R.J.Vyas, M.M.Tentzeris and T.Asami, ``Ambient RF Energy Harvesting Sensor Device with Capacitor-Leakage-Aware Duty Cycle Control", IEEE Sensors Journal, Vol.13, No.8, pp.2973-2983, August 2013. ***Listed among the Top-25 IEEE Sensors Downloaded Papers***

140.R.J.Vyas, B.Cook, Y.Kawahara and M.M.Tentzeris, ``E-WEHP: A Batteryless Embedded Sensor Platform Wirelessly Powered from Ambient Digital-TV Signals", IEEE Transactions on Microwave Theory and Techniques, Vol.61, No.6, pp.2491-2505.

141.S.Kim, C.Mariotti, F.Alimenti, P.Mezzanote, A.Georgiadis, A.Collado, L.Roselli and M.M.Tentzeris, ``No Battery Required: Perpetual RFID-Enabled Wireless Sensors for Cognitive Intelligence Applications", IEEE Microwave Magazine, Vol.14, No.5, pp.66-77, May 2013.

142.R.Moro, S.Kim, M.Bozzi and M.Tentzeris, "Inkjet-printed Paper-Based Substrate-Integrated Waveguide (SIW) Components and Antennas", International Journal of Microwave and Wireless Technologies, Vol.5, No.3, pp.197-204, June 2013.

143.A.Vena, A.A.Babar, L.Sydanheimo, M.M.Tentzeris and L.Ukkonen, ``A Novel Near-Transparent ASK-Reconfigurable Inkjet-Printed Chipless RFID Tag", IEEE Antennas and Wireless Propagation Letters, Vol.12, pp.753-756, June 2013.

144.M.Hasani, A.Vena, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, ``Implementation of a Dual-Interrogation-Mode Embroidered RFID-Enabled Strain Sensor", IEEE Antennas and Wireless Propagation Letters, Vol.12, pp.1272-1275, June 2013.

145.B.S.Cook, B.Tehrani and M.M.Tentzeris, ``Multi-Layer Inkjet Printing of Milimeter-Wave Proximity-Fed Patch Arrays on Flexible Substrates", IEEE Antennas and Wireless Propagation Letters, Vol.12, pp.1351-1354, June 2013.

146.B.S.Cook, J.R.Cooper and M.M.Tentzeris, ``Multi-Layer RF Capacitors on Flexible Substrates Utilizing Inkjet Printed Dielectric Polymers", IEEE Microwave and Wireless Components Letters, Vol.23, No.7, pp.353-355, July 2013.

147.S.Kim, B.Cook, T.Le, J.Cooper, H.Lee, V.Lakafosis, R.Vyas, R.Moro, M.Bozzi, A.Georgiadis, A.Collado and M.M.Tentzeris, ``Inkjet-Printed Antennas, Sensors and Circuits on Paper Substrate", IET Microwaves, Antennas and Propagation, Vol.7, No.10, pp.858-868, October 2013.

148.A.Vena, K.Koski, E.Moradi, A.Babar, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, ``An Embroidered 2-Dimensional Chipless Strain Sensor for Wireless Structural Deformation Monitoring", IEEE Sensors Journal, Vol.13, No.12, pp.4627-4637, December 2013.

149.B.S.Cook, J.R.Cooper and M.M.Tentzeris, ``An Inkjet-Printed Microfluidic RFID-Enabled Platform for Wireless Lab-On-Chip Applications", IEEE Transactions on Microwave Theory and Techniques, Vol.61, No.12-2, pp.4714-4723, December 2013.

150.O.Jonah, A.Merwaday, S.V.Georgakopoulos and M.M.Tentzeris, “Spiral resonators for optimally efficient strongly coupled magnetic resonant systems”, Journal on Wireless Power Transfer, Vol.1, No.1, pp.21-26, March 2014.

151.H.Saghlatoon, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, ``Optimization of Inkjet Printing of Patch Antennas on Low-Cost Fibrous Substrates", IEEE Antennas and Wireless Propagation Letters, Vol.13, pp.915-918, June 2014

152. B.S.Cook, R.Vyas, S.Kim, T.Thai, T.Le, A.Traille, H.Aubert and M.M.Tentzeris, "RFID-Based Sensors for Zero-Power Autonomous Wireless Sensor Networks", IEEE Sensors Journal, Vol.14, No.8, pp.2419-2431, August 2014, ***Listed among Top-25 Downloaded Papers***

153.S.H.Zheng, X.Y.Liu and M.M.Tentzeris, ``Optically Controlled Reconfigurable Band-Notched UWB Antenna for Cognitive Radio Applications", Electronics Letters, Vol.50, No.21, pp.1502-1504, October 2014.

154. S.Kim, R.Vyas, J.Bito, K.Niotaki, A.Collado, A.Georgiadi and M.M.Tentzeris, "Ambient RF Energy-Harvesting Technologies for Self-Sustainable Standalone Wireless Sensor Platforms", Proceedings of the IEEE, Vol.102, No.11, pp.1649-1666, November 2014.

155.M.M.Tentzeris, A.Georgiadis and L.Roselli, "Energy Harvesting and Scavenging [Scanning the Issue]", Proceedings of IEEE, Vol.102, No.11, pp.1644-1648, November 2014.

156.K.Niotaki, A.Collado, A.Georgiadis, S.Kim and M.M.Tentzeris, "Solar/ Electromagnetic Energy Harvesting and Wireless Power Transmission", Proceedings of the IEEE, Vol,102, No,11, pp.1712-1722, November 2014.

157.J.Kimionis, A.Georgiadis, A.Collado and M.M.Tentzeris, "Enhancement of RF Tag Backscatter Efficiency With Low-Power Reflection Amplifiers", IEEE Transactions on Microwave Theory and Techniques, Vol.62, No.12-2, pp.3562-3571, December 2014.

158.S.H.Zheng, X.Liu and M.M.Tentzeris, "Optically controlled reconfigurable band-notched UWB antenna for cognitive radio systems", Electronics Letters, Vol.50, No.21, pp.1502-1504, 2014.

159.C.Mariotti, B.S.Cook, L.Roselli and M.M.Tentzeris, "State-of-the-Art Inkjet-Printed Metal-Insulator-Metal (MIM) Capacitors on Silicon Substrate", IEEE Microwave and Wireless Components Letters, Vol.25, No.1, pp.13-15, January 2015.

160.A.Vena, L.Sydanheimo, M.M.Tentzeris and L.Ukkonen, ``A Fully Inkjet-Printed Wireless and Chipless Sensor for CO2 and Temperature Detection", IEEE Sensors Journal, Vol.15, No.1, pp.89-99, January 2015.

161.Z.Li, T.Le, Z.Wu, Y.Yao, L.Li, M.Tentzeris, K.-S.Moon and C.P.Wong, ``Rational Design of a Printable, Highly Conductive Silicone-based Electrically Conductive Adhesive for Stretchable Radio-Frequency Antennas”, Advanced Functional Materials, Wiley Eds., Vol.25, No.3, pp.464-470, January 2015.

162. K.Ling, M.Yoo, W.Su, K.Kim, B.Cook, M.M.Tentzeris and S.Lim,``Microfluidic Tunable Inkjet-Printed Absorber on Paper”, OSA Optics Express, pp.110-120, Vol.23, No.1, January 2015.

163.S.Choi, W.Su, M.M.Tentzeris and S.Lim, ``A Novel Fluid-Reconfigurable Advanced and Delayed Phase Line Using Inkjet-Printed Microfluidic Composite Right/Left-Handed Transmission Lines", IEEE Microwave and Wireless Components Letters, Vol.25, No.2, pp.142-144, February 2015.

164.J.G.Hester, S.Kim, J.Bito, T.Le, J.Kimionis, D.Revier, C.Saintsing, W.Su, B.Tehrani, A.Traille, B.S.Cook and M.M.Tentzeris, ``Additively Manufactured Nanotechnology and Origami-Enabled Flexible Microwave Electronics", Proceedings of IEEE, Vol.103, No.4, pp.583-606, April 2015.
165.H.Saghlatoon, T.Bjorninen, L.Sydanheimo, M.M.Tentzeris and L.Ukkonen, ``Inkjet-Printed Wideband Planar Monopole Antenna on Cardboard for RF Energy-Harvesting Applications", IEEE Antennas and Wireless Propagation Letters, Vol.14, pp.325-328, June 2015.
166.X.Y.Liu, Y.Liu and M.M.Tentzeris, ``A Novel Circularly Polarized Antenna With Coin-Shaped Patches and a Ring-Shaped Strip for Worldwide UHF RFID Applications", IEEE Antennas and Wireless Propagation Letters, Vol.14, No.707-710, June 2015.
167.S.Kim, Y.Kawahara, A.Georgiadis, A.Collado and M.M.Tentzeris, ``Low-Cost Inkjet-Printed Fully Passive RFID Tags for Calibration-Free Capacitive/Haptic Sensor Applications", IEEE Sensors Journal, Vol.15, No.6, pp.3135-3145, June 2015.
168.C.Mariotti, W.Su, B.S.Cook, L.Roselli and M.M.Tentzeris, ``Development of Low-Cost Wireless Inkjet-Printed Microfluidic RF Systems and Devices for Sensing or Tunable Electronics", IEEE Sensors Journal, Vol.15, No.6, pp.3156-3163, June 2015.
169.T.Le, Z.Lin, C.P.Wong and M.M.Tentzeris, ``Smart Skins: Could they be the ultimate sensing tool?", IEEE Nanotechnology Magazine, Vol.9, No.2, pp.4-10, June 2015.
170.M.Hasani, A.Vena, L.Sydanheimo, M.M.Tentzeris and L.Ukkonen, ``A Novel Enhanced-Performance Flexible RFID-Enabled Embroidered Wireless Integrated Module for Sensing Applications", IEEE Transactions on Components, Packaging and Manufacturing Technology, Vol.5, No.9, pp.1244-1252, September 2015.
171. S.Moscato, R.Bahr, T.Le, M.Pasian, M.Bozzi, L.Perregrini and M.M.Tentzeris, ``Additive Manufacturing of 3D Substrate Integrated Waveguide Components", Electronics Letters, Vol.51, No.18, pp.1426-1428, September 2015.
172. X.Yi, T.Wu, Y.Wang and M.M.Tentzeris, "Sensitivity Modeling of an RFID-Based Strain-Sensing Antenna with Dielectric Constant Change", IEEE Sensors Journal, Vol.15, No.11, pp.6147-6155, November 2015.
173. J.Kimionis, M.Isakov, B.S.Koh, A.Georgiadis and M.M.Tentzeris, ``3D-Printed Origami Packaging with Inkjet-Printed Antennas for RF Harvesting Sensors", IEEE Transactions on Microwave Theory & Techniques, Vol.63, No.12, pp.4521-4532, December 2015.
174. J.Bito, J.G.Hester and M.M.Tentzeris, ``Ambient RF Energy Harvesting From a Two-Way Talk Radio for Flexible Wearable Wireless Sensor Devices Utilizing Inkjet Printing Technologies", IEEE Transactions on Microwave Theory & Techniques, Vol.63, No.12, pp.4533-4543, December 2015.
175. Y.He, Z.Pan, X.Cheng, J.Qiao and M.M.Tentzeris, ``A Novel Dual-Band, Dual-Polarized, Miniaturized and Low-Profile Base Station Antenna",, IEEE Transactions on Antennas and Propagation, Vol.63, No.12, pp.5399-5408, December 2015.
176. X.Liu, S.Yao, B.S.Cook, M.M.Tentzeris and S.V.Georgakopoulos, ``An Origami Reconfigurable Axial-Mode Bifilar Helical Antenna",, IEEE Transactions on Antennas and Propagation, Vol.63, No.12, pp.5897-5903, December 2015.

177. R.Goncalves, S.Rima, R.Magueta, P.Pinho, A.Collado, A.Georgiadis, J.Hester, N.Carvalho and M.M.Tentzeris, ``RFID-Based Wireless Passive Sensors Utilizing Cork Materials",, IEEE Sensors Journal, Vol.15, No.12, pp.7242-7251, December 2015.
178.P.Vryonides, S.Nikolaou, S.Kim and M.M.Tentzeris, “Reconfigurable dual-mode band-pass filter with switchable bandwidth using PIN diodes”, International Journal of Microwave and Wireless Technologies, Vol.7, No.6, pp.655-660, December 2015.
179.J.Bito, S.Jeong and M.M.Tentzeris, “A Real-Time Electrically Controlled Active Matching Circuit Utilizing Genetic Algorithms for Wireless Power Transfer to Biomedical Implants”, IEEE Transactions on Microwave Theory and Techniques, Vol.64, No.2, pp.365-374, February 2016.
180.S.Kim, A.Shamim, A.Georgiadis, H.Aubert and M.M.Tentzeris, “Fabrication of Fully Inkjet-Printed Vias and SIW Structures on Thick Polymer Substrates”, IEEE Transactions on Components, Packaging and Manufacturing Technology, Vol.6, No.3, pp.486-496, March 2016.
181. X.Liu, Y.Di, H.Liu, Z.Wu and E.Tentzeris, ``A Planar Windmill-like Broadband Antenna Equipped with Artificial Magnetic Conductor for Off-Body Communications", IEEE Antennas and Wireless Propagation Letters, Vol.15, pp.64-67, June 2016.
182.H.Lee, B.S.Cook, K.P.Murali, M.Raj and M.M.Tentzeris, “Inkjet Printed High-Q RF Inductors on Paper Substrate with Ferromagnetic Material”, IEEE Microwave and Wireless Components Letters, Vol.26, No.6, pp.419-421, June 2016.
183.W.Su, B.S.Cook and M.M.Tentzeris, “Additively Manufactured Microfluidics-Based “Peel-and-Replace” RF Sensors for Wearable Applications”, IEEE Transactions on Microwave Theory and Techniques, Vol.64, No.6, pp.1928-1936, June 2016.
184.Q.Liu, T.Le, S.He and M.M.Tentzeris, “Button-Shaped Radio-Frequency Identification Tag Combining Three-Dimensional and Inkjet-Printing Technologies”, IET Microwaves, Antennas & Propagation, Vol.10, No.7, pp.737-741, July 2016.
185. S.Moscato, R.Bahr, T.Le, M.Pasian, M.Bozzi, L.Perregrini and M.M.Tentzeris, ``Infill Dependent 3D-Printed Material Based on NinjaFlex Filament for Antenna Applications", IEEE Antennas and Wireless Propagation Letters, Vol.15, pp.1506-1509, June 2016.
186. B.K.Tehrani, B.S.Cook and M.M.Tentzeris, ``Inkjet Printing of Multilayer Millimeter-Wave Yagi-Uda Antennas on Flexible Substrates", IEEE Antennas and Wireless Propagation Letters, Vol.15, pp.143-146, June 2016.
187.Y.Fang, J.Hester, B.Deglee, C.-C.Tuan, P.Brooke, T.Le, C.P.Wong, M.M.Tentzeris and K.H.Sandhage, ``A Novel, Facile, Layer-by-Layer Substrate Surface Modification for the Fabrication of All-Inkjet-Printed Flexible Electronic Devices on Kapton", Journal of Materials Chemistry C, (4), pp.7052-7060, July 2016.
188. A.Georgiadis and M.M.Tentzeris, "Guest Editorial for the Special Issue on Radio-Frequency Identification (RFID), Sensing and Imaging" IEEE Transactions on Microwave Theory and Techniques, Vol.64, No.7, pp.2292-2293, July 2016.
189. C.Cho, X.Yi, D.Li, Y.Wang and M.M.Tentzeris, ``Passive Wireless Frequency Doubling Antenna Sensor for Strain and Crack Sensing", IEEE Sensors Journal, Vol.16, No.14, pp.5725-5733, July 2016.

190. A.Farid, N.J.Laurita, B.Tehrani, J.G.Hester, M.M.Tentzeris and N.P.Hermitage, ``Inkjet Printed Wire-Grid Polarizers for the THz Frequency Rangeâ€, Journal of Infrared, Millimeter and Terahertz Waves, October 2016.
191. W.Su, B.S.Cook, Y.Fang and M.M.Tentzeris, ``Fully Inkjet-Printed Microfluidics: A Solution to Low-Cost Rapid Three-Dimensional Microfluidics Fabrication with Numerous Electrical and Sensing Applicationsâ€, Nature Scientific Reports, No.6:35111, October 2016.
192. S.Choi, S.Eom, M.M.Tentzeris and S.Lim, ``Inkjet-Printed Electromagnet-Based Touchpad Using Spiral Resonators", IEEE Journal of Microelectromechanical Systems, Vol.25, No.5, pp.947-953, October 2016.
193. J.Hester and M.M.Tentzeris, ``Inkjet-Printed Flexible mm-Wave Van-Atta Reflectarrays: A Solution for Ultralong-Range Dense Multitag and Multisensing Chipless RFID Implementations for IoT Smart Skinsâ€, IEEE Transactions on Microwave Theory and Techniques, Vol.64, No.12, pp.4763-4773, December 2016.
194. J.Kimionis and M.M.Tentzeris, ``Pulse Shaping: The Missing Piece of Backscatter Radio and RFID, IEEE Transactions on Microwave Theory and Techniques, Vol.64, No.12, pp.4774-4788, December 2016.
195. Y.Fang, J.G.D.Hester, W.Su, J.H.Chow, S.K.Sitaraman and M.M.Tentzeris, ``A bio-enabled maximally mild layer-by-layer Kapton surface modification approach for the fabrication of all-inkjet-printed flexible electronic devices", Nature Scientific Reports, No.6:39909, December 2016.
196. C.Mariotti, F.Alimenti, L.Roselli and M.M.Tentzeris, ``High-Performance RF Devices and Components on Flexible Cellulose Substrate by Vertically Integrated Additive Manufacturing Technologies", IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.1, pp.62-71, January 2017.
197. C.Cho, X.Yi, D.Li, Y.Wang and M.M.Tentzeris, ``An Eigenvalue Perturbation Solution for the Multiphysics Simulation of Antenna Strain Sensors", IEEE Journal of Multiscale and Multiphysics Computational Techniques, Vol.2, pp.49-57, February 2017.
198. H.-R.Ahn and M.M.Tentzeris, ``Novel Generic Assymetric and Symmetric Equivalent Circuits of 90o Coupled Transmission-Line Sections Applicable to Marchand Baluns", IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.3, pp.746-760, March 2017.
199. S.A.Nauroze, J.G.Hester, B.Tehrani, W.Su, J.Bito, R.Bahr, J.Kimionis and M.M.Tentzeris, "Additively Manufactured RF Components and Modules: Toward Empowering the Birth of Cost-Efficient Dense and Ubiquitous IoT Implementations", Proceedings of the IEEE, Vol.105, No.4, pp.702-722, April 2017.
200. J.Bito, S.Jeong and M.M.Tentzeris, "A Novel Heuristic Passive and Active Matching Circuit Design Method for Wireless Power Transfer to Moving Objects", IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.4, pp.1094-1102, April 2017.
201. J.G.D.Hester, J.Kimionis and M.M.Tentzeris, "Printed Motes for IoT Wireless Networks: State of the Art, Challenges and Outlooks", IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.5, pp.1819-1830, May 2017.
202. J.Bito, R.Bahr, J.G.Hester, S.A.Nauroze, A.Georgiadis and M.M.Tentzeris, ``A Novel Solar and Electromagnetic Energy Harvesting System with a 3D Printed Package for Energy Efficient Internet-of-Things Wireless Sensors", IEEE

Transactions on Microwave Theory and Techniques, Vol.65, No.5, pp.1831-1842, May 2017.

203. H.-R.Ahn and M.M.Tentzeris, ``A Novel Wideband, Compact, Microstrip Coupled-Line Ring Hybrid for Arbitrarily High Power-Division Ratios", IEEE Transactions on Circuits and Systems II, Vol.64, No.6, pp.630-634, June 2017.

204. X.Liu, Z.Wu, Y.Fan and M.M.Tentzeris, "A Miniaturized CSRR Loaded Wide-Beamwidth Circularly Polarized Implantable Antenna for Subcutaneous Real-Time Glucose Monitoring", IEEE Antennas and Wireless Propagation Letters, Vol.16, pp.577-580, June 2017.

205. S.I.H.Shah, D.Lee, M.M.Tentzeris and S.Lim, "A Novel High-Gain Tetrahedron Origami," IEEE Antennas and Wireless Propagation Letters, Vol.16, pp.848-851, June 2017.

206. Y.Fang, M.Akbari, J.G.D.Hester, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, ``Sensitivity Enhancement of Flexible Gas Sensors Via Conversion of Inkjet-Printed Silver Electrodes Into Porous Gold Counterparts." **Nature** Scientific Reports, No.7:8988, August 2017.

207. W.Su and M.M.Tentzeris, "Smart Test Strips: Next-Generation Inkjet-Printed Wireless Comprehensive Liquid Sensing Platforms." IEEE Transactions on Industrial Electronics, Vol.64, No.9, pp.7359-7367, September 2017.

208. J.Kimionis, A.Collado, M.M.Tentzeris and A.Georgiadis, "Octave and Decade Printed UWB Rectifiers Based on Nonuniform Transmission Lines for Energy Harvesting." IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.11, pp.4326-4334, November 2017.

209. S.N.Daskalakis, J.Kimionis, A.Collado, G.Goussetis, M.M.Tentzeris and A.Georgiadis, "Ambient Backscatterers Using FM Broadcasting for Low Cost and Low Power Wireless Applications." IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.12, pp.5251-5262, December 2017.

210. D.Henry, J.G.D.Hester, H.Aubert, P.Pons and M.M.Tentzeris, "Long-Range Wireless Interrogation of Passive Humidity Sensors Using Van-Atta Cross-Polarization Effect and Different Beam Scanning Techniques", IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.12, pp.5345-5354, December 2017.

211. T.-H.Lin, J.Bito, J.G.D.Hester, J.Kimionis, R.A.Bahr and M.M.Tentzeris, "On-Body Long-Range Wireless Backscattering Sensing System Using Inkjet-/3D-Printed Flexible Ambient RF Energy Harvesters Capable of Simultaneous DC and Harmonics Generation", IEEE Transactions on Microwave Theory and Techniques, Vol.65, No.12, pp.5389-5400, December 2017.

212. V.Palazzi, J.Hester, J.Bito, F.Alimenti, C.Kalialakis, A.Collado, P.Mezzanotte, A.Georgiadis, L.Roselli and M.M.Tentzeris, "A Novel Ultra-Lightweight Multiband Rectenna on Paper for RF Energy Harvesting in the Next Generation LTE Bands ." IEEE Transactions on Microwave Theory and Techniques, Vol.66, No.1, pp.366-379, January 2018.

213. R.Bahr, B.Tehrani and M.M.Tentzeris, "Exploring 3-D Printing for New Applications: Novel Inkjet- and 3D-Printed Millimeter-Wave Components, Interconnects, and Systems", IEEE Microwave Magazine, Vol.19, No.1, pp.57-66, January 2018.

214.S.I.H.Shah, M.M.Tentzeris and S.Lim, "Planar quasi-isotropic antenna for drone communications",Microwave and Optical Technology Letters, Vol.60, No.5, pp.1290-1295, April 2018.

215.Y.Yoon, D.Lim, M.M.Tentzeris and S.Lim, "Low-cost metamaterial absorber using a three-dimensional circular truncated cone", Microwave and Optical Technology Letters, Vol.60, No.7, pp.1622-1630, May 2018.

216.J.Kimionis, W.Su, J.Hester, J.Bito, X.He, T.-H.Lin and M.M.Tentzeris, "Zero-Power Sensors for Smart Objects: Novel Zero-Power Additively Manufactured Wireless Sensor Modules for IoT Applications", IEEE Microwave Magazine, Vol.19, No.6, pp.32-47, June 2018.

217.S.Kim and M.M.Tentzeris, "Parylene coated waterproof washable inkjet-printed dual-band antenna on paper substrate", International Journal of Microwave and Wireless Technologies, Vol.10, No.7, pp.814-818, September 2018.

218.S.N.Daskalakis, G.Goussetis, S.D.Assimonis, M.M.Tentzeris and A.Georgiadis, "A uW Backscatter-Morse-Leaf Sensor for Low-Power Agricultural Wireless Sensor Networks", IEEE Sensors Journal, Vol.18, No.19, pp.7889-7898, October 2018.

219.S.A.Nauroze, L.S.Novelino, M.M.Tentzeris and G.H.Paulino, ``Continuous-Range Tunable Multilayer Frequency-Selective Surfaces Using Origami and Inkjet Printing", Proceedings of the National Academy of Sciences, Vol.115, No.52, pp.13210-13215, December 2018.

220.M.Ali, F.Liu, A.Watanabe, P.M.Raj, V.Sundaram, M.M.Tentzeris and R.R.Tummala, "First Demonstration of Compact. Ultra-Thin Low-Pass and Bandpass Filters for 5G Small-Cell Applications", IEEE Microwave and Wireless Components Letters, Vol.28, No.12, pp.1110-1112, December 2018.

221.S.N.Daskalakis, R.Correia, G.Goussetis, M.M.Tentzeris, N.B.Carvalho and A.Georgiadis, "Four-PAM Modulation of Ambient FM Backscattering for Spectrally Efficient Low-Power Applications", IEEE Transactions on Microwave Theory and Techniques, Vol.66, No.12, pp.5909-5921, December 2018.

222.A.Eid, J.Hester, Y.Fang, B.Tehrani, S.A.Nauroze, R.Bahr and M.M.Tentzeris, "Nanotechnology-Empowered Flexible Printed Wireless Electronics: A Review of Various Applications of Printed Materials", IEEE Nanotechnology Magazine, Vol.13, No.1, pp.18-29, January 2019.

223.S.I.H.Shah, M.M.Tentzeris and S.Lim, "A Deployable Quasi-Yagi Monopole Antenna Using Three Origami Magic Spiral Cubes", IEEE Antennas and Wireless Propagation Letters, Vol.18, No.1, pp.147-151, January 2019.

224.H.-R.Ahn and M.M.Tentzeris, "Wideband and Compact Impedance-Transforming 90deg DC Blocks With Symmetric Coupled Transmission-Line Sections", IEEE Transactions on Components, Packaging and Manufacturing Technology, Vol.9, No.1, pp.80-87, January 2019.

225.M.Kheir, M.M.Tentzeris, A.Abdelgawad and I.You, Guest Editorial: Special Issue on Intrinsic Hardware Security for Internet of Things Infrastructure, IEEE Internet of Things Journal, Vol.6, No.1, pp.320-324, February 2019.

226.D.-G.Seo, J.-H.Kim, M.M.Tentzeris and W.-S.Lee, "A Quadruple-Polarization Reconfigurable Feeding Network for UAV RF Sensing Antennas", IEEE

Microwave and Wireless Components Letters, Vol.29, No.3, pp.183-185, March 2019.

227.H.-R.Ahn and M.M.Tentzeris, "Arbitrary Power-Division Branch-Line Hybrids for High-Performance. Wideband and Selective Harmonic Suppressions from 2fo", IEEE Transactions on Microwave Theory and Techniques, Vol.67, No.3, pp.978-987, March 2019.

228.Y.Kim, D.Lim, E.Park, M.M.Tentzeris and S.Lim, "Wide frequency switchable microwave resonator by injecting eutectic gallium indium into microfluidic defected ground structure", Microwave and Optical Technology Letters, Vol.61, No.10, pp.2405-2409, June 2019.

229.S.N.Daskalakis, A.Georgiadis, G.Goussetis and M.M.Tentzeris, "A Rectifier Circuit Insensitive to the Angle of Incidence of Incoming Waves Based on a Wilkinson Power Divider", IEEE Transactions on Microwave Theory and Techniques, Vol.67, No.7, pp.3210-3218, July 2019.

230.H.-R.Ahn and M.M.Tentzeris, "Balanced-to-Unbalanced Power Dividers for Arbitrary Power Division Ratios and For Arbitrary Real Termination Impedances", IET Microwaves, Antennas & Propagation, Vol.13, No.7, pp.904-910, July 2019.

231.H.-R.Ahn and M.M.Tentzeris, "In-Phase T-Junction: Study and Application to Gysel Power Dividers for High Power-Division Ratios Requiring No High-Impedance Transmission-Line Section", IEEE Access, Vol.7, pp.18146-18154, July 2019.

232.H.-R.Ahn and M.M.Tentzeris, "Compact and Wideband General Coupled-Line Ring Hybrids (GCRHs) for Arbitrary Circumferances and Arbitrary Power-Division Ratios", IEEE Access, Vol.7, pp.33414-33423, July 2019.

233.V.Palazzi, W.Su, R.Bahr, S.Bittolo-Bon, F.Alimenti, P.Mezzanotte, L.Valentini, M.M.Tentzeris and L.Roselli, "3D-Printing-Based Selective-Ink Deposition Technique Enabling Complex Antenna and RF Structures for 5G Applications up to 6 GHz", IEEE Transactions on Components, Packaging and Manufacturing Technology, Vol.9, No.7, pp.1434-1447, July 2019.

234.H.-R.Ahn and M.M.Tentzeris, "Complex Impedance Transformers Based on Allowed and Forbidden Regions", IEEE Access, Vol.7, pp.39288-39298, July 2019.

235.W.-S.Lee, S.Park, J.-H.Lee and M.M.Tentzeris, "Longitudinally Misalignment-Insensitive Dual-Band Wireless Power and Data Transfer Systems for a Position Detection of Fast-Moving Vehicles", IEEE Transactions on Antennas and Propagation, Vol.67, No.8, pp.5614-5622, August 2019.

236.Y.Xu, Y.Kim, M.M.Tentzeris and S.Lim, “Bi-Directional Loop Antenna Array Using Magic Cube Origami”, Sensors, Vol.19, No.18, Article 3911, September 2019.

237.S.Jeong, J.G.D.Hester, W.Su and M.M.Tentzeris, "Read/Interrogation Enhancement of Chipless RFID's Using Machine Learning Techniques", IEEE Antennas and Wireless Propagation Letters, Vol.18, No.11, pp.2272-2276, November 2019.

238.S.A.Nauroze and M.M.Tentzeris, "A Thermally Actuated Fully Inkjet-Printed Origami-Inspired Multilayer Frequency Selective Surface with Continuous-Range

Tunability Using Polyester-Based Substrates", IEEE Transactions on Microwave Theory and Techniques, Vol.67, No.12, pp.4944-4954, December 2019.

239.S.Jeong, T.-H.Lin and M.M.Tentzeris, "A Real-Time Range-Adaptive Impedance Matching Utilizing a Machine Learning Strategy Based on Neural Networks for Wireless Power Transfer Systems", IEEE Transactions on Microwave Theory and Techniques, Vol.67, No.12, pp.5340-5347, December 2019.

240.Y.Guan, Y.Wu and M.M.Tentzeris, "A Bidirectional Absorptive Common-Mode Filter Based on Interdigitated Microstrip Coupled Lines for 5G "Green" Communications", IEEE Access, Vol.8, pp.20759-20769, January 2020.

241.Y.Fan, H.Liu, X.Y.Liu, Y.Cao, Z.X.Li and M.M.Tentzeris, "Novel Coated Differentially Fed Dual-Band Fractal Antenna for Implantable Medical Devices", IET Microwaves, Antennas & Propagation, Vol.14, No.2, pp.199-208, February 2020.

242.E.M.Jung, Y.Cui, T.-H.Lin, X.He, A.Eid, J.G.D.Hester, G.D.Abowd, T.E.Starner, W.-S.Lee and M.M.Tentzeris, "A Wideband. Quasi-Isotropic. Kilometer-Range FM Energy Harvester for Perpetual IoT", IEEE Microwave and Wireless Components Letters, Vol.30, No.2, pp.201-204, February 2020.

243.H.-R.Ahn, M.M.Tentzeris, T.-H.Lin, B.Tehrani and X.He, "Coupled Lines for Wearable Power Dividers: Coupled Transmission-Line Sections for Power Dividers in Wearable and Flexible RF Electronics", IEEE Microwave Magazine, Vol.21, No.2, pp.5614-5622, February 2020.

244.A.O.Watanabe, B.K.Tehrani, T.Ogawa, P.M.Raj, M.M.Tentzeris and R.R.Tummala, "Ultra-Low-Loss Substrate-Integrated Waveguides in Glass-Based Substrates for Millimeter-Wave Applications", IEEE Transactions on Components, Packaging and Manufacturing Technology, Vol.10, No.3, pp.531-533, March 2020.

245.X.He, J.Zhu, W.Su and M.M.Tentzeris, "RFID Based Non-Contact Human Activity Detection Exploiting Cross Polarization", IEEE Access, Vol.8, pp.46585-46595, March 2020.

246.A.Adeyeye, Y.Cui, A.Eid, J.Hester and M.M.Tentzeris, "A Winning Backscatter Modulator: A Quarter-gram Ultrahigh-Frequency RFID for On-Metal Operation", IEEE Microwave Magazine, Vol.21, No.3, pp.5614-5622, March 2020.

247.D.H.Le, Y.Xu, M.M.Tentzeris and S.Lim, “Transformation from 2D meta-pixel to 3D meta-pixel using auxetic kirigami for programmable multifunctional electromagnetic response”, Elsevier Extreme Mechanics Letters, Vol.36, Article 100670, April 2020.

248.W.Su, J.Zhu, H.Liao and M.M.Tentzeris, "Wearable Antennas for Cross-Body Communication and Human Activity Recognition", IEEE Access, Vol.8, pp.58575-58582, April 2020.

249.A.Eid, J.G.D.Hester, J.Costantine, Y.Tawk, A.H.Ramadan and M.M.Tentzeris, "A Compact Source-Load Agnostic Flexible Rectenna Topology for IoT Devices", IEEE Transactions on Antennas and Propagation, Vol.68, No.4, pp.2621-2629, April 2020.

250.S.A.Alotaibi, Y.Cui and M.M.Tentzeris, "CSRR Based Sensors for Relative Permittivity Measurement With Improved and Uniform Sensitivity Throughout

[0.9-10.9] GHz Band", IEEE Sensors Journal, Vol.20, No.9, pp.4667-4678, May 2020.

251. G.Dong, W.Wang, Y.Wu, W.Li, Y.Liu and M.M.Tentzeris, "Dual-Band Balanced Bandpass Filter Using Slotlines Loaded Patch Resonators with Independently Controllable Bandwidths", IEEE Microwave and Wireless Components Letters, Vol.30, No.7, pp.653-656, July 2020.

252. G.Dong, W.Wang, Y.Wu, Y.Liu and M.M.Tentzeris, "Filtering Rat-Race Couplers with Impedance Transforming Characteristics Based on Terminated Coupled Line Structures", IET Microwaves, Antennas & Propagation, Vol.14, No.8, pp.734-742, July 2020.

253. G.Dong, W.Wang, Y.Wu, Y.Liu, Y.Fang and M.M.Tentzeris, "Compact Dual-Band Filtering Power Divider with Independently Controllable Bandwidths Using Shorted Patch Resonators", IET Microwaves, Antennas & Propagation, Vol.14, No.8, pp.759-767, July 2020.

254. X.He, B.K.Tehrani, R.Bahr, W.Su and M.M.Tentzeris, "Additively Manufactured mm-Wave Multichip Modules with Fully Printed "Smart" Encapsulation Structures", IEEE Transactions on Microwave Theory and Techniques, Vol.68, No.7, pp.2716-2724, July 2020.

255. H.-R.Ahn and M.M.Tentzeris, "Complex Impedance Transformers", IEEE Microwave Magazine, Vol.21, No.12, pp.53-64, September 2020.

256. S.Jeong, M.M.Tentzeris and S.Kim, "Machine Learning Approach for Wirelessly Powered RFID-based Backscattering Sensor System", IEEE Journal of Radio Frequency Identification, Vol.4, No.3, pp.186-194, September 2020.

257. M.Ali, A.O.Watanabe, T.-H.Lin, D.Okamoto, M.R.Pulugurtha, M.M.Tentzeris and R.R.Tummala, "Package-Integrated Wideband Power Dividing Networks and Antenna Arrays for 28-GHz 5G New Radio Bands", IEEE Transactions on Components, Packaging and Manufacturing Technology, Vol.10, No.9, pp.1515-1523, September 2020.

258.H.Jeong, Y.Cui, M.M.Tentzeris and S.Lim, “Hybrid (3D and inkjet) printed electromagnetic pressure sensor using metamaterial absorber”, Elsevier Additive Manufacturing, Vol.35, Article 101405, October 2020.

259. H.-R.Ahn and M.M.Tentzeris, "A Novel Compact Isolation Circuit Suitable for Ultracompact and Wideband Marchand Baluns", IEEE Transactions on Circuits and Systems II: Express Briefs, Vol.67, No.10, pp.2299-2303, October 2020.

260. A.Eid, J.Hester and M.M.Tentzeris, "Rotman Lens-Based Wide Angular Coverage and High Gain Semi-Passive Architecture for Ultra-Long Range mm-Wave RFIDs", IEEE Antennas and Wireless Propagation Letters, Vol.19, No.11, pp.1943-1947, November 2020.

261. T.-H.Lin, K.Kanno, A.O.Watanabe, P.M.Raj, R.R.Tummala, M.Swaminathan and M.M.Tentzeris, "Broadband and Miniaturized Antenna-in-Package (AiP) Design for 5G Applications", IEEE Antennas and Wireless Propagation Letters, Vol.19, No.11, pp.1963-1967, November 2020.

262. A.Eid, X.He, R.Bahr, T.-H.Lin, Y.Cui, A.Adeyeye, B.Tehrani and M.M.Tentzeris, "Inkjet-/3D-/4D-Printed Perpetual Electronics and Modules", IEEE Microwave Magazine, Vol.21, No.12, pp.87-103, December 2020.

263. A.O.Watanabe, T.-H.Lin, M.Ali, Y.Wang, V.Smet, P.M.Raj, M.M.Tentzeris, R.R.Tummala and M.Swaminathan, "Ultrathin Antenna-Integrated Glass-Based Millimeter-Wave Package With Through-Glass Vias", IEEE Transactions on Microwave Theory and Techniques, Vol.68, No.12, pp.5082-5092, December 2020.

264. A.Eid, J.G.D.Hester and M.M.Tentzeris, ``5G as a Wireless Power Grid," Nature Scientific Reports, No.11:636, January 2021. Top 99% - 109,000+ Paper Views

265. V.Palazzi, A.Cicioni, F.Alimenti, P.Mezzanotte, M.M.Tentzeris and L.Roselli, "Compact 3D-Printed 4x4 Butler Matrix Based on Low-Cost and Curing-Free Additive Manufacturing", IEEE Microwave and Wireless Components Letters, Vol.31, No.2, pp.125-128, February 2021.

266.H.Yang, X.Y.Liu, Y.Fan and M.M.Tentzeris, “Flexible Circularly Polarized Antenna with Axial Ratio Bandwidth Enhancement for Off-Body Communications”, Vol.15, No.2, pp. 754-767, March 2021.

267.A.D.Boursianis, M.S.Papadopoulou, S.Koulouridis, P.Rocca, A.Georgiadis, M.M.Tentzeris and S.K.Goudos, “Triple-Band Single-Layer Rectenna for Outdoor RF Energy Harvesting Applications”, MDPI Sensors, Vol.21, No.10, Article 3460, May 2021.

268. A.Adeyeye, C.Lynch, A.Eid, J.Hester and M.Tentzeris, "5.8GHz Low-Power Tunnel-Diode-Based Two-Way Repeater for Non-Line-of-Sight Interrogation of RFIDs and Wireless Sensor Networks", IEEE Microwave and Wireless Components Letters, Vol.31, No.6, pp.794-797, June 2021.

269. J.Kimionis, A.Georgiadis, S.N.Daskalakis and M.M.Tentzeris, ``A Printed Millimetre-Wave and Antenna Array for Backscatter Communications at Gigabit Data Rates," Nature Electronics, Vol.4, pp.439-446, June 2021.

270. F.A.Asadallah, A.Eid, G.Shehadeh, J.Costantine, Y.Tawk and M.M.Tentzeris, "Digital Reconfiguration of a Single Arm Three-Dimensional Bowtie Antenna", IEEE Transactions on Antennas and Propagation, Vol.69, No.7, pp.4184-4188, July 2021.

271.Y.Cui, R.Bahr, S.Van Rijs and M.M.Tentzeris, “A novel 4-DOF wide-range tunable frequence selective surface using an origami “eggbox” structure”, International Journal of Microwave and Wireless Technologies, Vol.13, No.7, pp.727-733, September 2021.

272.A.D.Boursianis, M.S.Papadopoulou, S.Nikolaidis, P.Sarigiannidis, K.Psannis, A.Georgiadis, M.M.Tentzeris and S.Goudos, “Novel Design Framework for Dual-Band Frequency Selective Surfaces Using Multi-Variant Differential Evolution”, MDPI Mathematics, Vol.9, No.19, Article 2381, September 2021.

273.T.Cheng, B.Li, Y.Zhang, Y.Li, C.Ramey, E.M.Jung, Y.Cui, S.G.Swaminathan, Y.Do, M.Tentzeris, G.D.Abowd and H.Oh, "Duco: Autonomous Large-Scale Direct-Circuit-Writing (DCW) on Vertical Everyday Surfaces Using A Scalable Hanging Plotter", Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Vol.5, No.3, Article 92, September 2021.

274.R.Torres, R.Correia, N.B.Carvalho, S.Daskalakis, G.Goussetis, Y.Ding, A.Georgiadis, A.Eid, J.Hester and M.M.Tentzeris, “Backscatter Communications”, IEEE Journal of Microwaves, Vol.1, No.4, pp.864-878, October 2021.

275. E.M.Jung, R.Vyas and M.M.Tentzeris, "A Wideband, Quasi-Isotropic, Ambient RF Energy Harvester Combining UHF-TV and FM", IEEE Antennas and Wireless Propagation Letters, Vol.20, No.10, pp.1854-1858, October 2021.

276. A.Eid, J.Zhu, L.Xu, J.G.D.Hester and M.M.Tentzeris, "Holography-Based Target Localization and Health Monitoring Technique Using UHF Tags Array", IEEE Internet of Things Journal, Vol.8, No.19, pp.14719-14730, October 2021.

277.C.Song, Y.Ding, J.G.D.Hester, X.He, R.Bahr, A.Georgiadis, G.Goussetis and M.M.Tentzeris, “Advances in Wirelessly Powered Backscatter Communications: Antenna/RF Circuitry Design to Printed Flexible Electronics”, Proceedings of IEEE, Vol.110, No.1, pp.171-192, January 2022.

278.A.D.Papadopoulos, B.K.Tehrani, R.A.Bahr, E.M.Tentzeris and E.N.Glytsis, “Uncertainty Quantification of Printed Microwave Interconnects by Use of the Sparse Polynomial Chaos Expansion Method”, IEEE Microwave and Wireless Components Letters, Vol.32, No.1, pp.1-4, January 2022.

279.V.Palazzi, L.Roselli, M.M.Tentzeris, P.Mezzanotte and F.Alimenti, “Energy-Efficient Harmonic Transponder Based on On-Off Keying Modulation for Both Identification and Sensing”, Sensors, Vol.22, No.2, Article 620, January 2022.

280.X.He, Y.Cui and M.M.Tentzeris, “Tile-Based Massively Scalable MIMO and Phased Arrays for 5G/B5G-Enabled Smart Skins and Reconfigurable Intelligent Surfaces”, Nature Scientific Reports, No.12:2741, February 2022.

281.A.O.Adeyeye, C.Lynch, A.Eid, J.G.D.Hester and M.M.Tentzeris, “Energy Autonomous Two-Way Repeater System for Non-Line-of-Sight Interrogation in Next Generation Wireless Sensor Networks”, IEEE Transactions on Microwave Theory and Techniques, Vol.70, No.3, pp.1779-1788, March 2022.

282.A.Kiourti, A.M.Abbosh, M.Athanasiou, T.Bjorninen, A.Eid, C.Furse, K.Ito, G.Lazzi, M.Manoufali, M.Pastorino, M.M.Tentzeris, K.Tisdale, E.Topsakal, L.Ukkonen, W.G.Whittow, H.Zhang and K.S.Nikita, “Next-Generation Healthcare: Enabling Technologies for Emerging Bioelectromagnetics Applications”, IEEE Open Journal of Antennas and Propagation, Vol.3, pp.363-390, March 2022.

283.G.Dong, X.Yang, Y.Fang and M.M.Tentzeris, “Filtering Push-Pull Power Amplifier Based on Multifunctional Impedance Matching Network”, IEEE Microwave and Wireless Components Letters, Vol.32, No.5, pp.422-425, May 2022.

284.S.N.Daskalakis, A.Georgiadis, M.M.Tentzeris, G.Goussetis and G.Deligeorgis, “The New Era of Long-Range “Zero-Interception” Ambient Backscattering Systems: 130m with 130nA Front-End Consumption”, Sensors, Vol.22, No.11, Article 4151, May 2022.

285.X.He, K.Hu, Y.Cui, R.Bahr, B.Tehrani and M.M.Tentzeris, “Additively Manufactured “Smart” RF Packaging Structures: A Quantum-Leap for On-Demand Customizable Integrated 5G and IoT Modules”, IEEE Microwave Magazine, Vol.23, No.8, pp.94-106, August 2022.

286.Y.Cui, R.Bahr, S.A.Nauroze, T.S.Almoneef and M.M.Tentzeris, “3D Printed "Kirigami"-Inspired Deployable Bi-Focal Beam-Scanning Dielectric Reflectarray

Antenna for mm-Wave Applications", IEEE Transactions on Antennas and Propagation, Vol.70, No.9, Sensors, Vol.22, No.11, pp.7683-7690, September 2022.

287. L.Portilla, K.Loganathan, H.Faber, A.Eid, J.G.D.Hester, M.M.Tentzeris, M.Fattori, E.Cantatore, C.Jiang, A.Nathan, G.Fiori,T. Ibn-Mohammed and T.D.Anthopoulos, "Wirelessly powered large-area electronics for the Internet of Things", Nature Electronics, https://doi.org/10.1038/s41928-022-00898-5, December 2022.

288. M.Wagih, L.Balocchi, F.Benassi, N.B.Carvalho, J.-C.Chiao, R.Correia, A.Costanzo, Y.Cui, D.Georgiadou, C.Gouveia, J.Grosinger, J.S.Ho, K.Hu, A.Komolafe, S.Lemey, C.Loss, G.Marrocco, P.Mitcheson, V.Palazzi, N.Panunzio, G.Paolini, P.Pinho, J.Preishuber-Pfluegl, Y.Qaragoez, H.Rahmani, H.Rogier, J.R.Lopera, L.Roselli, D.Schreurs, M.M.Tentzeris, R.Torah, R.Torres, P.Van Torre, D.Vital and S.Beeby, "Microwave-Enabled Wearables: Underpinning Technologies, Integration Platforms, and Next-Generation Roadmap", IEEE Journal on Microwaves, Vol.3, No.1, pp.193-226, January 2023.

289. C.Lynch, A.O.Adeyeye, A.Eid, J.G.D.Hester and M.M.Tentzeris, "5G/mm-Wave Fully-Passive Dual Rotman Lens-Based Harmonic mmID for Long Range Microlocalization Over Wide Angular Ranges", IEEE Transactions on Microwave Theory and Techniques, Vol.71, No.1, pp.330-338, January 2023.

290. W.Choi, A.Georgiadis, M.M.Tentzeris and S.Kim, "Analysis of Exponential Frequency-Diverse Array for Short-Range Beam-Focusing Technology", IEEE Transactions on Antennas and Propagation, Vol.71, No.2, pp.1437-1447, February 2023.

291. K.Niotaki, N.B.Cavalho, A.Georgiadis, X.Gu, S.Hemour, K.Wu, D.Matos, D.Belo, R.Pereira, R.Figueiredo, H.Chaves, B.Mendes, R.Correia, A.Oliveira, V.Palazzi, F.Alimenti, P.Mezzanotte, L.Roselli, F.Benassi, A.Costanzo, D.Masotti, G.Paolini, A.Eid, J.Hester, M.M.Tentzeris and N.Shinohara, "RF Energy Harvesting and Wireless Power Transfer for Energy Autonomous Wireless Devices and RFIDs", IEEE Journal on Microwaves, Vol.3, No.2, pp.763-782, April 2023.

292. M.E.Holda, G.E.Ponchak and E.M.Tentzeris, "Coplanar Stripline Single Pole Single Throw Switch", IEEE Microwave and Wireless Technology Letters, Vol.33, No.6. pp.671-674, June 2023.

293. K.Hu, T.W.Callis and M.M.Tentzeris, "Additively Manufactured Flexible On-Package Phased Antenna Arrays with Integrated Microfluidic Cooling Channels for 5G/mmWave System-On-Package Designs", IEEE Microwave and Wireless Technology Letters, Vol.33, No.6, pp.899-902, June 2023.

IV.B.2. Selected Refereed Conference Publications

1. E.Tentzeris, N.Dib, L.P.B.Katehi, J.Oswald and P.Siegel, "Time-Domain Characterization of Diode-Mounting Structures", Proc. of the Fifth International Symposium on Space Terahertz Technology, pp.720-727, Ann Arbor, MI, May 1994.
2. T.P.Budka, E.Tentzeris, S.Waclawik, N.Dib, L.P.B. Katehi and G.M.Rebeiz, "An Experimental and Theoretical Comparison of the Electric Fields above a Coupled Line Bandpass Filter", Proc. of the 1995 IEEE Symposium on Microwave Theory and Techniques, pp.1487-1490, Orlando, FL, May 1995.

3. E.Tentzeris, M.Krumpholz, N.Dib, L.P.B. Katehi, "A Waveguide Absorber Based on Analytical Green's Function", Proc. of the 1995 European Microwave Conference, pp.251-254, Bologna, ITALY, September 1995.
4. M.Krumpholz, E.Tentzeris, R.Robertson and L.P.B. Katehi, "Time Domain Analysis of Microwave Structures by MRTD", Proc. of the 1996 ACES (Applied Computational Electromagnetics Society) Symposium, pp.1303-1309, Monterey, CA, March 1996.
5. E.Tentzeris, M.Krumpholz and L.P.B. Katehi, "Application of MRTD to Printed Transmission Lines", Proc. of the 1996 IEEE Symposium on Microwave Theory and Techniques, pp.573-576, San Francisco, CA, June 1996.
6. R.Robertson, E.Tentzeris, M.Krumpholz and L.P.B. Katehi, "MRTD Analysis of Dielectric Cavity Structures", Proc. of the 1996 IEEE Symposium on Microwave Theory and Techniques, pp.1861-1864, San Francisco, CA, June 1996.
7. K.Goverdhanam, E.Tentzeris, M.Krumpholz and L.P.B. Katehi, "An FDTD Multigrid based on Multiresolution Analysis", Proc. of the 1996 IEEE AP-S (Antennas and Propagation Society) Microwave Conference, pp.352-355, Baltimore, MD, July 1996.
8. E.Tentzeris, R.Robertson, M.Krumpholz and L.P.B. Katehi, "Application of the PML Absorber to the MRTD Technique", Proc. of the 1996 IEEE AP-S (Antennas and Propagation Society) Microwave Conference, pp.634-637, Baltimore, MD, July 1996.
9. E.Tentzeris, A.Cangellaris and L.P.B.Katehi, "Space/Time Adaptive Meshing and Multiresolution Time-Domain Techniques", Invited Paper in the 1997 ACES (Applied Computational Electromagnetics Society) Conference, pp.1509-1514, Monterey, CA, March 1997.
10. E.Tentzeris, R.Robertson, A.Cangellaris and L.P.B.Katehi, "Space- and Time-Adaptive Gridding Using MRTD", Proc. of the 1997 IEEE Symposium on Microwave Theory and Techniques, pp.337-340, Denver, CO, June 1997.
11. R.Robertson, E.Tentzeris and L.P.B.Katehi, "Modeling of Membrane Patch Antennas Using MRTD Analysis", Proc. the 1997 IEEE AP-S (Antennas and Propagation Society) Microwave Conference, pp.126-129, Montreal, Canada, July 1997.
12. E.Tentzeris, J.Harvey and L.P.B.Katehi, "Time Adaptive Time Domain Techniques for the Design of Microwave Circuits", Invited Paper in the 1997 IEEE AP-S (Antennas and Propagation Society) Microwave Conference, pp.1476-1479, Montreal, CANADA, July 1997.
13. R.Robertson, E.Tentzeris and L.P.B.Katehi, "Analysis of Antenna Structures by Use of MRTD", Proc. of the 1997 NATO Advanced Study Institute on Applied Computational Electromagnetics, Samos, GREECE, August 1997.
14. E.Tentzeris and L.P.B.Katehi, "Time-Domain Schemes Using Multiresolution Expansion", Invited Paper in the 1997 NATO Advanced Study Institute on Applied Computational Electromagnetics, Samos, GREECE, August 1997.
15. G.Ponchak, E.Tentzeris and L.P.B.Katehi, "Coupling between Adjacent Finite Ground Coplanar Waveguides", Proc. ISHM 1997 Int. Symp. on Microelectronics, pp.7-10, Philadelphia, PA, October 1997. ***Best Paper Award by the International Hybrid Microelectronics and Packaging Society.***
16. K.Goverdhanam, E.Tentzeris and L.P.B.Katehi, "Modelling of Boundary Conditions at the Haar Multigrid", Proc. of the 1998 ACES (Applied

Computational Electromagnetics Society) Conference, pp.127-134, Monterey, CA, March 1998.
17. E.Tentzeris, R.Robertson and L.P.B.Katehi, "PML Implementation for the Battle-Lemarie MRTD Schemes", Invited Paper in the 1998 ACES (Applied Computational Electromagnetics) Conference, pp.647-654, Monterey, CA, March 1998.
18. E.Tentzeris and L.P.B.Katehi, "Space Adaptive Analysis of Evanescent Waveguide Filters", Proc. Of the 1998 IEEE Symposium on Microwave Theory and Techniques, pp.481-484, Baltimore, MD, June 1998.
19. L.Roselli, E.Tentzeris and L.P.B.Katehi, "Nonlinear Circuit Characterization Using a Multiresolution Time-Domain Technique", Proc. of the 1998 IEEE Symposium on Microwave Theory and Techniques, pp.1387-1390, Baltimore, MD, June 1998.
20. R.Robertson, E.Tentzeris, T.Ellis and L.P.B.Katehi, "Characterization of a MS-CPW Transition for Antenna Applications", Proc. of the 1998 IEEE AP-S (Antennas and Propagation Society) Conference, pp.1380-1383, Atlanta, GA, June 1998.
21. E.Tentzeris, R.Robertson, J.Harvey and L.P.B.Katehi, "Application of the Multiresolution Time-Domain Technique (MRTD) to Microwave Circuits and Antennas Problems", Invited Paper in the 1998 European Microwave Conference, Amsterdam, THE NETHERLANDS, October 1998.
22. G.E.Ponchak, L.P.B.Katehi and E.M.Tentzeris, "Finite Ground Coplanar (FGC) Waveguide: Its Characteristics and Advantages for Use in RF and Wireless Communication Circuits", Invited Paper in the 3rd International Wireless Communications Conference (WCC '98) Digest, pp.75-83, San Diego, CA, November 1998.
23. R.L.Robertson, E.M.Tentzeris and L.P.B.Katehi, "Analysis of Micromachined Dielectric Transitions using MRTD", Proc. of the 1999 IEEE International Microwave Symposium, pp.1463-1466, Anaheim, CA, June 1999.
24. L.P.B.Katehi, E.M.Tentzeris and J.Harvey, "Multiresolution-Time Domain Analysis (MRTD) of High-Frequency Circuits Including Non-linear Elements", Invited Paper in the General Assembly of URSI (International Union of Radio Science) 1999, p.694, Toronto, CANADA, August 1999.
25. E.M.Tentzeris, "Analysis and Design of RF Circuits Including Non-linear Elements, using MRTD", Proc. of the 54th ARFTG (Automatic RF Techniques Group) Conference, pp.38-40, Atlanta, GA, December 1999.
26. E.M.Tentzeris, "Computational Optimization of MRTD Haar-based Adaptive Schemes used for the Design of RF Packaging Structures", Invited Paper in the ACES (Applied Computational Electromagnetics) 2000, pp.548-555, Monterey, CA, March 2000.
27. G.E.Ponchak and E.M.Tentzeris, "Development of Finite Ground Coplanar (FGC) Waveguide 90 Degree Crossover Junctions with Low Coupling", Proc. of the 2000 IEEE IMS (International Microwave Symposium), pp.III.1891-1894, Boston, MA, June 2000.
28. N.Bushyager and E.M.Tentzeris, "Characterization of Micromachined Transmission Lines Using MRTD", Proc. of the 2000 IEEE IMS (International Microwave Symposium), pp.251-254, Boston, MA, June 2000.

29. A.Sutono, N.G.Cafaro, J.Laskar and E.M.Tentzeris, "Experimental Study and Modeling of Microwave Bond Wire Interconnects", Proc. of the 2000 IEEE AP-S (Antennas and Propagation) Symposium, pp.IV.2020-2023, Salt Lake City, UT, July 2000.
30. M.Swaminathan and M.Tentzeris, "Design Issues in the Packaging of Heterogeneous Systems", Proc. of the 2000 IEEE AP-S (Antennas and Propagation) Symposium, pp.II.592-595, Salt Lake, UT, July 2000.
31. B.McGarvey, D.Staiculescu, E.M.Tentzeris and J.Laskar, "Adaptive Modeling of Complex Packaging Geometries Using Haar-based MRTD Algorithms", Proc. of the 2000 European Microwave Conference, pp.413-416 (Vol.I), Paris, FRANCE, October 2000.
32. J.Laskar, E.M.Tentzeris, A.Sutono, H.Liang, N.Bushyager and K.Lim, "Next Generation Packaging Architectures for Highly Integrated Wireless Systems", Proc. of the 2000 European Microwave Conference, pp.136-139 (Vol.III), Paris, FRANCE, October, 2000.
33. D.Staiculescu, J.Laskar and E.M.Tentzeris, "Flip Chip Design Rule Development for Multiple Signal and Ground Bump Configurations", Proc. of the 2000 IEEE Asia-Pacific Microwave Conference, pp.136-139, Sydney, Australia, December 2000.
34. N.Bushyager, B.McGarvey and E.M.Tentzeris, "Adaptive Numerical Modeling of RF Structures Requiring the Coupling of Maxwell's, Mechanical and Solid-State Equations", Invited Paper in the 2001 ACES (Applied Computational Electromagnetics Society) Conference, pp.1-6, Monterey, CA, March 2001. ***Best Paper Award ACES 2001***
35. N.Bushyager and M.Tentzeris, "Modeling and Design of RF MEMS Structures Using Computationally Efficient Numerical Techniques", Proc. of the 2002 IEEE Electronic Components and Technology Conference (ECTC), pp.327-330, Orlando, FL, May 2001.
36. D.Heo, A.Sutono, E.Chen, E.Gebara, S.Yoo, Y.Suh, J.Laskar, E.Dalton and M.Tentzeris, "A High-Efficiency 0.25-umCMOS PA with LTCC Multi-Layer High-Q Integrated Passives for 2.4 GHz ISM Band", Proc. of the 2001 IEEE International Microwave Symposium, pp.II.915-918, Phoenix, AZ, May 2001.
37. G.E.Ponchak, E.M.Tentzeris and J.Papapolymerou, "Coupling Between Microstrip Lines Embedded in Polyimide Layers for 3D-MMICs on Si", Proc. of the 2001 IEEE International Microwave Symposium, pp.III.1723-1726, Phoenix, AZ, May 2001.
38. N.Bushyager, E.M.Tentzeris, L.Gatewood and J.DeNatale, "A Novel Adaptive Approach to Modeling MEMS Tunable Capacitors Using MRTD and FDTD Techniques", Proc. of the 2001 IEEE International Microwave Symposium, pp.2003-2006, Phoenix, AZ, May 2001.
39. N.Bushyager and E.M.Tentzeris, "Modeling and Design of RF MEMS Structures Using Computationally Efficient Numerical Techniques", Invited Paper in the 2001 Electronic Components and Technology Conference, pp.324-327, Lake Buena Vista, FL, May 2001.
40. N.Bushyager and E.M.Tentzeris, "RF MEMS: Development of Design Rules", Proc. of the 2001 Interpack (Pacific Rim/International, Intersociety, Electronic Packaging Technical Conference), Kauai, HI, July 2001.

41. N.Bushyager, A.Obatoyinbo, E.M.Tentzeris and J.Laskar, "Multilayer Package Modeling Using the Multiresolution Time-Domain Technique", Proc. of the 2001 IEEE AP-S (Antennas and Propagation Society) Symposium, pp.IV.806-809, Boston, MA, July 2001.
42. A.Sutono, C.Lee, A.Obatoyinbo, K.Lim, E.M.Tentzeris and J.Laskar, "Development of Highly Integrated 3D Microwave-MillimeterWave Radio Front-End System-on-Package (SOP)", Invited Paper in the 2001 European GaAs Conference, pp.235-238, London, England, September 2001.
43. B.McGarvey and E.M.Tentzeris, "Coupling of Solid-State and Electromagnetic Equations for Simulation of Wireless Packaged Geometries", Proc. of the 2001 European Microwave Symposium, pp.I.217-220, London, England, September 2001.
44. G.E.Ponchak, J.Papapolymerou and E.M.Tentzeris, "Coupling Between Finite Ground Coplanar Waveguides Embedded in Polyimide Layers for 3D-MMICs on Si", Proc. of the 2001 European Microwave Symposium, pp.I.25-28, London, England, September 2001.
45. J.Laskar, A.Sutono, C.-H.Lee, M.Davis, M.Maeng, N.Lal, K.Lim, S.Pinel, M.Tentzeris and A.Obatoyinbo, "Development of Integrated 3D Radio Front-end System-on-Package (SOP)", Proc. 2001 Gallium Arsenide Integrated Circuit (GaAs IC) Symposium, pp.215-218, Monterey, CA, October 2001.
46. B.McGarvey, R.Cicconetti, N.Bushyager, E.Dalton and E.M.Tentzeris, "Beowulf Cluster Design for Scientific PDE Models", Proc. of the 2001 Annual Linux Showcase, Oakland, CA, November 2001.
47. N.Bushyager, M.Davis, E.Dalton, J.Laskar and M.Tentzeris, "Q-Factor Prediction and Optimization of Multilayer Inductors for RF Packaging Microsystems Using Time-Domain Techniques", Proc. of the 2002 IEEE Electronic Components and Technology Conference (ECTC), pp.1718-1721, San Diego, CA, May 2002.
48. N.Bushyager, K.Lange, E.M.Tentzeris and J.Papapolymerou, "Modeling and Optimization of RF-MEMS Reconfigurable Tuners with Computationally Efficient Time-Domain Techniques", Proc. Of the 2002 IEEE International Microwave Symposium, pp.II.883-886, Seattle, WA, June 2002.
49. M.F.Davis, S.-W.Yoon, S.Mandal, N.Bushyager, M.Maeng, K.Lim, S.Pinel, A.Sutono, J.Laskar, M.Tentzeris, T.Nonaka, V.Sundaram, F.Liu and R.Tummala, "RF/Microwave Multiband Design Solutions for Multilayer Organic System-on-Package Integrated Passives", Proc. of the 2002 IEEE International Microwave Symposium, pp.III.2217-2220, Seattle, WA, June 2002.
50. S.Pinel, S.Chakraborty, M.Roellig, R.Kunze, S.Mandal, H.Liang, C.-H.Lee, R.Li, K.Lim, G.White, M.Tentzeris and J.Laskar, "3D Integrated LTCC Module Using uBGA Technology for Compact C-band RF Front-end Module", Proc. of the 2002 IEEE International Microwave Symposium, pp.III.1553-1556, Seattle, WA, June 2002.
51. G.E.Ponchak, E.Dalton, E.M.Tentzeris and J.Papapolymerou, "Coupling Between Microstrip Lines with Finite Ground Planes Embedded in Polyimide Layers for 3D-MMICs on Si", Proc. of the 2002 IEEE International Microwave Symposium, pp.III.2221-2224, Seattle, WA, June 2002.
52. J.Papapolymerou, G.E.Ponchak and E.M.Tentzeris, "A Wilkinson Power Divider on a Low-Resistivity Si Substrate with a Polyimide Interface Layer for Wireless

Circuits", Proc. of the 2002 IEEE International Microwave Symposium, pp.I.593-596, Seattle, WA, June 2002.
53. A.Bacon, G.E.Ponchak, J.Papapolymerou, N.Bushyager andM.Tentzeris, "Folded CoplanarWaveguide Slot Antenna on Silicon Substrates with a Polyimide Interface Layer", Proc. of the 2002 IEEE Antennas and Propagation Symposium, pp.II.432-435, San Antonio, TX, June 2002.
54. R.L.Li, E.Tsai, G.DeJean, M.Tentzeris and J.Laskar, "Novel Small Folded Shorted-Patch Antennas", Proc. of the 2002 IEEE Antennas and Propagation Symposium, pp.IV.26-29, San Antonio, TX, June 2002.
55. R.L.Li, K.Lim, M.Maeng, E.Tsai, G.DeJean, M.Tentzeris and J.Laskar, "Design of Compact Stacked-Patch Antennas on LTCC Technology for Wireless Communication Applications", Proc. of the 2002 IEEE Antennas and Propagation Symposium, pp.II.500-503, San Antonio, TX, June 2002.
56. G.Zheng, S.Pinel, K.Lim, R.Li, M.Tentzeris, J.Papapolymerou and J.Laskar, "Design of Compact RF Components for Low-Cost High-Performance Wireless Front-Ends", Proc. of the 2002 ICMMT, pp.259-262, Beijing, CHINA, August 2002.
57. S.Pinel, K.Lim, M.Maeng, M.F.Davis, R.Li, M.Tentzeris and J.Laskar, "RF System-on-Package (SOP) Development for Compact Low CostWireless Front-end Systems", Proc. of the 2002 European Microwave Symposium, pp.I.61-64, Milan, ITALY, September 2002.
58. G.E.Ponchak, E.Dalton, A.Bacon, J.Papapolymerou andM.Tentzeris, "Measured Propagation Characteristics of Finite-Ground Coplanar Waveguide on Silicon with a Thick Polyimide Interface Layer", Proc. of the 2002 European Microwave Symposium, pp.I.167-170, Milan, ITALY, September 2002.
59. E.M.Tentzeris, "Adaptive modeling and design of highly integrated 3D microwave-millimeter wave radio front-ends", Proc. 2002 Gallium Arsenide Integrated Circuit (GaAs IC) Symposium, pp.109-112, Monterey, CA, October 2002.
60. M.Tentzeris, N.Bushyager, R.L.Li, K.Lim, M.Davis, S.Pinel, J.Laskar, E.Zheng and J.Papapolymerou, "Analysis of MEMS and Embedded Components in Multilayer Packages Using FDTD/MRTD for System-on-Package Applications", Proc. 2002 Asian-Pacific Microwave Symposium, pp.I.554-557, Kyoto, JAPAN, November 2002.
61. E.Y.Tsai, A.M.Bacon, M.Tentzeris and J.Papapolymerou, "Design and Development of Novel Micromachined Patch Antennas for Wireless Applications", Proc. 2002 Asian-Pacific Microwave Symposium, pp.II.821-824, Kyoto, JAPAN, November 2002.
62. M.Kuroda, N.Miura and M.Tentzeris, "A Novel Time-Domain Technique for the Analysis of MEMS-Based Variable Capacitors with Moving Metallic Parts", Proc. 2002 Asian-Pacific Microwave Symposium, pp.III.1208-1211, Kyoto, JAPAN, November 2002.
63. J.Laskar, M.Tentzeris, K.Lim, S.Pinel, M.Davis, A.Raghavan, M.Maeng, S.-W.Yoon and R.Tummala, "Advanced System-on-Package RF Front-ends for Emerging Wireless Communications", Proc. 2002 Asian-Pacific Microwave Symposium, pp.III.1703-1708, Kyoto, JAPAN, November 2002.
64. N.Bushyager and M.Tentzeris, "Intracell Modeling of Metal/Dielectric Interfaces for EBG/MEMS RF Structures Using the Multiresolution Time-Domain

Technique", Invited Paper in the ACES (Applied Computational Electromagnetics) 2003, pp.403-407, Monterey, CA, March 2003.

65. J.Lee, E.T.K.Dalton, N.Bushyager, M.Kunze, W.Heinrich and M.Tentzeris, "Coupling of Electromagnetic Time-Domain Simulators with DSP/Subgridding Techniques for the Adaptive Modeling of Wireless Packaging Structures", Invited Paper in the ACES (Applied Computational Electromagnetics) 2003, pp.579-584, Monterey, CA, March 2003.
66. M.Kuroda, N.Miura and M.M.Tentzeris, "A Novel Numerical Approach for the Analysis of 2D MEMS-Based Variable Capacitors with Motion to Arbitrary Directions", Proc. of the ACES (Applied Computational Electromagnetics) 2003, pp.48-53, Monterey, CA, March 2003.
67. M.Al-Ahmad, F.Coccetti, M.Tentzeris and P.Russer, "Parametric Model Generation Algorithm for Planar Microwave Structures Based on Full-Wave Analysis and Design of Experiment", Proc. of the ACES (Applied Computational Electromagnetics) 2003, pp.751-756, Monterey, CA, March 2003.
68. R.L.Li, G.DeJean, M.Tentzeris and J.Laskar, "Integration of Miniaturized Patch Antennas with High Dielectric Constant Multilayer Packages and Soft-and-Hard Surfaces (SHS)", Proc. of the 2003 IEEE Electronic Components and Technology Conference (ECTC), pp.474-477, New Orleans, LA, May 2003.
69. E.T.K.Dalton, M.Kunze, W.Heinrich and M.M.Tentzeris, "Accurate Modeling of Multilayer Packaging Structures with a Hybrid FDTD Method", Proc. of the 2003 IEEE Electronic Components and Technology Conference (ECTC), pp.1028-1031, New Orleans, LA, May 2003.
70. N.Bushyager, L.Martin, S.Khushrushahi, S.Basat and M.Tentzeris, "Design of RF and Wireless Packages Using Fast Hybrid Electromagnetic/Statistical Methods", Proc. of the 2003 IEEE Electronic Components and Technology Conference (ECTC), pp.1546-1549, New Orleans, LA, May 2003.
71. D.Thompson, P.Kirby, J.Papapolymerou and M.Tentzeris, "W-Band Characterization of Finite-Ground Coplanar Transmission Lines on Liquid Crystal Polymer (LCP) Substrate", Proc. of the 2003 IEEE Electronic Components and Technology Conference (ECTC), pp.1652-1655, New Orleans, LA, May 2003.
72. N.Bushyager, M.M.Tentzeris and J.Papapolymerou, "Electromagnetic Band-Gap Structure Design Using a Composite-Cell Multiresolution Time-Domain Technique", Proc. of the 2003 IEEE-IMS Symposium, pp.2081-2084, Philadelphia, PA, June 2003.
73. M.Fujii, M.M.Tentzeris and P.Russer, "Performance of Nonlinear Dispersive APML in High-Order FDTD Schemes", Proc. of the 2003 IEEE-IMS Symposium, pp.1129-1132, Philadelphia, PA, June 2003.
74. M.Kuroda, N.Miura, K.Kawano and M.M.Tentzeris, "Numerical Modeling of the Transient Behavior of MEMS Structures Involving Motion in Arbitrary Directions", Proc. of the 2003 IEEE-APS Symposium, pp.I.359-362, Columbus, OH, June 2003.
75. L.Pierantoni, M.Farina, T.Rozzi, F.Coccetti, P.Russer, N.Bushyager and M.M.Tentzeris, "Comparison of Electromagnetic Solvers for the Analysis of LTCC Components", Proc. of the 2003 IEEE-APS Symposium, pp.I.733-736 Columbus, OH, June 2003.

76. R.Li, G.DeJean, M.Tentzeris, J.Laskar and J.Papapolymerou, "LTCC Multilayer Based CP Patch Antenna Surrounded by a Soft-and-Hard Surface for GPS Applications", Proc. of the 2003 IEEE-APS Symposium, pp.II.651-654, Columbus, OH, June 2003.
77. R.Li, G.DeJean, M.Tentzeris and J.Laskar, "Novel Multiband Broadband Planar Wire Antennas for Wireless Communication Handheld Terminals", Proc. of the 2003 IEEE-APS Symposium, pp.III.44-47, Columbus, OH, June 2003.
78. N.Bushyager and M.M.Tentzeris, "Modeling of intracell metallic elements using the MRTD Technique", Proc. of the 2003 IEEE-APS Symposium, pp.I.354-355, Columbus, OH, June 2003.
79. M.M.Tentzeris and J.Laskar, "RF System-on-PAkage (SOP) Development for Compact Low-Cost Wireless Front-End Systems", Proc. of the 2003 Interpack Conference and Exhibition, pp.19-24, Maui, HI, July 2003.
80. D.Thompson, P.Kirby, J.Papapolymerou and M.Tentzeris, "W-Band Characterization of Finite-Ground Coplanar Transmission Lines on Liquid Crystal Polymer Substrates", Invited Paper, 2003 GHz Interconnect Workshop, pp. 25-29, Sedona, AZ, September 21-24, 2003.
81. S.Pinel, K.Lim, G.DeJean, R.L.Li, C.-H.Lee, M.Maeng, M.F.Davis, M.Tentzeris and J.Laskar, "System-on-package (SOP) Architectures for Compact and Low-cost RF Front-end Modules", Proc. of the 2003 IEEE European Microwave Symposium, pp.I.307-310, Munich, GERMANY, October 2003.
82. G.Zheng, P.Kirby, A.Rodriguez, J.Papapolymerou, M.Tentzeris and L.Dunleavy, "Design and On-Wafer Measurement of a W-Band Via-Less CPW RF Probe Pad to Microstrip Transition", Proc. of the 2003 IEEE European Microwave Symposium, pp.I.443-446, Munich, GERMANY, October 2003.
83. N.Bushyager and M.Tentzeris, "Composite Cell MRTD Method for the Efficient Simulation of Complex Microwave Structures", Proc. of the 2003 IEEE European Microwave Symposium, pp.I.77-80, Munich, GERMANY, October 2003.
84. E.T.K.Dalton, M.Kunze, W.Heinrich and M.Tentzeris, "A Hybrid FDTD Quasistatic Technique for the Accurate Modeling of Complex Integrated RF Structures Including the Effects of Lossy Metals", Proc. of the 2003 IEEE European Microwave Symposium, pp.I.331-334, Munich, GERMANY, October 2003.
85. K.Lim, M.F.Davis, M.Maeng, S.-W.Yoon, S.Pinel, L.Wan, D.Guidotti, D.Ravi, J.Laskar, M.Tentzeris, V.Sundaram, G.White, M.Swaminathan, M.Brooke, N.Jokerst and R.Tummala, "Development of Intelligent Network Communicator for Mixed Signal Communications Using the System-on-a-Package (SOP) Technology", Proc. of the 2003 IEEE Asian Pacific Microwave Conference, pp.TD2-05, Seoul, KOREA, November 2003.
86. S.Pinel, K.Lim, G.DeJean, R.L.Li, C.-H.Lee, M.Maeng, M.F.Davis, M.Tentzeris and J.Laskar, "Advanced 3D Integrated and Low Cost RF Wireless Systems Using System-on-Package (SOP) Architectures", Proc. of the 2003 IEEE Asian Pacific Microwave Conference, pp.WA5-01, Seoul, KOREA, November 2003.
87. J.Lee, K.Lim, S.Pinel, G.DeJean, R.L.Li, C.-H.Lee, M.F.Davis, M.Tentzeris and J.Laskar, "Advanced System-on-Package (SOP)Multilayer Architectures for RF/ Wireless Systems up to Millimeter-Wave Frequency Bands", Proc. of the 2003

IEEE Asian Pacific Microwave Conference, pp.FA5-01, Seoul, KOREA, November 2003.
88. N.Bushyager, D.Staiculescu, L.Martin, J.-H.Lee, N.Vasiloglou and M.M.Tentzeris, "Design and Optimization of 3D RF Modules, Microsystems and Packages Using Electromagnetic and Statistical Tools", Proc. of the 2004 IEEE-ECTC Symposium, pp.1412-1415, Las Vegas, NV, June 2004.
89. V.Palazzari, D.Thompson, N.Papageorgiou, S.Pinel, J.-H.Lee, S.Sarkar, R.Pratap, G.DeJean, R.Bairavasubramanian, R.L.Li, M.M.Tentzeris, J.Laskar, J.Papapolymerou and L.Roselli, "Multiband RF and mm-Wave Design Solutions for Integrated RF Functions in Liquid Crystal Polymer System-On-Package Technology", Proc. of the 2004 IEEE-ECTC Symposium, pp.1658-1663, Las Vegas, NV, June 2004.
90. V.Sundaram, R.Tummala, G.White, K.Lim, L.Wan, D.Guidotti, F.Liu, S.Bhattacharya, R.Pulugurtha, I.Abothu, R.Doraiswami, R.Pucha, J.Laskar, M.M.Tentzeris, G.K.Chang, M.Swaminathan, "System-on-Package (SOP) Substrate and Module with Digital, RF and Optical Integration", Proc. of the 2004 IEEE-ECTC Symposium, pp.17-23, Las Vegas, NV, June 2004.
91. K.Lim, L.Wan, D.Guidotti, V.Sundaram, G.White, F.Liu, S.Bhatacharya, R.Doraiswami, Y.-J.Chang, J.Yu, S.Sarkar, R.Pratap, S.-W.Yoon, M.Maeng, S.Pinel, J.Laskar, M.M.Tentzeris, G.K.Chang, M.Swaminathan and R.Tummala, "System-on-a-Package (SOP) Module Development for Digital, RF and Optical Mixed Signal Integrated System", Proc. of the 2004 IEEE-ECTC Symposium, pp.1693-1697, Las Vegas, NV, June 2004.
92. N.Bushyager and M.M.Tentzeris, "Intracell Modeling of Lumped Elements Using the Composite-Cell MRTD Technique", Proc. of the 2004 IEEE-IMS Symposium, pp.1041-1044, Fort-Worth, TX, June 2004.
93. N.Bushyager, D.Staiculescu, A.Obatoyinbo and M.M.Tentzeris, "Optimization of 3D Multilayer RF Components using the Design of Experiments (DOE) Technique", Proc. of the 2004 IEEE-IMS Symposium, pp.1859-1862, Fort-Worth, TX, June 2004.
94. E.T.K.Dalton and M.M.Tentzeris, "A Hybrid FDTD/Quasistatic Technique for the Accurate Modeling of RF Loss Mechanisms", Proc. of the 2004 IEEE-IMS Symposium, pp.1709-1712, Fort-Worth, TX, June 2004.
95. S.Sarkar, V.Palazarri, G.Wang, N.Papageorgiou, D.Thompson, J.-H.Lee, S.Pinel, M.M.Tentzeris, J.Papapolymerou and J.Laskar, "RF and mm-Wave SOP Module Platform using LCP and RF MEMS Technologies", Proc.of the 2004 IEEE-IMS Symposium, pp.567-570, Fort-Worth, TX, June 2004.
96. B.Pan, Y.Yoon, P.Kirby, J.Papapolymerou, M.M.Tentzeris and M.Allen, "AW-band Surface Micromachined Monopole for Low-cost Wireless Communication Systems", Proc. of the 2004 IEEE-IMS Symposium, pp.1935-1938, Fort-Worth, TX, June 2004.
97. G.DeJean, R.L.Li, M.M.Tentzeris, J.Papapolymerou and J.Laskar, "Radiation-Pattern Improvement of Patch Antennas Using a Compact Soft/Hard Surface (SHS) Structure on LTCC Multilayer Technology", Student Paper Contest Finalist in the 2004 IEEE-APS Symposium, pp.317-320, Monterey, CA, June 2004.
98. R.L.Li, G.DeJean, M.M.Tentzeris and J.Laskar, "Integrable Miniaturized Folded Antennas for RFID Applications", Proc. of the 2004 IEEE-APS Symposium, pp.1431-1434, Monterey, CA, June 2004.

99. G.DeJean and M.M.Tentzeris, "Modeling and Optimization of Circularly-Polarized Patch Antennas Using the Lumped Element Equivalent Circuit Approach", Proc. of the 2004 IEEE-APS Symposium, pp.4432-4435, Monterey, CA, June 2004.
100. K.Kawano, T.Mori, M.Kuroda and M.M.Tentzeris, "Numerical Modeling of MEMS Structures Involving Motion Effected by the Coupling of Maxwell's and Mechanical Equations", Proc. of the 2004 IEEE-APS Symposium, pp.2843-2846, Monterey, CA, June 2004.
101. N.Bushyager and M.M.Tentzeris, "Metamaterial Modeling Using Composite Cell MRTD Techniques", Proc. of the 2004 URSI Symposium, p.249, Monterey, CA, June 2004.
102. N.Vasiloglou, D.Staiculescu and M.M.Tentzeris, "Investigation of the Effect of Fractal Shapes on the Broadband Behavior of One-Dimensional Optimized Antennas", Proc. of the 2004 URSI Symposium, p.69, Monterey, CA, June 2004.
103. E.Gebara, M.M.Tentzeris and J.Laskar, "An Integrated CMOS Interference Canceller for MIMO Systems", Procs. of the 2004 7th European Conference on Wireless Technology, pp.137-140, Amsterdam, The Netherlands, October 2004, Best Paper Contest Finalist .
104. G.Wang, D.Thompson, M.M.Tentzeris and J.Papapolymerou, "Low Cost RF MEMS Switches Using LCP Substrate", Procs. of the 2004 European Microwave Symposium, pp.1441-1444, Amsterdam, The Netherlands, October 2004.
105. J.-H.Lee, G.DeJean, S.Sarkar, S.Pinel, K.Lim, J.Papapolymerou, M.M.Tentzeris and J.Laskar, "Advanced 3D LTCC System-on-Package (SOP) Architectures for Highly Integrated Millimeter-Wave Wireless Systems", Procs. of the 2004 European Microwave Symposium, pp.II.523-526, Amsterdam, The Netherlands, October 2004.
106. S.Pinel, S.Sarkar, R.Bairavasubramanian, J.-H.Lee, M.M.Tentzeris, J.Papapolymerou and J.Laskar, "Highly Integrated LTCC and LCP Millimeter-Wave Functions for 3D-SOP High Data Rate Wireless Systems", Procs. of the 2004 IEEE Asian Pacific Microwave Conference, New Delhi, INDIA, December 2004.
107. N.Bushyager and M.M.Tentzeris, "Subcell Lumped Element Modeling in MRTD with Applications to Metamaterial Characterization", Procs. of the 2004 IEEE Asian Pacific Microwave Conference, New Delhi, INDIA, December 2004.
108. V.Palazzari, S.Pinel, M.M.Tentzeris, L.Roselli, J.Laskar and F.Alimenti, "Design of WLAN Filters in LTCC and LCP System-On-Package Technologies", Procs. of the 2005 IEEE German Microwave Conference, Ulm, GERMANY, April 2005.
109. N.Bushyager and M.M.Tentzeris, "Practical Considerations in the MRTD Modeling of Microwave Structures", Procs. of the 2005 IEEE/ACES Int. Conf. on Wireless Communications and Applied Computational Electromagnetics, pp.281-284, Honolulu, HI, April 2005.
110. K.Kawano, S.Shahrani, T.Mori, M.Kuroda and M.M.Tentzeris, "Dynamic and Electrical Analysis of MEMS Capacitors with Accelerated Motion Effects", Procs. of the 2005 IEEE/ACES Int. Conf. on Wireless Communications and Applied Computational Electromagnetics, pp.759-762, Honolulu, HI, April 2005.
111. D.Staiculescu, N.Bushyager and M.M.Tentzeris, "Microwave/Millimeter-Wave Metamaterial Development Using the Design of Experiments Technique", Procs.

of the 2005 IEEE/ACES Int. Conf. on Wireless Communications and Applied Computational Electromagnetics, pp.417-420, Honolulu, HI, April 2005.
112. J.Laskar, S.Pinel, C.-H.Lee, S.Sarkar, B.Perumana, J.Papapolymerou and M.M.Tentzeris, "Circuit and Module Challenges for 60 GHz Gb/s Radio", Procs. of the 2005 IEEE/ACES Int. Conf. on Wireless Communications and Applied Computational Electromagnetics, pp.447-450, Honolulu, HI, April 2005.
113. S.K.Kavadias and E.M.Tentzeris, "To Dillhma toy ekpaideyomenou", [Greek] Invited Paper in the International Conference on New Technologies and Continuous Education 2005 Digest, pp.20-45, Lamia, GREECE, April 2005.
114. J.-H.Lee, S.Sarkar, S.Pinel, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "3D-SOP Millimeter-Wave Functions For High Data Rate Wireless Systems Using LTCC and LCP Technologies", Procs. of the 2005 IEEE-ECTC Symposium, pp.764-768, Orlando, FL, June 2005.
115. D.Staiculescu, N.Bushyager, L.Martin and M.M.Tentzeris, "Design of Millimeter-Wave Metamaterials Using Deterministic Full-Wave Electromagnetic Simulators and Patch of Ascent Statistical Optimizer", Procs. of the 2005 IEEE-ECTC Symposium, pp.1565-1568, Orlando, FL, June 2005.
116. S.Basat, K.Lim, I.Kim, J.Laskar, M.M.Tentzeris, Y.Kim, S.Lim and B.Chung, "Design and Development of a Miniaturized Embedded UHF RFID Tag for Automotive Tire Applications", Procs. of the 2005 IEEE-ECTC Symposium, pp.867-870, Orlando, FL, June 2005.
117. R.J.Pratap, J.H.Lee, S.Pinel, G.S.May, J.Laskar and M.M.Tentzeris, "MillimeterWave RF Front-End Design Using Neuro-Genetic Algorithms", Procs. of the 2005 IEEE-ECTC Symposium, pp.1802-1806, Orlando, FL, June 2005.
118. W.J.R.Hoefer, P.P.M.So, D.Thompson and M.M.Tentzeris,"Topology and Design of Wideband 3D Metamaterials made of Periodically Loaded Transmission Line Arrays" , Procs. of the 2005 IEEE-IMS Symposium, pp.313-316, Long Beach, CA, June 2005.
119. N.Bushyager and M.M.Tentzeris, "Haar-MRTD Time and Space Adaptive Grid techniques for Practical RF Structures" , Procs. of the 2005 IEEE-IMS Symposium, pp.1123-1126, Long Beach, CA, June 2005.
120. D.Thompson, N.Kingsley, G.Wang, J.Papapolymerou and M.M.Tentzeris, "RF Characteristics of Thin Film Liquid Crystal Polymer (LCP) Packages for RF MEMS and MMIC Integration" , Procs. of the 2005 IEEE-IMS Symposium, pp.857-860, Long Beach, CA, June 2005.
121. B.Pan, Y.Yoon, Y.Z.Zhao, J.Papapolymerou, M.M.Tentzeris and M.Allen, "A Broadband Surface-Micromachined 15-45 GHz Microstrip Coupler" , Procs. of the 2005 IEEE-IMS Symposium, pp.989-992, Long Beach, CA, June 2005.
122. A.Raghavan, E.Gebara, M.M.Tentzeris and J.Laskar, "An Active Interference Canceller for Multistandard Collocated Radio" , Procs. of the 2005 IEEE-IMS Symposium, pp.723-726, Long Beach, CA, June 2005.
123. Y.-K.Yoon, B.Pan, J.Papapolymerou, M.M.Tentzeris and M.G.Allen, "Surface-micromachinedMillimeter-Wave Antennas" , Procs. of the 13th International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers 2005), Vol.2, pp.2986-1989, Hiltonhead, SC, June 2005.
124. R.L.Li, J.Laskar and M.M.Tentzeris, "Circular Loop Antennas Reactively Loaded for a Uniform Traveling-Wave Current Distribution" , Procs. of the 2005 IEEE-APS Symposium, pp.455-458, vol.3B, Washington, DC, July 2005.

125. B.Pan, Y.Yoon, J.Papapolymerou, M.M.Tentzeris and M.G.Allen, "A High Performance Surface-Micromachined Elevated Patch Antenna" , Procs. of the 2005 IEEE-APS Symposium, pp.397-400, vol.1B, Washington, DC, July 2005.
126. I.-K.Kim, S.Pinel, J.Papapolymerou, M.M.Tentzeris, J.Laskar and J.-G.Yook, "Linear Tapered Slot Antennas on LTCC Substrate for Millimeter-Wave Applications" , Procs. of the 2005 IEEE-APS Symposium, pp.483-486, vol.2A, Washington, DC, July 2005.
127. S.Nikolaou, G.E.Ponchak, J.Papapolymerou and M.M.Tentzeris, "Shorted Annular Slot Antenna (ASA) Matched at Three Different Frequencies" , Procs. of the 2005 IEEE-APS Symposium, pp.541-544, vol.1B, Washington, DC, July 2005.
128. S.Nikolaou, G.E.Ponchak, J.Papapolymerou and M.M.Tentzeris, "Double Exponentially Tapered Slot Antenna (DETSA) on Liquid Crystal Polymer (LCP) for UWB Applications" , Student Paper Contest Finalist in the 2005 IEEE-APS Symposium, pp.623-626, vol.2A, Washington, DC, July 2005.
129. G.DeJean and M.M.Tentzeris, "A Printed Microstrip Yagi Antenna Array for Millimeter-Wave Multi-sector Applications" , Procs. of the 2005 IEEE-APS Symposium, pp.529-532, vol.2A, Washington, DC, July 2005.
130. Y.Yoon, B.Pan, J.Papapolymerou, M.M.Tentzeris and M.G.Allen, "A Vertical W-band Surface-Micromachined Yagi-Uda Antenna" , Procs. of the 2005 IEEE-APS Symposium, pp.594-597, vol.3A, Washington, DC, July 2005.
131. K.Yamagata, M.Kuroda andM.M.Tentzeris, "Numerical Modeling of Antennas with Mechanically/MEMS Enabled Moving Parts" , Procs. of the 2005 IEEE-APS Symposium, pp.429-432, vol.2A,Washington, DC, July 2005.
132. R.Bairavasubramanian, D.Thompson, G.DeJean, G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Development of mm-Wave Dual-Frequency Multilayer Antenna Arrays on Liquid Crystal Polymer (LCP) Substrate" , Procs. of the 2005 IEEE-APS Symposium, pp.393-396, vol.1B, Washington, DC, July 2005.
133. G.DeJean, R.L.Li, J.Laskar and M.M.Tentzeris, "Circularly Polarized Loop Antennas with a Parasitic Element for Bandwidth Enhancement" , Student Paper Contest Finalist in the 2005 IEEE-APS Symposium, pp.401-404, vol.1B, Washington, DC, July 2005.
134. D.C.Thompson, R.L.Li, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "New Short Backfire Antennas for Wireless Applications" , Procs. of the 2005 IEEE-APS Symposium, pp.371-374, vol.2A, Washington, DC, July 2005.
135. L.J.Martin, D.Staiculescu and M.M.Tentzeris, "Design and Optimization of 3D Multilayer Balun Architectures Using the Design of Experiments Technique" , Procs. of the 2005 IEEE-APS Symposium, pp.93-96, vol.1A, Washington, DC, July 2005.
136. S.S.Basat, K.Lim, J.Laskar and M.M.Tentzeris, "Design and Modeling of Embedded 13.56 MHz RFID Antennas" , Procs. of the 2005 IEEE-APS Symposium, pp.64-67, vol.4B, Washington, DC, July 2005.
137. S.Nikolaou, L.Marcaccioli, G.E.Ponchak, J.Papapolymerou and M.M.Tentzeris, "Conformal Double Exponentially Tapered Slot Antennas (DETSA) for UWB Communication Systems' Front Ends", Procs. of the 2005 IEEE-ICU International Conference on Ultrawideband Technologies, Zurich, Switzerland, September 2005.

138. M.M.Tentzeris and S.El-Ghazaly, "Welcome to the CEM-TD Workshop 2005" , Procs. of the 2005 IEEE CEM-TD Workshop, pp.0.4, Atlanta, GA, September 2005.
139. J.H.Lee, N.Bushyager, M.M.Tentzeris, "Comparative Study of DSP Techniques for the Effective Modeling and Design of Highly Complex RF-MEMS Structures" , Procs. of the 2005 IEEE CEM-TD Workshop, pp.88-91, Atlanta, GA, September 2005.
140. M.Kuroda, K.Yamagata and M.M.Tentzeris, "Numerical Technique for the Analysis of Patch Antennas with MEMS-enabled Moving Parts" , Procs. of the 2005 IEEE CEM-TD Workshop, pp.84-87, Atlanta, GA, September 2005.
141. D.Staiculescu, L.Martin and M.M.Tentzeris, "40 GHz Metamaterial Development using Hybrid Electromagnetic/Statistical Tools" , Procs. of the 2005 IEEE CEM-TD Workshop, pp.110-113, Atlanta, GA, September 2005.
142. I.-K.Kim, N.Kingsley, M.Morton, J.Papapolymerou, M.M.Tentzeris and J.-G.Yook, "Fractal-Shape 40 GHz Microstrip Bandpass Filter on High-Resistivity Si for Suppression of the 2nd Harmonic" , Procs. of the 2005 European Microwave Symposium, Vol.2, pp.825-828, Paris, FRANCE, October 2005.
143. L.Marcacciolli, C.Lugo, M.M.Tentzeris, J.Papapolymerou and R.Sorrentino, "A Novel Reconfigurable Coupler for Intelligent SOP RF Front-Ends" , Procs. of the 2005 European Microwave Symposium, Vol.1, pp., Paris, FRANCE, October 2005.
144. B.Pan, Y.Yoon, J.Papapolymerou, M.M.Tentzeris andM.G.Allen, "Design and Fabrication of Substrate-Independent Integrated Antennas Utilizing Surface Micromachining Technology" , Procs. of the 2005 Asian-Pacific Microwave Conference, Vol.2, pp., Shuzhou, CHINA, December 2005.
145. J.-H.Lee, N.Kidera, S.Pinel, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "A Highly Integrated 3D Millimeter-Wave Filter Using LTCC System-on-Package (SOP) Technology for V-Band WLAN Gigabit Wireless Systems" , Procs. of the 2005 Asian-Pacific Microwave Conference, Vol.1, pp., Shuzhou, CHINA, December 2005.
146. S.Nikolaou, G.E.Ponchak, J.Papapolymerou and M.M.Tentzeris, "Design and Development of an Annular Slot Antenna (ASA) with a Reconfigurable Radiation Pattern" , Procs. of the 2005 Asian-Pacific Microwave Conference, Vol.5, pp., Shuzhou, CHINA, December 2005.
147. J.Laskar, A.Raghavan, C.-H.Lee, E.Gebara, M.M.Tentzeris and T.Stelliga, "An Active Integrated Circuit Wireless Interference Cancellation Solution" , Procs. of the 2006 IEEE Radio and Wireless Symposium, pp.559-562, San Diego, CA, January 2006.
148. G.E.Ponchak and M.M.Tentzeris, "Multiple Modes on Embedded Inverted Microstrip Lines" , Procs. of the 2006 IEEE SiRF Conference, pp., San Diego, CA, January 2006.
149. R.L.Li, J.Laskar and M.M.Tentzeris, "A Quasi-Planar Miniaturized Broadband Antenna" , Procs. of the 2006 IEEE Int. Workshop on Antenna Technology, Small Antennas and Novel Metamaterials, pp.120-123, Urbana-Champaign, IL, March 2006.
150. S.Basat, M.M.Tentzeris and J.Laskar, "Miniaturized Embedded UHF RFID Tags for Automotive Applications" , Procs. of the 2006 IEEE Int. Workshop on

Antenna Technology, Small Antennas and Novel Metamaterials, pp.160-123, Urbana-Champaign, IL, March 2006.
151. S.Horst, S.Bhattacharya, S.Johnston, M.M.Tentzeris and J.Papapolymerou, "Modeling and Characterization of Thin Film Broadband Resistors on LCP for RF Applications", Procs. of the 2006 IEEE-ECTC Symposium, pp.1751-1755, San Diego, CA, June 2006.
152. B.Pan, G.DeJean, J.Papapolymerou, M.M.Tentzeris, Y.Yoon, M.G.Allen, "High-Performance System-on-Package Integrated Yagi-Uda Antennas for W-band Applications and mm-Wave Ultra-Wideband Data Links", Procs. of the 2006 IEEE-ECTC Symposium, pp.1712-1717, San Diego, CA, June 2006.
153. S.Basat, S.Bhattacharya, A.Rida, S.Johnston, L.Yang, M.M.Tentzeris and J.Laskar, "Fabrication and Assembly of a Novel High-Efficiency UHF RFID Tag on Flexible LCP Substrate", Procs. of the 2006 IEEE-ECTC Symposium, pp.1352-1355, San Diego, CA, June 2006.
154. J.-H.Lee, N.Kidera, S.Pinel, J.Laskar and M.M.Tentzeris, "V-band Integrated Filter and Antenna for LTCC Front-End Modules" , Procs. of the 2006 IEEE MTT-S International Microwave Symposium Digest, pp.978-981, San Francisco, CA, June 2006.
155. D.Staiculescu, C.You, L.Martin, W.Hwang and M.M.Tentzeris, "Hybrid Electrical/ Mechanical Optimization Technique Using Time-Domain Modeling, Finite Element Method and Statistical Tools for Composite Smart Structures" , Procs. of the 2006 IEEE MTT-S International Microwave Symposium Digest, pp.288-291, San Francisco, CA, June 2006.
156. D.E.Anagnostou, J.Papapolymerou, C.G.Christodoulou and M.M.Tentzeris, "A Small Planar Log-Periodic Koch-Dipole Antenna (LPKDA)" , Procs. of the 2006 IEEE-APS Symposium, pp.3685-3688, Albuquerque, NM, July 2006.
157. D.Staiculescu, L.Martin and M.M.Tentzeris, "Multilayer Embedded Metamaterial Optimization for 3D Integrated Module Applications" , Procs. of the 2006 IEEE-APS Symposium, pp.4137-4140, Albuquerque, NM, July 2006.
158. G.R.DeJean, T.T.Thai and M.M.Tentzeris, "Design of Microstrip bi-Yagi and Microstrip quad-Yagi Antenna Arrays for WLAN and Millimeter-Wave Applications" , Procs. of the 2006 IEEE-APS Symposium, pp.989-992, Albuquerque, NM, July 2006.
159. C.You, D.Staiculescu, L.Martin, W.Hwang and M.M.Tentzeris, "Efficient Co-Design of Composite Smart Structures (antennas and mechanical structures) Using a Novel Hybrid Optimization Technique" , Procs. of the 2006 IEEE-APS Symposium, pp.569-572, Albuquerque, NM, July 2006.
160. B.Pan, R.L.Li, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "Low-Profile Broadband and Dual-Frequency Two-Strip Planar Monopole Antennas" , Procs. of the 2006 IEEE-APS Symposium, pp.2665-2668, Albuquerque, NM, July 2006.
161. B.Pan, R.L.Li, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "A Cavity-Backed Broadband Circularly Polarized Slot/Strip Loop Antenna with a Simple Feeding Structure" , Procs. of the 2006 IEEE-APS Symposium, pp.2595-2598, Albuquerque, NM, July 2006.
162. B.Kim, S.Nikolaou, G.E.Ponchak, Y.-S.Kim, J.Papapolymerou and M.M.Tentzeris, "A Curvature CPW-fed Ultra-wideband Monopole Antenna on Liquid Crystal Polymer Substrate Using Flexible Characteristics" , Procs. of the 2006 IEEE-APS Symposium, pp.1667-1670, Albuquerque, NM, July 2006.

163. J.-H.Lee, N.Kidera, S.Pinel, J.Laskar and M.M.Tentzeris, "60 GHz High-gain Aperture-coupled Microstrip Antennas Using Soft-surface and Stacked Cavity on LTCC Multilayer Technology", Procs. of the 2006 IEEE-APS Symposium, pp.1621-1624, Albuquerque, NM, July 2006.
164. I.-K.Kim, J.-I.Kim, S.Pinel, J.Laskar, M.M.Tentzeris and J.-G.Yook, "Novel Feeding Topologies for 2nd Harmonic Suppression in Broadband Microstrip Patch Antennas" , Procs. of the 2006 IEEE-APS Symposium, pp.1483-1486, Albuquerque, NM, July 2006.
165. S.Nikolaou, D.E.Anagnostou, G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Compact Ultra Wide-Band (UWB) CPW-fed Elliptical Monopole on Liquid Crystal Polymer (LCP)" , Procs. of the 2006 IEEE-APS Symposium, pp.4657-4660, Albuquerque, NM, July 2006.
166. S.Basat, S.Bhattacharya, L.Yang, A.Rida, M.M.Tentzeris and J.Laskar, "Design of Novel High-Efficiency UHF RFID Antenna on Flexible LCP Substrate with High Read-range Capability" , Procs. of the 2006 IEEE-APS Symposium, pp.1031-1034, Albuquerque, NM, July 2006.
167. L.Yang, S.Basat and M.M.Tentzeris, "Design and Development of Novel Inductively Coupled RFID Antennas" , Procs. of the 2006 IEEE-APS Symposium, pp.1035-1038, Albuquerque, NM, July 2006.
168. A.Ferrer-Vidal, A.Rida, S.Basat, L.Yang and M.M.Tentzeris, "Integration of Sensors and RFID's on Ultra-low-cost Paper-based Substrates for Wireless Sensor Networks" , Procs. of the 2006 2nd Workshop on Wireless Mesh Networks (WiMesh 2006), pp.126-128, Washington, DC, September 2006.
169. D.Staiculescu, L.Martin and M.M.Tentzeris, "Performance capability modeling and Optimization of RF/Millimeter Wave Integrated Functions and Modules Using a Hybrid Statistical/EM Technique that Includes Process Variations", Procs. of the 2006 IEEE-EuMC Symposium, pp.474-477, Manchester, UK, September 2006.
170. J.-H.Lee, N.Kidera, S.Pinel, J.Laskar and M.M.Tentzeris, "A Compact Quasi-Elliptic Dual-Mode Cavity Filter Using LTCC Technology for V-band WLAN Gigabit Wireless Systems", Procs. of the 2006 IEEE-EuMC Symposium, pp.1377-1379, Manchester, UK, September 2006.
171. J.-H.Lee, K.Nobutaka, A.Traille, S.Pinel, J.Laskar and M.M.Tentzeris, "Advanced 3D LTCC Passive Components Using Cavity Structures for 60 GHz Gigabit Wireless Systems", Procs. of the 2006 IEEE-APMC Symposium, pp.356-359, Yokohama, JAPAN, December 2006.
172. S.Nikolaou, B.Kim, Y.-S.Kim, J.Papapolymerou and M.M.Tentzeris, "CPW-fed Ultra Wideband (UWB) Monopoles with Band Rejection Characteristic on Ultra Thin Organic Substrate", Procs. of the 2006 IEEE-APMC Symposium, pp.2010-2013, Yokohama, JAPAN, December 2006.
173. L.Yang, S.Basat, A.Rida and M.M.Tentzeris, "Design and Development of Novel Miniaturized UHF RFID tags on Ultra-low-cost Paper-based Substrates", Procs. of the 2006 IEEE-APMC Symposium, pp.1493-1496, Yokohama, JAPAN, December 2006. ***2006 IEEE-APMC Award***
174. M.M.Tentzeris, "Multilayer (3D)Wireless, RF andMillimeter-Wave Passives andModules Using SOP Technology", Procs. of the 2007 Topical Meeting on SiRF, pp.181-182, Long Beach, CA, January 2007.

175. S.Bhattacharya, M.M.Tentzeris, L.Yang, S.Basat and A.Rida, "Flexible LCP and Paper-based Substrates with Embedded Actives, Passives, and RFIDs", Procs. of the 2007 6th International Conference on Polymers and Adhesives in Microelectronics and Photonics (Polytronic 2007), pp.159-166, Tokyo, JAPAN, January 2007.
176. A.Rida, R.Vyas, T.Wu, R.L.Li and M.M.Tentzeris, "Development and Implementation of Novel UHF Paper-Based RFID Designs for Anti-counterfeiting and Security Applications", Procs. of the 2007 IEEE International Workshop on Anti-counterfeiting, Security and Identification, pp.52-56, Xiamen, CHINA, April 2007.
177. A.Rida, R.Vyas, S.Basat, A.Ferrer-Vidal, L.Yang, S.Bhattacharya and M.Tentzeris, "Paper-Based Ultra Low-Cost Integrated RFID Tags for Sensing and Tracking Applications", Procs. of the 2007 IEEE-ECTC Symposium, pp.1977-1980, San Diego, CA, May 2007.
178. S.Horst, D.E.Anagnostou, G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Beam-Shaping of Planar Array Antennas Using Integrated Attenuators", Procs. of the 2007 IEEE-ECTC Symposium, pp.165-168, San Diego, CA, May 2007.
179. A.Rida, L.Yang, R.Vyas, S.Basat, S.Bhattacharya and M.M.Tentzeris, "Novel Manufacturing Processes for Ultra Low-Cost Paper-Based RFID Tags with Enhanced "Wireless Intelligence" ", Procs. of the 2007 IEEE-ECTC Symposium, pp.773-776, San Diego, CA, May 2007.
180. S.Horst, S.Bhattacharya, M.M.Tentzeris and J.Papapolymerou, "Monolithic Low-Cost Ka-Band Wilkinson Power Dividers on Flexible Organic Substrates", Procs. of the 2007 IEEE-ECTC Symposium, pp.1851-1854, San Diego, CA, May 2007.
181. L.Yang andM.M.Tentzeris, "Design and Characterization of Novel Paper-based Inkjet-Printed RFID and Microwave Structures for Telecommunication and Sensing Applications", Procs. of the 2007 IEEE-IMS Symposium, pp.1633-1636, Honolulu, HI, June 2007. ***Third IMS 2007 Best Student Paper Award***
182. F.Placentino, D.Staiculescu, S.Nikolaou, L.Martin, A.Scarponi, F.Alimenti, L.Roselli and M.M.Tentzeris, "Concurrent Circuit-Level/System-Level Optimization of a 24GHz Mixer for Automotive Applications Using a Hybrid Electromagnetic/Statistical Technique", Procs. of the 2007 IEEE-IMS Symposium, pp.1217-1220, Honolulu, HI, June 2007.
183. Y.Li, B.Pan, M.M.Tentzeris and J.Papapolymerou, "A Fully Micromachined W-Band Coplanar Waveguide to Rectangular Waveguide Transition", Procs. of the 2007 IEEE-IMS Symposium, pp.1031-1034, Honolulu, HI, June 2007.
184. A.Rida, L.Yang and M.M.Tentzeris, "Design and Characterization of Novel Paper-based Inkjet-Printed UHF Antennas for RFID and Sensing Applications", Procs. of the 2007 IEEE-APS Symposium, pp.2749-2752, Honolulu, HI, June 2007. ***Best APS 2007 Student Paper Award***
185. D.J.Chung, D.E.Anagnostou, G.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Integration of a 4x8 Antenna Array with a Reconfigurable 2-bit Phase Shifter Using RFMEMS Switches on Multilayer Organic Substrates", Procs. of the 2007 IEEE-APS Symposium, pp.93-96, Honolulu, HI, June 2007.
186. L.Yang, A.Rida, T.Wu, S.Basat and M.M.Tentzeris, "Integration of Sensors and Inkjet-Printed RFID Tags on Paper-Based Substrates for UHF Cognitive Intelligence Applications", Procs. of the 2007 IEEE-APS Symposium, pp.1193-1196, Honolulu, HI, June 2007.

187. R.Vyas, A.Rida, S.Bhattacharya and M.M.Tentzeris, "Liquid Crystal Polymer (LCP): The Ultimate Solution for Low-Cost RF Flexible Electronics and Antennas", Procs. of the 2007 IEEE-APS Symposium, pp.1729-1732, Honolulu, HI, June 2007.
188. T.T.Thai, G.R.DeJean and M.M.Tentzeris, "Design and Development of a Novel Compact Soft-Surface Structure for the Front-to-Back Ratio Improvement and Size Reduction of Microstrip Yagi Antenna Arrays", Procs. of the 2007 IEEE-APS Symposium, pp.1381-1384, Honolulu, HI, June 2007.
189. S.Nikolaou, G.E.Ponchak, M.M.Tentzeris and J.Papapolymerou, "Compact Cactus-Shaped Ultra-Wideband (UWB) Monopole on Organic Substrate", Procs. of the 2007 IEEE-APS Symposium, pp.4637-4640, Honolulu, HI, June 2007.
190. R.L.Li, B.Pan, J.Papapolymerou, J.Laskar and M.M.Tentzeris, "Low-Profile Broadband Planar Antennas for DVB-H, DCS-1800 and IMT-2000 Applications", Procs. of the 2007 IEEE-APS Symposium, pp.4729-4732, Honolulu, HI, June 2007.
191. D.E.Anagnostou, S.Nikolaou, H.Kim, B.Kim, M.M.Tentzeris and J.Papapolymerou, "Dual Band-Notched UWB Antenna for 802.11a WLAN Environments", Procs. of the 2007 IEEE-APS Symposium, pp.4621-4624, Honolulu, HI, June 2007.
192. T.Wu, A.Traille, L.Yang, B.Pan, J.Papapolymerou and M.M.Tentzeris, "Novel Substrate-Independent Broadband Micromachined Antennas for mm-wave Cognitive Radio Applications", Procs. of the 2007 IEEE-APS Symposium, pp.5833-5836, Honolulu, HI, June 2007.
193. G.DeJean, D.Staiculescu, L.Martin, U.Onyewuchi, R.L.Li and M.M.Tentzeris, "Hybrid Statistical/Electromagnetic Optimization and Performance Capability Modeling of an LTCC Compact Soft/Hard Surface Structure", Procs. of the 2007 IEEE-APS Symposium, pp.5749-5752, Honolulu, HI, June 2007.
194. N.Tavassolian, S.Nikolaou and M.M.Tentzeris, "Microwave Tumor Detection Using a Flexible UWB Elliptical Slot Antenna with a Tuning Uneven U-shape Stub on LCP", Procs. of the 2007 IEEE-APS Symposium, pp.257-260, Honolulu, HI, June 2007.
195. J.L.Jordan, G.E.Ponchak, N.Tavassolian andM.M.Tentzeris, "Characteristics of a Linearly Tapered Slot Antenna (LTSA) Conformed Longitudinally Around a Cylinder ", Procs. of the 2007 IEEE-APS Symposium, pp.3848-3851, Honolulu, HI, June 2007.
196. C.You, W.Hwang and M.M.Tentzeris, "Impact Behavior and Radiation Performance of a Structurally Integrated Antenna Array Conformed Around Cylindrical Bodies", Procs. of the 2007 IEEE-APS Symposium, pp.3844-3847, Honolulu, HI, June 2007.
197. L.Yang and M.M.Tentzeris, "3D Multilayer Integration and Packaging on Organic/Paper Low-cost Substrates for RF and Wireless Applications", Procs. of the 2007 IEEE International Symposium on Signals, Systems and Electronics (ISSSE 2007) Digest, pp.267-270, Ottawa, CANADA, July-August 2007.
198. M.Tentzeris, L.Yang, A.Rida, A.Traille, R.Vyas and T.Wu, "Inkjet-Printed Antennas on Paper: Are they the Ultimate Solution for UHF Ubiquitous Cognitive-Intelligence RFID-enabled Applications?", Procs. 2007 International Symposium on Antennas and Propagation (ISAP 2007), pp.1011-1014, Niigata, JAPAN, August 2007. ***ISAP 2007 Poster Award***

199. A.Traille and M.M.Tentzeris, "Design and Modeling of a Novel Dual-Band Circular-Polarization Antenna for Multi-Standard/Multi-Band "Universal" RFID Readers", Procs. 2007 International Symposium on Antennas and Propagation (ISAP 2007), pp.1142-1145, Niigata, JAPAN, August 2007.
200. L.Yang, A.Rida, J.Li and M.M.Tentzeris, "Antenna Advancement Techniques and Integration of RFID Electronics on Organic Substrates for UHF RFID Applications in Automotive Sensing and Vehicle Security", Digest of the 2007 66th IEEE Vehicular Technology Conference (VTC-2007), pp.2040-2041, Baltimore, MD, September-October 2007.
201. A.Rida, L.Yang, R.Vyas, S.Bhattacharya and M.M.Tentzeris, "Integration of Sensors and Inkjet-Printed RFID Tags on Paper-Based Substrates for UHF Cognitive Intelligence Applications", Procs. of the 2007 European Microwave Conference, pp.724-727, Munich, GERMANY, October 2007.
202. A.Traille, L.Yang, A.Rida, T.Wu and M.M.Tentzeris, "Design and Modeling of Novel Multiband/Wideband Antennas for RFID Tags and Readers Using Time-/ Frequency-Domain Simulators", Proc. of the 2007 IEEE CEM-TD Symposium, pp.1-3, Perugia, ITALY, October 2007.
203. L.Martin, D.Staiculescu, H.Li, S.L.Ooi, C.P.Wong and M.M.Tentzeris, "Investigation of the Impact of Magnetic Permeability and Loss of Magnetic Composite Materials on RFID and RF Passives Miniaturization", Proc. of the 2007 IEEE CEM-TD Symposium, pp.1-4, Perugia, ITALY, October 2007.
204. R.Vyas, A.Rida, L.Yang and M.M.Tentzeris, "Design and Development of a Novel Paper-Based Inkjet-Printed FID-Enabled UHF (433.9 MHz) Sensor Node", Proc. of the 2007 IEEE APMC Symposium, Vol.II, pp.1037-1040, Bangkok, THAILAND, December 2007.
205. N.Tavassolian, S.Nikolaou and M.M.Tentzeris, "A Flexible UWB Elliptical Slot Antenna with a Tuning Uneven U-shape Stub on LCP for Microwave Tumor Detection", Proc. of the 2007 IEEE APMC Symposium, Vol.III, pp.1577-1580, Bangkok, THAILAND, December 2007.
206. S. Nikolaou, A. Amadjikpe, J. Papapolymerou and M.M.Tentzeris, "Compact Ultra Wideband (UWB) Elliptical Monopole with Potentially Reconfigurable Band Rejection Characteristic", Proc. of the 2007 IEEE APMC Symposium, Vol.III, pp.1875-1878, Bangkok, THAILAND, December 2007.
207. M.M.Tentzeris, "Novel Paper-based Inkjet-Printed Antennas and Wireless Sensor Modules", Procs. of the 2008 COMCAS International Conference, Invited Paper, Tel Aviv, ISRAEL, May 2008.
208. A.Rida, L.Yang, N.Chaisilwattana, S.Travis, S.Bhattacharya and M.Tentzeris, "3D Packaging Architecture Using Paper as a Dielectric Medium", Procs. of the 2008 IEEE-ECTC Symposium, pp.371-373, Orlando, FL, May 2008.
209. T.Thai, A.Haque, J.Ratner, M.M.Tentzeris and G.DeJean, "Development of a Fully-Integrated Ultrasensitive Wireless Sensor Utilizing Carbon Nanotubes and Surface Plasmon Theory", Procs. of the 2008 IEEE-ECTC Symposium, pp.436-439, Orlando, FL, May 2008. ***Motorola Award Finalist***
210. L.Yang, R.Vyas, A.Rida, J.Pan and M.Tentzeris, "Wearable RFID-Enabled Sensor Nodes for Biomedical Applications", Procs. of the 2008 IEEE-ECTC Symposium, pp.2156-2159, Orlando, FL, May 2008.
211. A.Traille, L.Yang, A.Rida and M.M.Tentzeris, "A Novel Liquid Antenna for Wearable Biomonitoring", Procs. of the 2008 IEEE IMS Symposium, pp.923-926, Atlanta, GA, June 2008.

212. B.Pan, Y.Li, M.M.Tentzeris and J.Papapolymerou, "A Novel Low-loss Integrated 60 GHz Cavity Filter with Source-load Coupling using Surface Micromachining Technology', Procs. of the 2008 IEEE IMS Symposium, pp.639-642, Atlanta, GA, June 2008.
213. B.McGarvey and M.M.Tentzeris, "An Efficient Method for the Coupling of a Fully-Explicit Time-Domain Solid-State Hydrodynamic simulator with FDTD EM Solvers", Procs. of the 2008 IEEE IMS Symposium, pp.49-52, Atlanta, GA, June 2008.
214. R. Vyas, A. Rida, L. Yang and M.M.Tentzeris, "Design, Integration and Characterization of a Novel Paper-based Wireless Sensor Module", Procs. of the the 2008 IEEE IMS Symposium, pp.1305-1308, Atlanta, GA, June 2008. ***Student Paper Competition Finalist***
215. L.Yang, L.Martin, D.Staiculescu, C.P.Wong and M.M.Tentzeris, "A Novel Flexible Magnetic Composite Material for RFID, Wearable RF and Bio-monitoring Applications", Procs. of the 2008 IEEE IMS Symposium, pp.963-966, Atlanta, GA, June 2008. ***Student Paper Competition Honorable Mention***
216. Y.Zhao, S.Kim, Y.Li, B.Pan, X.Wu, M.M.Tentzeris, J.Papapolymerou and M.G.Allen, "A Micromachined Airflow Sensor Based on RF Evanescent-mode Cavity Resonator", Procs. of the 2008 IEEE IMS Symposium, pp.1199-1202, Atlanta, GA, June 2008.
217. Y.Li, H.Doo, B.Pan, M.M.Tentzeris, Z.L.Zhang and J.Papapolymerou, "Novel Enhanced-Thickness Magnetic Nanoparticle Thin-Films for System-On-Chip (SOC) Wireless Applications", Procs. of the 2008 IEEE IMS Symposium, pp.97-100, Atlanta, GA, June 2008.
218. R.L.Li, B.Pan, T.Wu, J.Laskar and M.M.Tentzeris, "A Triple-band Low-Profile Planar Antenna for Wireless Applications", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008.
219. T.Wu, R.L.Li, S.Y.Eom, K.Lim, S.I.Leon, J.Laskar and M.M.Tentzeris, "A Multiband/Scalable Reconfigurable Antenna for Cognitive Radio Base Stations", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008.
220. L.Yang, L.Martin, D.Staiculescu, C.P.Wong and M.M.Tentzeris, "Design and Development of Compact Conformal RFID Antennas Utilizing Novel Flexible Magnetic Composite Materials for Wearable RF and Biomedical Applications', Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008.
221. T.T.Thai, A.Haque, G.R.DeJean and M.M.Tentzeris, "A Novel Ultrasensitive Gas Detector System Based on Carbon Nanotube Mixtures and Antenna Radiation Variation", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008.
222. R.L.Li, B.Pan, T.Wu, K.Lim, J.Laskar and M.M.Tentzeris, "A Broadband printed Dipole and a Printed Array for Base Station Applications", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008.
223. C.Kruesi and M.M.Tentzeris, " "Magic-Cube" Antenna Configurations for Ultra Compact RFID and Wireless Sensor Nodes", procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008.
224. S.Hong, H.Chunyu, K.Liu and M.M.Tentzeris, "Combination of Adaptive Modulation and Power Management for the Performance Enhancement of MIMO-OFDM Systems", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008.

*225.*A.Traille, L.Yang and M.M.Tentzeris, "A Novel Liquid Ionic Antenna for Bio-Signal Monitoring Applications", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008. ***Student Paper Competition Finalist***.

226.R.J.Vyas, A.Rida, L.Yang and M.M.Tentzeris, "Design and Development of the First Entirely paper-Based Wireless Temperature-Sensor Module", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008. ***Student Paper Competition Honorable Mention.***

227.L.Yang, L.Martin, D.Staiculescu, C.P.Wong and M.M.Tentzeris, "Design and Development of Compact Conformal RFID Antennas Utilizing Flexible Magnetic Composite Materials for Wearable and Biomedical Applications", Procs. of the 2008 IEEE APS Symposium, San Diego, CA, July 2008. ***Student Paper Competition Honorable Mention.***

228. M.M.Tentzeris and Y.Kawahara, "Novel Energy Harvesting Technologies for ICT Applications", Procs. of the 2008 SAINT Symposium, pp.373-376, Helsinki, FINLAND, August 2008.

229. L.Marcaccioli, P.Farinelli, M.M.Tentzeris, J.Papapolymerou and R.Sorrentino, "Design of a Broadband MEMS-based Reconfigurable Coupler in Ku-Band", Procs. of the 2008 European Microwave Conference (EuMW 08), Amsterdam, NETHERLANDS, September 2008.

230. A.Rida, R.Vyas, L.Yang, C.Kruesi and M.M.Tentzeris, "Low Cost Inkjet-Printing Paper-based Modules for RFID Sensing and Wireless Applications", Procs. of the 2008 European Microwave Conference (EuMW 08), Amsterdam, NETHERLANDS, September 2008.

231. L.Yang, L.Martin, D.Staiculescu, C.P.Wong and M.M.Tentzeris, "Comprehensive Study on the Impact of Dielectric and Magnetic Loss on Performance of a Novel Flexible Magnetic Composite Material", Procs. of the 2008 European Microwave Conference (EuMW 08), Amsterdam, NETHERLANDS, September 2008.

232. R.L.Li, T.Wu and M.M.Tentzeris, "A Dual-Band Unidirectional Coplanar Antenna for 2.4-5 GHz Wireless Applications', Procs. of the 2008 Asia-Pacific Microwave Conference (APMC 2008), Hong Kong, CHINA, December 2008.

233. M.M.Tentzeris, A.Traille, L.Yang, V.Lakafossis, R.Vyas, A.Rida, A.Haque and D.Staiculescu, "RFID-Enabled Biosensing Wireless Modules", Procs. of the 2009 IEEE Radio and Wireless Symposium (RWS09), pp.131-134, San Diego, CA, January 2009.

234. A.Rida, S.Nikolaou and M.M.Tentzeris, "Broadband UHF RFID/Sensor Modules for Pervasive Cognition Applications", Procs. of the 2009 European Conference on Antennas and Propagation (EuCAP 2009), pp.2344-2347, Berlin, GERMANY, April 2009.

235. Z.Konstas, A.Rida, R.Vyas, K.Katsibas, N.Uzunoglu and M.M.Tentzeris, "A Novel "Green" Inkjet-Printed Z-Shaped Monopole Antenna for RFID Applications", Procs. of the 2009 European Conference on Antennas and Propagation (EuCAP 2009), pp.2340-2343, Berlin, GERMANY, April 2009.

236. S.Hong, H.Xiong, K.Liu, Q.Chang, Q.Zhang, Y.Liu, X.He and M.M.Tentzeris, "Application of Bridge Function Sequences in Passive Beamformer", Procs.of the 2009 International Conference on Networks Security, Wireless Communications and Trusted Computing (NSWCTC 2009), Vol.1, pp.637-640, Wuhan, CHINA, April 2009.

237. T.Thai, J.Ratner, W.Chen, G.DeJean and M.M.Tentzeris, "Characterization and Testing of Novel Polarized Nanomaterial Textiles for Ultrasensitive Wireless Gas

Sensors", Procs. of the 2009 IEEE ECTC Conference, pp.1049-1052, San Diego, CA, May 2009.

238. A.Rida, A.Margomenos and M.M.Tentzeris, "Wideband mmW Compensated 90deg Bends for Grounded Coplanar Waveguide and Microstrip Transmission Lines on Flexible LCP Substrates", Procs. of the 2009 IEEE ECTC Conference, pp.2000-2003, San Diego, CA, May 2009.
239. V.Lakafosis and M.M.Tentzeris, "Implementation of Multi-hop Routing Protocols for the Dramatic Range Enhancement of Wireless Sensor Networks", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
240. A.Rida, L.Yang, T.Reynolds, E.Tan, S.Nikolaou and M.M.Tentzeris, "Inkjet-Printing UHF Antenna for RFID and Sensing Applications on Liquid Crystal Polymer", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
241. V.Lakafosis, N.Chaisilwattana, C.Kruesi, L.Yang, D.Staiculescu and M.M.Tentzeris, "Low-Cost Low-Power Small-Form-Factor Node for Health Monitoring Wireless Multi-Hop Personal Area Networks with Drastically Increased Range', Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
242. R.L.Li, T.Wu and M.M.Tentzeris, "A Triple-Band Unidirectional Coplanar Antenna for 2.4/3.5/5-GHz WLAN/WiMax Applications", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
243. T.T.Thai, G.R.DeJean and M.M.Tentzeris, "Novel Ultrasensitive Millimeter-Wave Pressure Transducer Utilizing a Si Membrane and a stacked-patch Configuration", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009. ***Second Best Student Paper Award APS 2009***
244. R.J.Vyas, V.Lakafosis, Z.Konstas and M.M.Tentzeris, "Design of a Novel, Battery-less, Solar Powered Wireless Tag for Enhanced Range Remote Tracking Applications", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009. ***Student Paper Competition Finalist APS 2009***
245. T.Thai, J.Ratner, W.Chen, T.Thivikraman, G.DeJean and M.M.Tentzeris, "First Generation of Ultrathin Polarized Nanomaterials for Millimeter-Wave (26-40 GHz) Textile Antenna Applications", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
246. Z.Konstas, K.Katsibas and M.M.Tentzeris, "A Novel "Green" Inkjet-Printed Monopole Antenna Topology for Concurrent RFID and Cellular Communications", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
247. L.Yang, D.Staiculescu, R.Zhang, C.P.Wong and M.M.Tentzeris, "A Novel "Green" Fully Integrated Ultrasensitive RFID-Enabled Gas Sensor Utilizing Inkjet-printed Antennas and Carbon Nanotubes", Procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
248. T.Wu, R.L.Li and M.M.Tentzeris, "A Mechanically Stable, Low Profile, Omni-Directional Solar-Cell Integrated Antenna for Outdoor Wireless Sensor Nodes", procs. of the 2009 IEEE APS Symposium, Charleston, SC, May 2009.
249. A.Rida, A.Margomenos, T.Wu and M.M.Tentzeris, "Novel wideband 3D Transitions on Liquid Crystal Polymer for Millimeter-wave Applications up to 100 GHz", Procs. of the 2009 IEEE IMS Symposium, pp.953-956, Boston, MA, June 2009.

250. T.T.Thai, G.R.DeJean and M.M.Tentzeris, "A Novel Front-End Radio Frequency Pressure Transducer based on a Dual-Band Resonator for Wireless Sensing", procs. of the 2009 IEEE IMS Symposium, pp.1701-1704, Boston, MA, June 2009.
251. R.Vyas, V.Lakafosis, T.Wu, Y.Kawahara and M.M.Tentzeris, "Near-Perpetual Operated Solar and RF Powered Autonomous Sensing Systems", Procs. of the 2009 IEEE IMS Symposium, pp.2240-2243, Boston, MA, June 2009.
252. J.Dowling, M.M.Tentzeris and N.Beckett, "RFID-Enabled Temperature Sensing Devices: a Major Step Forward for Energy Efficiency in Home and Industrial Applications?", Procs. of the 2009 IEEE MTT-S International workshop on Wireless Sensing, Local Positioning and RFID (IMWS 2009), pp.1-4, Croatia, September 2009.
253. R.Vyas, V.Lakafosis, Z.Konstas and M.M.Tentzeris, "Design and Characterization of a Novel Battery-less, Solar Powered Wireless Tag for Enhanced-Range Remote Tracking Applications", Procs. of the 2009 European Microwave Conference (EuMC 2009), pp.169-172, Rome, ITALY, September 2009.
254. J.Choo, J.Ryoo, J.Hong, H.Jeon, C.Choi and M.M.Tentzeris, "T-Maching Networks for the Efficient Matching of Practical RFID Tags", Procs. of the 2009 European Microwave Conference (EuMC 2009), pp.5-8, Rome, ITALY, September 2009.
255. A.Rida, F.Nasri, A.Margomenos and M.M.Tentzeris, "Integration of Novel mm-Wave Components on Flexible Organic Substrates for Automotive Radar Applications", Procs. of the 2009 European Microwave Conference (EuMC 2009), pp.1327-1330, Rome, ITALY, September 2009. **Best Student Paper Finalist**
256. A.Traille, L.Yang, A.Rida, V.Lakafosis and M.M.Tentzeris, "Novel Miniaturized Antennas for RFID-enabled Sensors", Procs. of IEEE Sensors 2009, Christchurch, NEW ZEALAND, October 2009.
257. M.M.Tentzeris, "Organic and Ceramic SoP Solutions and Modules for mmW Applications", Procs. of the 2009 IEEE International Symposium on Radio-Frequency Integration Technology (RFIT 2009), pp.166-169, Invited Presentation, Singapore, SINGAPORE, December 2009.
258. J.Dowling and M.M.Tentzeris, " "Smart House" and "Smart Energy" Applications of Low-Power RFID-based Wireless Sensors", Procs. of the 2009 APMC Conference, pp.2412-2415, Singapore, SINGAPORE, December 2009.
259. M.M.Tentzeris, "Inkjet-Printed Paper-Based RFID and Nanotechnology-Based Ultrasensitive Sensors: The "Green" Ultimate Solution for an Ever Improving Life Quality and Safety?", Procs. 2010 IEEE Radio and Wireless Symposium (RWS), pp.120-123, New Orleans, LA, January 2010.
260. V.Lakafosis, R.Vyas and M.M.Tentzeris, "A Localization and Position Tracking Solution utilizing Solar-Powered RFID Tags", Procs. of the 2010 European Conference on Antennas and Propagation (EuCAP), Barcelona, SPAIN, April 2010.
261. T.Trang, A.Haque, J.Ratner, G.R.DeJean and M.M.Tentzeris, "Remote Sensing Structures Based on Surface Plasmon Resonances and Carbon Nanotubes", Procs. of the 2010 European Conference on Antennas and Propagation (EuCAP), Barcelona, SPAIN, April 2010.

262. A.Rida, G.Shaker, E.Tan, S.Nikolaou and M.M.Tentzeris, "Design, Integration and Packaging of a Wireless Module for Location Finding and Healthcare Applications", Procs. of the 2010 European Conference on Antennas and Propagation (EuCAP), Barcelona, SPAIN, April 2010.
263. Z.Konstas, A.Traille, K.Katsibas and M.M.Tentzeris, "A Novel Green Multi-Antenna Topology for Concurrent 4G Cellular and RFID-Enabled Wireless Sensor Data Bundling", Procs. of the 2010 European Conference on Antennas and Propagation (EuCAP), Barcelona, SPAIN, April 2010.
264. G.Orecchini, R.Zhang, J.Agar, D.Staiculescu, M.M.Tentzeris, L.Roselli and C.P.Wong, "Inkjet Printed Organic Transistors for Sustainable Electronics", Procs. of the IEEE 2010 Electronic Components and Technology Conference (ECTC), pp.985-989, Las Vegas, NV, May 2010.
265. M.M.Tentzeris, R.Vyas, V.Lakafosis, A.Traille, A.Rida and G.Shaker, "Inkjet-Printed System-on-Paper/Polymer "Green" RFID and Wireless Sensors", Procs. of the IEEE 2010 Electronic Components and Technology Conference (ECTC10), pp.1552-1555, Las Vegas, NV, May 2010. ***Best Session Paper Award***
266. V.Mukala, V.Lakafosis, A.Traille and M.M.Tentzeris, "A Novel Zigbee-based Low-cost Low-power Wireless EKG System", Procs. of the 2010 IMS Symposium, pp.624-627, Anaheim, CA, June 2010.
267. V.Lakafosis, A.Traille, H.Lee, G.Orecchini, E.Gebara, M.M.Tentzeris, J.Laskar, G.DeJean, D.Kirovski, "An RFID System with Enhanced Hardware-Enabled Authentication and Anti-counterfeiting Capabilities", Procs. of the 2010 IMS Symposium, pp.840-843, Anaheim, CA, June 2010.
268. T.T.Thai, M.Jatlaoui, P.Pons, H.Aubert, M.M.Tentzeris, G.R.DeJean and R.Plana, "A Novel Passive Wireless Ultrasensitive RF Temperature Transducer for Remote Sensing", Procs. of the 2010 IMS Symposium, pp.473-476, Anaheim, CA, June 2010.
269. R.Vyas, V.Lakafosis and M.Tentzeris, "Wireless Remote Localization System Utilizing Ambient RF/Solar Power Scavenging RFID Tags", Procs. of the 2010 IMS Symposium, pp.1764-1767, Anaheim, CA, June 2010.
270. L.Yang, G.Orecchini, G.Shaker, H.Lee and M.M.Tentzeris, "Battery-free RFID-enabled Wireless Sensor Nodes", Procs. of the 2010 IMS Symposium, pp.1528-1531, Anaheim, CA, June 2010.
271. F.Alimenti, V.Palazzari, G.Orecchini, G.Pinca, P.Mezzanotte, M.M.Tentzeris and L.Roselli, "Crossed Dipole Frequency Doubling RFIDTag Based on Paper Substrate and Inkjet Printing Technology", Procs. of the 2010 IMS Symposium, pp.840-842, Anaheim, CA, June 2010.
272. F.Alimenti, M.Virili, P.Mezzanotte, V.Palazzari, M.M.Tentzeris and L.Roselli, "Low-Cost Assembly of UHF RFID Chips and Flexible Substrate Antennas by Magnetic Coupling Approach", Procs. of the 2010 IMS Symposium, pp.1532-1535, Anaheim, CA, June 2010.
273. X.Zhang, V.Lakafosis, A.Traille and M.M.Tentzeris, "Performance Analysis of "fast moving" RFID Tags in State-of-the-Art High-Speed Railway Systems", Procs. of the 2010 IEEE International Conference on RFID Technology and Applications (RFID-TA), pp.281-285, Guangzhou, June 2010.
274. R.Vyas, V.Lakafosis and M.Tentzeris, "Enabling Localization in WSN's with Solar-Powered End Devices", Procs. of the 2010 IEEE International Conference

on Sensor Networks, Ubiquitous and Trustworthy Computing (SUTC), pp.155-160, CA, June 2010.
275. G.Shaker, M.Tentzeris and S.Safavi-Naeini, "Low-cost Antennas for mm-Wave Sensing Applications Using Inkjet Printing of Silver nanoparticles on Liquid Crystal Polymers", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
276. V.Mukala, A.N.Traille, V.Lakafosis and M.M.Tentzeris, "Design and Development of a Novel Wireless EKG System Utilizing Low-Power Zigbee Standard", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
277. G.Orecchini, L.Yang, M.M.Tentzeris and L.Roselli, "High Directivity Passive UHF RFID Tag with Dual Radiating-Body Antenna", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
278. X.Zhou, R.L.Li and M.M.Tentzeris, "A Compact Broadband MIMO Antenna for Mobile Handset Applications", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
279. R.Hasse, K.Naishadham, W.Hunsicker, M.M.Tentzeris and T.Wu, "Full-Wave Analysis of a Dual-Frequency Printed Slot Antenna with Microstrip Feed", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
280. M.Y.Lai, R.L.Li and M.M.Tentzeris, "Low-Profile Broadband RFID Tag Antennas Mountable on Metallic Objects", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
281. T.T.Thai, F.Chebila, J.M.Mehdi, P.Pons, H.Aubert, G.R.DeJean, M.M.Tentzeris and R.Plana, " A Novel Passive Ultrasensitive RF Temperature Transducer for Remote Sensing and Identification Utilizing Radar Cross Section Variability", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
282. A.Rida, R.L.Li, P.Schmalenberg, J.S.Lee and M.M.Tentzeris, "Proximity Coupled Fed Antenna Arrays on LCP for mm-wave Applications", Procs. of the 2010 IEEE APS Symposium, Toronto, CANADA, July 2010.
283. G.Shaker, H.Lee, K.Duncan and M.Tentzeris, "Integrated Antenna with Inkjet-Printed Compact Artificial Magnetic Surface for UHF Applications", Procs. of the 2010 IEEE International Conference on Wireless Information Technology and Systems (ICWITS), Honolulu, HI, September 2010.
284. T.T.Thai, F.Chebila, J.M.Mehdi, P.Pons, H.Aubert, G.R.DeJean, M.M.Tentzeris and R.Plana, "Design and Development of a Millimetre-Wave Novel Passive Ultrasensitive Temperature Transducer for Remote Sensing and Identification", Procs. of the 2010 European Microwave Conference (EuMC), pp.45-48, Paris, FRANCE, October 2010.
285. A.Takacs, A.Coustou, H.Aubert and M.M.Tentzeris, " Electromagnetic Analysis of the Near-Field Coupling between an RFID Tag and Harness for Aeronautical Applications", Procs. PIERS 2011, Marrakech, MOROCCO, March 2011.
286. M.M.Tentzeris, A.Traille, H.Lee, R.Vyas, V.Lakafosis and A.Rida, "Inkjet-Printed Paper/Polymer-based "Green" RFID and Wireless Sensor Nodes", Procs. PIERS 2011, Marrakech, MOROCCO, March 2011.
287. V.Lakafosis, A.Traille, H.Lee, E.Gebara, M.M.Tentzeris, G.DeJean and D.Kirovski, "RFID-CoA: The RFID Tags as Certificates of Authenticity", Procs. Of the 2011 IEEE International Conference on RFID, pp.207-214, Orlando, FL, April 2011.

288. M.Marroncelli, D.Trinchero, V.Lakafosis and M.M.Tentzeris, Procs. Of the 2011 IEEE International Conference on RFID, pp.6-10, Orlando, FL, April 2011.
289. G.Shaker, A.Rida, S.Safavi-Naeini, M.M.Tentzeris and S.Nikolaou, "Inkjet Printing of UWB Antennas on Paper-Based Substrates", Procs. Of the 5th European Conference on Antennas and Propagation (EuCAP 2011), pp.3001-3004, Roma, ITALY, April 2011.
290. G.DeJean, V.Lakafosis, A.Traille, H.Lee, E.Gebara, M.M.Tentzeris and D.Kirovski, "RFDNA: A Wireless Authentication System on Flexible Substrates", Procs. Of the 2011 IEEE 61st Electronic Components and Technology Conference (ECTC), pp.1332-1337, Lake Buena Vista, FL, June 2011. ***Listed among the top-20 academic collaboration projects of Microsoft Research[add link].***
291. A.Traille and M.M.Tentzeris, "MultiResolution Time-Domain and Level-Set Techniques for Multi-Domain / Multi-Physics / Multi-Phase Simulations", Procs. Of the 2011 IEEE International Microwave Symposium (IMS), Baltimore, MD, June 2011.
292. T.T.Thai, H.Aubert, P.Pons, M.M.Tentzeris and R.Plana, "Design of a Highly Sensitive Wireless Passive RF Strain Transducer", Procs. of the 2011 IEEE International Microwave Symposium (IMS), Baltimore, MD, June 2011.
293. G.Orecchini, L.Yang, M.M.Tentzeris and L.Roselli, "Wearable Battery-free Active Paper-Printed RFID Tag with Human Energy Scavenger", Procs. Of the 2011 IEEE International Microwave Symposium (IMS), Baltimore, MD, June 2011. ***Best Student Paper Competition Finalist IMS 2011***
294. C.Occhiuzzi, A.Rida, G.Marrocco and M.M.Tentzeris, "CNT-Based RFID Passive Gas Sensor", Procs. Of the 2011 IEEE International Microwave Symposium (IMS), Baltimore, MD, June 2011.
295. R.DePaolis, S.Pacchini, F.Coccetti, G.Monti, L.Tarricone, M.M.Tentzeris and R.Plana, "Circuit Model of Carbon-Nanotube Inks for Microelectronic and Microwave Tunable Devices", Procs. Of the 2011 IEEE International Microwave Symposium (IMS), Baltimore, MD, June 2011.
296. R.Vyas, V.Lakafosis, M.M.Tentzeris, H.Nishimoto and Y.Kawahara, "A Battery-less Wireless Mote for Scavenging Wireless Power at UHF (470-570 MHz) Frequencies", Procs. Of the 2011 IEEE Antenna and Propagation Symposium, Spokane, WA, July 2011. ***Listed in CBS, NSF Homepage, MSNBC, CNN, Discovery Channel, IEEE The Institute and 500+ top High-Tech sites as one of the major technical inventions of the year***
297. C.Occhiuzzi, A.Rida, G.Marrocco and M.M.Tentzeris, "Passive Ammonia Sensor: RFID Tag Integrating Carbon Nanotubes", Procs. Of the 2011 IEEE Antenna and Propagation Symposium, Spokane, WA, July 2011.
298. G.Orecchini, L.Yang, M.M.Tentzeris and L.Roselli, " "Smart Shoe": An Autonomous Inkjet-Printed RFID System Scavenging Walking Energy", Procs. Of the 2011 IEEE Antenna and Propagation Symposium, Spokane, WA, July 2011.
299. H.Lee, G.Shaker, K.Naishadham and M.M.Tentzeris, "A Novel Highly-Sensitive Antenna-based "Smart Skin" Gas Sensor Utilizing Carbon Nanotubes and Inkjet Printing", Procs. Of the 2011 IEEE Antenna and Propagation Symposium, Spokane, WA, July 2011. ***Best Student Paper Competition Honorable Mention APS 2011***

300. X.Quan, R.L.Li and M.M.Tentzeris, "A Novel Broadband Omni-Directional Circularly Polarized Antenna for Mobile Communications", Procs. Of the 2011 IEEE Antenna and Propagation Symposium, Spokane, WA, July 2011. ***Best Student Paper Competition Honorable Mention APS 2011.***

301. T.Zhang, M.M.Tentzeris and R.L.Li, "A Dual-Frequency Broadband Antenna for Mobile Phone Applications", Procs. Of the 2011 IEEE Antenna and Propagation Symposium, Spokane, WA, July 2011.

302. A.Rida, S.Nikolaou and M.M.Tentzeris, "Design of Low-Cost Microstrip Antenna Arrays for mm-Wave Applications", Procs. Of the 2011 IEEE Antenna and Propagation Symposium, Spokane, WA, July 2011.

303. M.Marroncelli, D.Trinchero and M.M.Tentzeris, " Paper-Based Inkjet-Printed Text-Meandered UHF Resonant Antennas for RFID's", Procs. Of the 2011 URSI General Assembly, Istanbul, TURKEY, August 2011.

304. A.Traille and M.M.Tentzeris, "Liquid RF Antennas, Electronics and Sensors: A Modeling Challenge", Procs. Of the 2011 URSI General Assembly, Istanbul, TURKEY, August 2011. ***National Academy of Engineering (NAE) Travel Grant Award.***

305. S.Beck, S.T.Kim, K.Lim, M.M.Tentzeris, "A Multi-Band WCDMA SAW-less Receiver with a Frequency Selective Feedback Loop", Procs. 54th International Midwest Symposium on Circuits and Systems (MWSCAS), Seoul, KOREA, August 2011..

306. A.Rida, V.Lakafosis, R.Vyas, M.M.Tentzeris and S.Nikolaou, "Review of Technologies for Low-Cost Integrated Sensors", Procs. 2011 IEEE International Conference on RFID Technologies and Applications (RFID-TA), pp.513-520, Barcelona, SPAIN, September 2011.

307. X.Yi, T.Wu, G.Lantz, J.Cooper, C.Cho, Y.Wang, M.M.Tentzeris and R.T.Leon, "Sensing Resolution and Measurement Range of a Passive Wireless Strain Sensor", Procs. 8th International Workshop on Structural Health Monitoring, Stanford, CA, September 2011. ***Best Student Paper Award***

308. A.Traille, S.Bouaziz, H.Aubert, P.Pons and M.M.Tentzeris, "A Novel Wireless Passive Temperature Sensor Utilizing Microfluidic Principles in Millimeter-Wave Frequencies", Procs. IEEE Sensors 2011 Conference, pp.524-525, Limerick, IRELAND, October 2011.

309. V.Lakafosis, X.Yi, T.Le, E.Gebara, Y.Wang and M.M.Tentzeris, " Wireless Sensing with Smart Skins", Invited Paper to the IEEE Sensors 2011 Conference, pp.623-626, Limerick, IRELAND, October 2011.

310. T.T.Thai, H.Aubert, P.Pons, R.Plana and M.M.Tentzeris, "A Newly Developed Radio Frequency Wireless Passive Highly Sensitive Strain Transducer", Procs. IEEE Sensors 2011 Conference, pp.211-214, Limerick, IRELAND, October 2011.

311. A.Traille, S.Bouaziz, S.Pinon, P.Pons, H.Aubert, M.M.Tentzeris and A.Boukabache, "A Wireless Temperature Sensor Using Liquid Metal and Microfluidic Technologies", Procs. European Microwave Week 2011, Manchester, UK, October 2011.

312. G.Shaker, H.Lee, S.Safavi-Naeini and M.M.Tentzeris, "Printed Electronics for Next Generation Wireless Devices", Procs. 2011 Antennas and Propagation Conference (LAPC 2011), Loughborough, UK, November 2011.

313. F.Ciuppi, A.Georgiadis, S.Via, A.Collado, R.Vyas, M.M.Tentzeris and M.Bozzi, "A 927 MHz Solar Powered Active Antenna Oscillator Beacon Signal

Generator", Procs. 2012 IEEE Conference on Wireless Sensors and Sensor Networks (WiSNeT 2012), Santa Clara, CA, January 2012. ***Best Student Paper Award Finalist***

314. Le, Taoran; Lakafosis, Vasileios; Lin, Ziyin; Wong, C. P.; Tentzeris, M. M.; , "Inkjet-printed graphene-based wireless gas sensor modules," Procs. 2012 IEEE Electronic Components and Technology Conference (ECTC), pp.1003-1007, June 2012, San Diego, CA.

315. A.Georgiadis, A.Collado, S.Kim, H.Lee and M.M.Tentzeris, "UHF solar powered active oscillator antenna on low cost flexible substrate for wireless identification applications", Procs. 2012 IEEE International Microwave Symposium, pp.1-3, June 2012, Montreal, CANADA.

316. H.Lee, S.Kim, D.De Donno and M.M.Tentzeris, "A novel "Universal" inkjet-printed EBG-backed flexible RFID for rugged on-body and metal mounted applications", Procs. 2012 IEEE International Microwave Symposium, pp.1-3, June 2012, Montreal CANADA. ***Best Student Paper Finalist***

317. R.Vyas, H.Nishimoto, M.M.Tentzeris, Y.Kawahara and T.Asami, "A battery-less, energy harvesting device for long range scavenging of wireless power from terrestrial TV broadcasts", Procs. 2012 IEEE Internatinal Microwave Symposium , pp.1-3, June 2012, Montreal, CANADA. ***Best Student Paper Finalist***

318. S.Kim, M.M.Tentzeris, G.Jin, S.Nikolaou, ``Inkjet Printed Ultra Wideband Spiral Antenna Using Integrated Balun on Liquid Crystal Polymer (LCP)", Procs. 2012 IEEE International Symposium on Antennas and Propagation, pp.1-2, July 2012, Chicago, IL.

319. H.Lee, F.Bush, M.M.Tentzeris and G.Shaker, ``Inkjet-Printed Cylindrical EBG for Low-Cost Omnidirectional Antennas Using Split-Ring Resonators", Procs. 2012 IEEE International Symposium on Antennas and Propagation, pp.1-2, July 2012, Chicago, IL.

320. H.Lee, M.M.Tentzeris and J.Geiger, ``Flexible Spiral Antenna with Microstrip Tapered Infinite Balun for Wearable Applications", Procs. 2012 IEEE International Symposium on Antennas and Propagation, pp.1-2, July 2012, Chicago, IL.

321. S.Kim, M.M.Tentzeris, S.Nikolaou, ``Wearable Biomonitoring Monople Antennas Using Inkjet Printed Electromagnetic Band gap Structures", Procs. 2012 IEEE International Symposium on Antennas and Propagation, pp.1-2, July 2012, Chicago, IL.

322. S.Palacios, S.Kim, S.Elia, A.Rida, M.M.Tentzeris and S.Nikolaou, ``Inkjet-Printed Planar Antenna for a Wireless Sensor on Paper Operating at WiFi Frequencies", Procs. 2012 IEEE International Symposium on Antennas and Propagation, pp.1-2, July 2012, Chicago, IL.

323. D.DeDonno, L.Tarricone, V.Lakafosis and M.M.Tentzeris, ``Multipacket Reception MAC Schemes for the RFID EPC Gen2 Protocol", Procs. 2012 International Symposium on Wireless Communication Systems (ISWCS), pp.311-315, August 2012, Paris, FRANCE.

324. H.Lee, M.M.Tentzeris, Y.Kawahara and A.Georgiadis, ``Novel Inkjet-Printed Ferromagnetic-Based Solutions for Miniaturized Wireless Power Transfer (WPT) Inductors and Antennas", Procs.2012 International Symposium on Antennas and Propagation (ISAP), pp.14-17, October 2012, JAPAN.

325. T.Le, V.Lakafosis, Z.Lin, M.M.Tentzeris and C.P.Wong, "A Novel Graphene-Based Inkjet-Printed WISP-Enabled Gas Sensor", Procs. 2012 European Microwave Conference, Amsterdam, NETHERLANDS, November 2012. ***Listed among Best Conference Papers.***

326. R.Moro, M.Bozzi, S.Kim and M.M.Tentzeris, "Substrate Integrated Waveguide Components in Paper-Based Inkjet-Printed Technologies", Procs. 2012 European Microwave Conference, Amsterdam, NETHERLANDS, November 2012. ***Listed among Best Conference Papers.***

327. R.Shigeta, T.Sasaki, D.M.Quan, Y.Kawahara, R.Vyas, M.Tentzeris and T.Asami, "Ambient RF Energy Harvesting Sensor Node with Capacitor-Leakage-Aware Duty Cycle Control", Procs. 2012 IEEE Sensors Conference, Taipei, TAIWAN, November 2012. ***Second Best Paper Award Prize***

328. T.Le, T.Thai, V.Lakafosis, M.Tentzeris, Z.Lin, Y.Fang, K.Sandhage, C.P.Wong, ``Graphene-Enhanced Wireless Sensors", Procs. 2012 IEEE Sensors Conference, pp.1-4, Taipei, TAIWAN, November 2012.

329. J.R.Cooper and M.M.Tentzeris, ``Novel "Smart-Cube" Wireless Sensors with Embedded Processing/Communication/Power Core for "Smart Skin" Applications", Procs. 2012 IEEE Sensors Conference, pp.1-4, Taipei, TAIWAN, November 2012.

330. J.Virkki, J.Virtanen, L.Sydanheimo, L.Ukkonen and M.Tentzeris, ``Embedding Inkjet-Printed Antennas into Plywood Structures for Identification and Sensing", Procs. 2012 IEEE International Conference on RFID Technologies and Applications (RFID-TA), pp.34-39, Nice, FRANCE, November 2012.

331. H.Aubert, F.Chebila, M.Jatlaoui, T.Thai, H.Hallil, A.Traille, S.Bouaziz, A.Rifai, P.Pons, P.Menini and M.Tentzeris, ``Wireless Sensing and Identification of Passive Electromagnetic Sensors based on Millimeter-Wave FMCW Radar", Procs. 2012 IEEE International Conference on RFID Technologies and Applications (RFID-TA), pp.398-403, Nice, FRANCE, November 2012.

332. L.Aluigi, T.T.Thai, M.M.Tentzeris, L.Roselli, F.Alimenti, ``Heterogeneous Integration of Flexible Substrate Spiral Antennas and Silicon Chips by Magnetic Coupling", Procs. 2012 Asia-Pacific Microwave Conference, pp.848-850, TAIWAN, December 2012.

333. C.Mariotti, V.Lakafosis, M.M.Tentzeris and L.Roselli, ``An IPv6-enabled Wireless Shoe-Mounted Platform for Health Monitoring", Procs. 2013 IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet), pp.46-48, Austin, TX, January 2013. Invited Paper

334. L.Aluigi, T.T.Trang, M.M.Tentzeris, L.Roselli and F.Alimenti, ``Chip-to-Package Wireless Power Transfer and its Application to mm-Wave Antennas and Monolithic Radiometric Receivers", Procs. 2013 IEEE Radio and Wireless Symposium (RWS), pp.202-204, Austin, TX, January 2013.

335. Y.Kawahara, W.Wei, Y.Narusue, R.Shigeta, T.Asami and M.M.Tentzeris, ``Virtualizing Power Cords by Wireless Power Transmission and Energy Harvesting", Procs. 2013 IEEE Radio and Wireless Symposium (RWS), pp.37-39, Austin, TX, January 2013.

336. T.Bjorninen, J.Virkki, J.Virtanen, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, ``Inkjet-Printing and Performance Evaluation of UHF RFID Tag Antennas on Renewable Materials with Porous Surfaces", Procs. 2013 European Conference on Antennas and Propagation (EuCAP), pp.1721-1725, SWEDEN, March 2013.
337. H.Aubert, P.Pons and M.M.Tentzeris, ``Wireless Remote Sensing Based on Radar Cross Section Variability Measurement of Passive Electromagnetic Sensors", Procs. 2013 European Conference on Antennas and Propagation (EuCAP), pp.1714-1717, SWEDEN, March 2013.
338. S.Kim, R.Moro, M.Bozzi, S.Nikolaou and M.M.Tentzeris, ``Inkjet-Printed Wearable Microwave Components for Biomedical Applications", Procs. 2013 European Conference on Antennas and Propagation (EuCAP), pp.1714-1717, SWEDEN, March 2013.
339. O.Jonah, S.V.Georgakopoulos and M.M.Tentzeris, ``Wireless Power Transfer to Mobile Wearable Devices via Magnetic Resonance", Procs. 2013 IEEE Wireless and Microwave Technology Conference (WAMICON), pp.1714-1717, Orlando, FL, April 2013.
340. A.Vena, E.Moradi, K.Koski, A.A.Babar, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, ``Design and Realization of Stretchable Sewn Chipless RFID Tags and Sensors for Wearable Applications", Procs. 2013 IEEE International Conference on RFID, pp.176-183, Orlando, FL, pp.176-183, April 2013.
341. O.Jonah, S.V.Georgakopoulos and M.M.Tentzeris, ``Orientation-Insensitive Power Transfer by Magnetic Resonance in Mobile Devices", Procs. 2013 IEEE Wireless Power Transfer Conference (WPTC), pp., Perugia, ITALY, May 2013. ***Second Best Paper Award***
342. T.Le, Z.Lin, C.P.Wong and M.M.Tentzeris, ``Novel Enhancement Techniques for Ultra-High-Performance Conformal Wireless Sensors and "Smart Skins" Utilizing Inkjet-Printed Graphene", Procs. 2013 IEEE Conference on Electronic Components and Technology (ECTC), pp.1640-1643, Las Vegas, NV, May 2013.
343. B.S.Cook, J.R.Cooper, S.Kim and M.M.Tentzeris, ``A Novel Inkjet-Printed Passive Microfluidic RFID-Based Sensing Platform", Procs. 2013 IEEE International Microwave Symposium (IMS), pp., Seattle, WA, June 2013.
344. S.Kim, B.Cook, J.Cooper, A.Traille, A.Georgiadis, H.Aubert and M.M.Tentzeris, ``A Novel Dual-Band Retrodirective Reflector Array on Paper Utilizing Substrate Integrated Waveguide (SIW) and Inkjet Printing Technologies for Chipless RFID Tag and Sensor Applications", Procs. 2013 IEEE International Microwave Symposium (IMS), pp., Seattle, WA, June 2013.
345. R.Vyas, B.Cook, Y.Kawahara and M.M.Tentzeris, ``A Self-sustaining Autonomous Wireless Sensor Beacon Powered from Long-Range Ambient RF Energy", Procs. 2013 IEEE International Microwave Symposium (IMS), pp., Seattle, WA, June 2013.
346. R.De Paolis, T.Le, F.Coccetti, G.Monti, L.Tarricone and M.M.Tentzeris, ``A Novel Circuit Model of Nanotechnology-Enabled Inkjet-Printed Gas Sensors Using Multi-Wall Carbon Nanotubes", Procs. 2013 IEEE International Microwave Symposium (IMS), pp., Seattle, WA, June 2013.
347. S.Kim, Y.Kawahara, A.Georgiadis, A.Collado and M.M.Tentzeris, ``Low-Cost Inkjet-Printed Fully Passive RFID Tags Using Metamaterial-inspired Antennas for Capacitive Sensing Applications", Procs. 2013 IEEE International Microwave Symposium (IMS), pp., Seattle, WA, June 2013.

348. A.Rifai, E.Debourg, S.Bouaziz, A.Traille, P.Pons, H.Aubert and M.M.Tentzeris, ``Wireless Chipless Passive Microfluidic Temperature Sensor", Procs. 2013 International Conference on Transducers and Eurosensors, pp.1024-1027, Barcelona, SPAIN, June 2013.
349. W.Su, B.Cook, M.Tentzeris, C.Mariotti and L.Roselli, "A Novel Inkjet-Printed Microfluidic Tunable Coplanar Patch Antenna", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.858-859, Memphis, TN, July 2014.
350. P.Pons, H.Aubert and M.Tentzeris, "Overview of electromagnetic transducers with radar interrogation for passive wireless sensors applications", Procs. 2014 20th International Conference on Microwaves, Radar, and Wireless Communication (MIKON), pp.1-3, Gdansk, POLAND, June 2014.
351. S.Yao, X.Liu, S.V.Georgakopoulos and M.M.Tentzeris, "A novel reconfigurable origami spring antenna", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.374-375, Memphis, TN, July 2014.
352. A.Traille, S.Kim, A.Coustou, H.Aubert and M.M.Tentzeris, "A conformal/rollable monolithic miniaturized ultra-portable ground penetrating radar using additive and inkjet printing", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
353. A.Traille, A.Coustou, H.Aubert, S.Kim, J.Kimionis, M.M.Tentzeris, A.Georgiadis, A.Collado, "Novel Inkjet Printed Modules for Sensing, Radar and Energy Harvesting Applications", Procs. 2014 44th European Microwave Conference (EuMC), pp.1-4, Paris, FRANCE, October 2014.
354. S.Jang, S.Kim and M.M.Tentzeris, "Low-cost flexible RFID tag for on-metal applications", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.1298-1299, Memphis, TN, July 2014.
355. S.Yao, S.V.Georgakopoulos, B.Cook and M.M.Tentzeris, "A novel reconfigurable origami accordion antenna", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
356. X.Liu, S.Yao, S.V.Georgakopoulos, B.S.Cook and M.M.Tentzeris, "Reconfigurable helical antenna based on an origami structure for wireless communication system", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
357. C.Mariotti, L.Aluigi, T.T.Thai, F.Alimenti, L.Roselli and M.M.Tentzeris, "A fully inkjet-printed 3D transformer balun for conformal and rollable microwave applications", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.330-331, Memphis, TN, July 2014.
358. S.Kim, H.Aubert and M.M.Tentzeris, "An inkjet-printed flexible broadband coupler in substrate integrated waveguide (SIW) technology for sensing, RFID and communication applications", Procs. 2014 IEEE MTT-S Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
359. D.Daerhan, O.Jonah, H.Hu, S.V.Georgakopoulos and M.M.Tentzeris, "Novel highly-efficient and misalignment insensitive wireless power transfer systems utilizing Strongly Coupled Magnetic Resonance principles", Procs. 2014 IEEE 64th Electronic Components and Technology Conference (ECTC), pp.759-762, Orlando, FL, May 2014.
360. S.Kim, T.Le, M.M.Tentzeris, A.Harrabi, A.Collado and A.Georgiadis, "An RFID-enabled inkjet-printed soil moisture sensor on paper for “smart” agricultural

applications", Procs. 2014 IEEE Sensors Conference, pp.1507-1510, Valencia, SPAIN, November 2014.

361. J.Bito, B.Tehrani, B.Cook and M.Tentzeris, "Fully inkjet-printed multilayer microstrip patch antenna for Ku-band applications", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.854-855, Memphis, TN, July 2014.
362. R.J.Vyas, J.Bito, S.Kim and M.M.Tentzeris, "Harvesting wireless signals from two-way talk-radios to power smart meters and displays", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
363. H.Saghlatoon, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, "Optimized RF/ microwave antennas and circuits on low-cost fibrous substrates using inkjet-printing technology", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.322-323, Memphis, TN, July 2014.
364. M.Yoo, S.Lim and M.Tentzeris, "Flexible inkjet-printed metamaterial paper absorber", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.2060-2061, Memphis, TN, July 2014.
365. J.Kimionis, M.M.Tentzeris and S.Nikolaou, "Inkjet-printed UHF RFID folded dipole antennas for remote sensing applications", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.332-333, Memphis, TN, July 2014.
366. A.Traille, A.Coustou, H.Aubert, S.Kim and M.M.Tentzeris, "A Technology for fully printable and rollable ground penetrating radar (GPR) systems", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.334-335, Memphis, TN, July 2014.
367. J.Kimionis, A.Georgiadis, S.Kim, A.Collado, K.Niotaki and M.M.Tentzeris, "An enhanced-range RFID tag using an ambient energy powered reflection amplifier", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
368. Y.-H.Di, X.-Y.Liu and M.M.Tentzeris, "A conformable dual-band antenna equipped with AMC for WBAN applications", Procs. 2014 3rd Asia-Paciic Conference on Antennas and Propagation (APCAP), pp.388-391, Harbin, CHINA, July 2014.
369. X.Liu, S.Yao, S.V.Georgakopoulos and M.Tentzeris, "Origami Quadrifilar Helix Antenna in UHF band", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.372-373, Memphis, TN, July 2014..
370. J.Bito, S.Kim, M.Tentzeris and S.Nikolaou, "Ambient energy harvesting from 2-way talk-radio signals for "smart" meter and display applications", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.1353-1354, Memphis, TN, July 2014.
371. M.Hasani, A.Vena, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, "A novel RFID-enabled strain sensor using the double power measurement technique", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
372. B.Tehrani, B.Cook, J.Cooper and M.Tentzeris, "Inkjet printing of a wideband, high gain mm-Wave Vivaldi antenna on a flexible organic substrate", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.320-321, Memphis, TN, July 2014.

373. Y.He, Z.Pan, J.Yang, G.Sun and M.M.Tentzeris, "Effect of feeder cable's phase tolerance on the first sidelobe level of base station antenna", Procs. 2014 International Wireless Communications and Mobile Computing Conference (IWCMC), pp.1022-1026, Nicosia, CYPRUS, August 2014.
374. R.Goncalves, J.Hester, N.Carvalho, P.Pinho and M.Tentzeris, "Passive sensors for food quality monitoring and counterfeiting", Procs. 2014 IEEE Sensors Conference, pp.1511-1514, Valencia, SPAIN, November 2014.
375. A.Vena, M.Tedjini, T.Bjorninen, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, "A novel inkjet-printed wireless chipless strain and crack sensor on flexible laminates", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.1294-1295, Memphis, TN, July 2014.
376. S.-H.Zheng, X.-Y.Liu and M.M.Tentzeris, "A novel optically controlled reconfigurable antenna for cognitive radio systems", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.1246-1247, Memphis, TN, July 2014.
377. B.K.Tehrani, J.Bito, B.S.Cook and M.M.Tentzeris, "Fully inkjet-printed multilayer microstrip and T-resonator structures for the RF characterization of printable materials and interconnects", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
378. A.Vena, L.Sydanheimo, L.Ukkonen and M.M.Tentzeris, "A fully inkjet-printed chipless RFID gas and temperature sensor on paper", Procs. 2014 IEEE RFID Technology and Applications Conference (RFID-TA), pp.115-120, Tampere, FINLAND, September 2014.
379. S.Kim, M.M.Tentzeris and H.Aubert, "An inkjet-printed flexible broadband multilayer SIW coupler for antenna array systems", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.324-325, Memphis, TN, July 2014.
380. B.S.Cook, C.Mariotti, J.R.Cooper, D.Revier, B.K.Tehrani, L.Aluigi, L.Roselli and M.M.Tentzeris, "Inkjet-printed, vertically-integrated, high-performance inductors and transformers on flexible LCP substrate", Procs.2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
381. W.Su, C.Mariotti, B.S.Cook, S.Lim, L.Roselli and M.M.Tentzeris, "A metamaterial-inspired temperature stable inkjet-printed microfluidic-tunable bandstop filter", Procs. 2014 44th European Microwave Conference (EuMC), pp.9-12, Rome, ITALY, October 2014.
382. J.Kimionis and M.M.Tentzeris, "RF tag front-end design for uncompromised communication and harvesting", Procs. 2014 IEEE RFID Technology and Applications Conference (RFID-TA), pp.109-114, Tampere, FINLAND, September 2014. ***Best Student Paper Award***
383. S.Yao, X.Liu, S.V.Georgakopoulos and M.M.Tentzeris, "A novel tunable origami accordion antenna", Procs. 2014 IEEE Antennas and Propagation International Symposium (APS), pp.370-371, Memphis, TN, July 2014.
384. A.Traille, A.Georgiadis, A.Collado, Y.Kawahara, H.Aubert and M.M.Tentzeris, "Inkjet-printed "Zero-Power" wireless sensor and power management nodes for IoT and "Smart Skin" applications", Procs. 2014 XXXIth URSI General Assembly and Scientific Symposium (URSI GASS), pp.1-4, August 2014.
385. K.Niotaki, S.Kim, F.Giuppi, A.Collado, A.Georgiadis and M.M.Tentzeris, "Optimized design of multiband and solar rectennas", Procs. 2014 IEEE Topical

Conference on Wireless Sensors and Sensor Networks (WiSNet), pp.31-33, Newport Beach, CA, January 2014.

386. J.R.Cooper, B.S.Cook and M.M.Tentzeris, "The first hardware-based, anti-collision methodology for frequency doubling transceivers for RFID and wireless sensing applications", Procs. 2014 IEEE MTT-S International Microwave Symposium (IMS), pp.1-4, Tampa Bay, FL, June 2014.
387. T.Le, Z.Lin, C.P.Wong and M.M.Tentzeris, "Enhanced-performance wireless conformal "smart skins" utilizing inkjet-printed carbon-nanostructures", Procs. 2014 IEEE 64th Electronic Components and Technology Conference (ECTC), pp.769-774, Orlando, FL, May 2014.
388. J.Kimionis, M.M.Tentzeris, A.Georgiadis and A.Collado, "Inkjet-printed reflection amplifier for increased-range Backscatter radio", Procs. 2014 44th European Microwave Conference (EuMC), pp.5-8, Rome, ITALY, October 2014.
389. M.M.Tentzeris, S.Kim, R.Vyas, A.Traille, P.Pons, H.Aubert, A.Georgiadis and A.Collado, "Inkjet-printed "Zero-Power" wireless sensor and power management nodes for IoT and "Smart Skin" applications", Procs. 2014 20th International Conference on Microwaves, Radar, and Wireless Communication (MIKON), pp.1-7, Gdansk, POLAND, June 2014.
390. C.D.Saintsing, K.Yu, H.J.Qi and M.M.Tentzeris, "Planar Monopole Antennas on Substrates Fabricated Through an Additive Manufacturing Process", Proc. of the 2015 IEEE Radio and Wireless Symposium (RWS), pp.159-161, January 2015.
391. Z.Khonsari, T.Bjorninen, M.M.Tentzeris, L.Sydanheimo and L.Ukkonen, "2.4 GHz Inkjet-Printed RF Energy Harvester on Bulk Cardboard Substrate", Proc. of the 2015 IEEE Radio and Wireless Symposium (RWS), pp.153-155, January 2015.
392. A.Georgiadis, A.Collado, S.Kim and M.M.Tentzeris, "Inkjet-Printed Meta-Material Inspired Passive Antenna Sensor for UHF RFID Systems", Proc. of the 2015 International Workshop on Antenna Technology (iWAT), March 2015, Seoul, KOREA, pp.92-94.
393. K.Ling, M.Yoo, K.Kim, S.Lim, W.Su, B.Cook and M.M.Tentzeris, "Microfluidically Tunable Paper-Based Inkjet-Printed Metamaterial Absorber", Proc. of the 2015 International Workshop on Antenna Technology (iWAT), March 2015, Seoul, KOREA, pp.218-220.
394. X.Liu, S.V.Georgakopoulos and M.M.Tentzeris, "A Novel Mode and Frequency Reconfigurable Origami Quadrifilar Helical Antenna", Proc. of the 2015 IEEE Wireless and Microwave Technology Conference (WAMICON), April 2015, Cocoa Beach, FL, pp.1-3.
395. W.Su, B.S.Cook and M.M.Tentzeris, "Low-COST Microfluidics-Enabled Tunable Loop Antenna Using Inkjet-Printing Technologies", Proc. of the 2015 EuCAP Symposium, Lisbon, PORTUGAL, April 2015, pp.1-2.
396. E.Sipila, Y.Ren, J.Virkki, L.Sydanheimo, M.M.Tentzeris and L.Ukkonen, "Parametric Optimization of Inkjet Printing and Optical Sintering of Nanoparticle Inks", Proc. of the 2015 EuCAP Symposium, Lisbon, PORTUGAL, April 2015, pp.1-4.
397. R.Martinez, J.Kimionis, A.Georgiadis, A.Collado, M.Tentzeris, G.Goussetis and J.L.Tornero, "Circularly Polarized Shorted Ring Slot Rectenna with a Mesh Design for Optimized Inkjet Printing on Paper Substrate", Proc. of the 2015 EuCAP Symposium, Lisbon, PORTUGAL, April 2015, pp.1-3.

398. R.Goncalves, P.Pinho, N.Carvalho and M.M.Tentzeris, "Humidity Passive Sensors Based on UHF RFID Using Cork Dielectric Slabs", Proc. of the 2015 EuCAP Symposium, Lisbon, PORTUGAL, April 2015, pp.1-4.
399. J.Bito, S.Jeong and M.M.Tentzeris, "A Real-Time Electrically Controlled Active Matching Circuit Utilizing Genetic Algorithms for Biomedical WPT Applications", Proc. of the 2015 IEEE Wireless Power Transfer Conference (WPTC), pp.1-4, May 2015, Boulder, CO.
400. T.Le, B.Song, Q.Liu, R.A.Bahr, S.Moscato, C.P.Wong and M.M.Tentzeris, "A Novel Strain Sensor Based on 3D Printing Technology and 3D Antenna Design", Proc. of the 2015 IEEE ECTC Conference, May 2015, San Diego, CA, pp.981-986.
401. C.Mariotti, B.S.Cook, F.Alimenti, L.Roselli and M.M.Tentzeris, "Additively Manufactured Multilayer High-Performance RF Passive Components on Cellulose Substrates for Internet-of-Things Electronic Circuits", Proc. of the 2015 IMS Symposium, Phoenix, AZ, May 2015, pp.1-4.
402. S.Kim, J.Bito, S.Jeong, A.Georgiadis and M.M.Tentzeris, "A Flexible Hybrid Printed RF Energy Harvester Utilizing Catalyst-Based Copper Printing Technologies for Far-Field RF Energy Harvesting Applications", Proc. of the 2015 IMS Symposium, Phoenix, AZ, May 2015, pp.1-4.
403. J.Bito, J.G.Hester and M.M.Tentzeris, "Ambient Energy Harvesting from a Two-Way Talk Radio for Flexible Wearable Devices Utilizing Inkjet Printing Masking", Proc. of the 2015 IMS Symposium, Phoenix, AZ, May 2015, pp.1-4.
404. J.Kimionis, A.Georgiadis, M.Isakov, H.J.Qi and M.M.Tentzeris, "3D/Inkjet-Printed Origami Antennas for Multi-Direction RF Harvesting", Proc. of the 2015 IMS Symposium, Phoenix, AZ, May 2015, pp.1-4. ***Best Student Paper Award Finalist***
405. A.Traille and M.M.Tentzeris, "Status and Challenges of Inkjet-Printed RF and THz Structures", Proc. of the 2015 IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP), Suzhou, CHINA, July 2015, pp.1-2.
406. J.Bito and M.M.Tentzeris, "A Novel Flexible Wearable Magnetic Energy Harvester Utilizing Inkjet Masking Techniques", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.204-205.
407. B.K.Tehrani, B.S.Cook and M.M.Tentzeris, "Post-Process Fabrication of Multilayer mm-Wave On-Package Antennas with Inkjet Printing", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.607-608.
408. S.A.Nauroze and M.M.Tentzeris, "A Novel Printed Stub-Loaded Square Helical Antenna", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.774-775.
409. Y.Pan, Y.Cui, R.L.Li and M.M.Tentzeris, "A Dual-Polarized Triple-Band MIMO Antenna for WLAN/WiMAX Applications", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.934-935.
410. J.H.Kim, J.Bito and M.M.Tentzeris, "Design Optimization of an Energy Harvesting RF-DC Conversion Circuit Operating at 2.45 GHz", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.1280-1281.
411. Z.Khonsari, T.Bjorninen, L.Sydanheimo, M.Tentzeris and L.Ukkonen, "Inkjet-Printed Monopole Antenna and Voltage Doubler on Cardboard for RF Energy Harvesting", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.1312-1313.

412. W.He, Y.He and M.M.Tentzeris, "Modeling, Design and Experimentation of a UHF RFID Tag Antenna Embedded in Railway Tickets", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.1416-1417.
413. Y.He, Y.He and M.M.Tentzeris, "A Broadband Dual-Polarization Base Station Antenna Element with a Coupling Feed", Proc. of the 2015 APS Symposium, Vancouver, CANADA, July 2015, pp.2001-2002.
414. S.Moscato, M.Pasian, M.Bozzi, L.Perregrini, R.Bahr, T.Le and M.M.Tentzeris, "Exploiting 3D Printed Substrates for Microfluidic SIW Sensors", Proc. of the 2015 EuMW Symposium, Paris, FRANCE, September 2015, pp.28-31. ***Best Paper Award Finalist***
415. T.Le, R.Bahr, M.M.Tentzeris, B.Song and C.P.Wong, "A Novel Chipless RFID-Based Stretchable and Wearable Hand Gesture Sensor", Proc. of the 2015 EuMW Symposium, September 2015, Paris, FRANCE, pp.371-374.
416. K.A.Nate, J.Hester, M.Isakov, R.Bahr and M.M.Tentzeris, "A Fully Printed Multilayer Aperture-Coupled Patch Antenna Using Hybrid 3D/Inkjet Additive Manufacturing Techniques", Proc. of the 2015 EuMW Symposium, September 2015, Paris, FRANCE, pp.610-613.
417. R.Bahr, T.Le, M.M.Tentzeris, S.Moscato, M.Pasian, M.Bozzi and L.Perregrini, "RF Characterization of 3D Printed Flexible Materials - NinjaFlex Filaments", Proc. of the 2015 EuMW Symposium, Paris, FRANCE, September 2015, pp.742-745.
418. J.Hester, M.M.Tentzeris and Y.Fang, "Inkjet-Printed Flexible High-Performance Carbon Nanomaterial Based Sensors for Ammonia and DMMP Gas Detection", Proc. of the 2015 EuMW Symposium, September 2015, Paris, FRANCE, pp.857-860.
419. K.Nate and M.M.Tentzeris, "A Novel 3-D Printed Loop Antenna Using Flexible NinjaFlex Material for Wearable and IoT Applications", Proc. of the 2015 IEEE EPEPS Symposium, San Jose, CA, October 2015, pp.171-174.
420. W.Su, J.R.Cooper, B.S.Cook, M.M.Tentzeris, C.Mariotti and L.Roselli, "Inkjet-Printed Dual Microfluidic-Based Sensor Integrated Systems", Proc. of the 2015 IEEE Sensors Conference, Busan, KOREA, November 2015, pp.1-3.
421. W.Su, J.R.Cooper, B.S.Cook, M.M.Tentzeris, C.Mariotti and L.Roselli, "Inkjet-Printed Dual Microfluidic-Based Sensor Integrated Systems", Proc. of the 2015 IEEE Sensors Conference, Busan, KOREA, November 2015, pp.1-3.
422. T.Le, C.-C.Tuan, R.A.Bahr, C.P.Wong and M.M.Tentzeris, "A Novel Approach to Integrating 3D/4D Printing and Stretchable Conductive Adhesive Technologies for High-Frequency Packaging Applications", Proc. of the 2016 ECTC Symposium, Las Vegas, NV, May 2016, pp.1551-1556.
423. S.A.Nauroze, J.Hester, W.Su and M.M.Tentzeris, "Inkjet-Printed Substrate Integrated Waveguides (SIW) with "drill-less" Vias On Paper Substrates", Proc. of the2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.
424. W.Su, Q.Liu, B.Cook and M.M.Tentzeris, "All-Inkjet-Printed Microfluidics-Based Encodable Flexible Chipless RFID Sensors", Proc. of the 2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.
425. J.Bito, M.M.Tentzeris and A.Georgiadis, "A Hybrid Heuristic Design Technique for Real-Time Matching Optimization Of Wearable Near-Field Ambient RF Energy Harvesters", Proc. of the 2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.

426. J.Kimionis and M.M.Tentzeris, "Pulse Shaping for Backscatter Radio", Proc. of the 2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.
427. B.K.Tehrani, B.S.Cook and M.M.Tentzeris, "Inkjet-Printed 3D Interconnects for Millimeter-Wave System-on-Package Solutions", Proc. of the 2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.
428. J.G.D.Hester and M.M.Tentzeris, "Inkjet-Printed Van-Atta Reflectarray Sensors: A New Paradigm for Long-Range Chipless Low Cost Ubiquitous Smart Skin Sensors of the Internet of Things", Proc. of the 2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.
429. J.Kimionis and M.M.Tentzeris, "Software-Defined Reader for Multi-Modal RFID Sensing", Proc. of the 2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.
430. M.M.Tentzeris, R.A.Bahr, A.D.Papadopoulos and E.N.Glytsis, "Multi-Domain Modeling of 3D Printed, Nanotechnology and Morphing/Origami-Based RF Modules", Proc. of the 2016 IMS Symposium, San Fransisco, AZ, May 2016, pp.1-4.

431. W.Su, R.Bahr, S.A.Nauroze and M.M.Tentzeris, "3D Printed Reconfigurable Helical Antenna Based on Microfluidics and Liquid Metal Alloy." Proc. of the 2016 IEEE APS/URSI Symposium, Fajardo, PR, July 2016, pp

432. J.Bito and M.M.Tentzeris, "Bias Circuit Design for a Real-Time Electrically Controlled Active Matching Circuit Utilizing p-i-n Diode Switches for Wireless Power Transfer." Proc. of the 2016 IEEE APS/URSI Symposium, Fajardo, PR, July 2016, pp.405-406.

433. B.K.Tehrani and M.M.Tentzeris, "Substrate-Independent System-on-Package Antenna Integration with Inkjet Printing." Proc. of the 2016 IEEE APS/URSI Symposium,Fajardo, PR, July 2016, pp.827-828.

434. J.G.D.Hester, M.M.Tentzeris and Y.Fang, "UHF Lumped Element Model of a Fully-Inkjet-Printed Single-Wall-Carbon-Nanotube Based Inter-Digitated Electrodes Breath Sensor."Proc. of the 2016 IEEE APS/URSI Symposium, Fajardo, PR, July 2016, pp.1959-1960.

435. M.M.Tentzeris, "Invited Talk: Inkjet-/3D-/4D-Printed Paper/Polymer-Based "Green" mmW Modules: The Final Step to Bridge Cognitive Intelligence, Nanotechnology and RF for IoT and 5G Applications." Proc. of the 2016 International Conference on Smart Green Technologies in Electrical and Information Systems (ICSGTEIS), Bali, INDONESIA, October 2016, pp.1-4.

436. M.Bozzi, C.Tomassoni, L.Perregrini, R.Bahr and M.M.Tentzeris, "Additive Manufacturing of Substrate Integrated Waveguide Components." Proc. of the 2016 46th European Microwave Conference (EuMC), London, UK, October 2016, pp.253-256.

437. C.Tomassoni, R.Bahr, M.Tentzeris, M.Bozzi and L.Perregrini, "3D Printed Substrate Integrated Waveguide Filters with Locally Controlled Dielectric Permittivity." Proc. of the2016 IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP), Chengdu, CHINA, October 2016, pp.

438. D.Revier and M.M.Tentzeris, "A Low-Cost. Single-Platform. Hybrid Manufacturing System for RF Passives", Proc. of the 2017 IEEE RWS Symposium, Phoenix, AZ, January 2017, pp.83-85.

439. S.I.H.Shah, S.Lim and M.M.Tentzeris, "Military Field Deployable Antennas Using Origami", Proc. of the 2017 International Workshop on Antenna Technology: Small Antennas, Innovative Structures, and Applications (iWAT), Athens?? March 2017, pp.72-73.

440. J.Bito, J.G.Hester and M.M.Tentzeris, "A Fully Autonomous Ultra-Low Power Hybrid RF/Photovoltaic Energy HarvestingSystem with -25dbm Sensitivity", Proc. of the 2017 IEEE Wireless Power Transfer Conference (WPTC), Taipei, TAIWAN, May 2017, pp.1-4.

441. J.Bito, V.Palazzi, J.Hester, R.Bahr, F.Alimenti, P.Mezzanotte, L.Roselli and M.M.Tentzeris, "Millimeter-Wave Inkjet-Printed RF Energy Harvester for Next Generation Flexible Electronics", Proc. of the 2017 IEEE Wireless Power Transfer Conference (WPTC), Taipei, TAIWAN, May 2017, pp.1-4.

442. S.Jeong, J.Bito and M.M.Tentzeris, "Design of a Novel Wireless Power Transfer System Using Machine Learning Techniques for Drone Applications", Proc. of the 2017 IEEE Wireless Power Transfer Conference (WPTC), Taipei, TAIWAN, May 2017, pp.1-4.

443. X.He, J.Bito and M.M.Tentzeris, "A Drone-Based Wireless Power Transfer and Communications Platform", Proc. of the 2017 IEEE Wireless Power Transfer Conference (WPTC), Taipei, TAIWAN, May 2017, pp.1-4.

444. A.O.Watanabe, M.Ali, B.Tehrani, J.Hester, H.Matsuura, T.Ogawa, P.M.Raj, V.Sundaram, M.M.Tentzeris and R.Tummala, "First Demonstration of 28 GHz and 39 GHz Transmission Lines and Antennas on Glass Substrates for 5G Modules", Proc. of the 2017 IEEE 67th ECTC Symposium, Orlando, FL, May 2017, pp.236-241.

445. R.Bahr, A.Nauroze, W.Su and M.M.Tentzeris, "Self-Actuating 3D Printed Packaging for Deployable Antennas", Proc. of the 2017 IEEE 67th ECTC Symposium, Orlando, FL, May 2017, pp.1425-1430.

446. W.Su, Z.Wu, Y.Fang, R.Bahr, P.M.Raj, R.Tummala and M.M.Tentzeris, "3D Printed Wearable Flexible SIW and Microfluidics Sensors for Internet of Things and Smart Health Applications", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.544-547.

447. J.Kimionis, A.Georgiadis and M.M.Tentzeris, "Millimeter-Wave Backscatter: A Quantum Leap for Gigabit Communication. RF Sensing and Wearables", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.812-815.

448. D.Henry, J.G.D.Hester, H.Aubert, P.Pons and M.M.Tentzeris, "Long Range Wireless Interrogation of Passive Humidity Sensors Using Van-Atta Cross Polarization Effect and 3D Beam Scanning Analysis", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.816-819.

449. T.-H.Lin, J.Bito, J.G.Hester, J.Kimionis, R.A.Bahr and M.M.Tentzeris, "Ambient Energy Harvesting from Two-Way Talk Radio for On-Body Autonomous Wireless Sensing Networks Using Inkjet and 3D Printing", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.1034-1037.

450. S.-N.Daskalakis, J.Kimionis, A.Collado, M.M.Tentzeris and A.Georgiadis, "Ambient FM Backscattering fro Smart Agricultural Monitoring", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.1339-1341.

451. J.G.D.Hester and M.M.Tentzeris, "A mm-Wave Ultra-Long-Range Energy-Autonomous Printed RFID-Enabled Van-Atta Wireless Sensor: At the Crossroads of 5G and IoT", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.1557-1560. Best Student Paper Award Honorable Mention

452. S.A.Nauroze, L.Novelino, M.M.Tentzeris and Glaucio H. Paulino, "Inkjet-Printed "4D" Tunable Spatial Filters Using On-Demand Foldable Surfaces", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.1575-1578.

453. W.Su, S.A.Nauroze, R.Bahr and M.M.Tentzeris, "Novel 3D Printed Liquid-Metal-Alloy Microfluidics-Based Zigzag and Helical Antennas for Origami Reconfigurable Antenna "Trees" ", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.1579-1582.

454. R.A.Bahr, Y.Fang, W.Su, B.Tehrani, V.Palazzi and M.M.Tentzeris, "Novel Uniquely 3D Printed Intricate Voronoi and Fractal 3D Antennas", Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.1583-1586.

455. B.K.Tehrani, R.A.Bahr, W.Su, B.S.Cook and M.M.Tentzeris, "E-Band Characterization of 3D-Printed Dielectrics for Fully-Printed Millimeter-Wave Wireless System Packaging",Proc. of the 2017 IEEE IMS Symposium, Honolulu, HI, June 2017, pp.1756-1759.

456. T.-H.Lin, P.M.Raj, A.Watanabe, V.Sundaram, R.Tummala and M.M.Tentzeris, "Nanostructured Miniaturized Artificial Magnetic Conductors (AMC) for High-Performance Antennas in 5G. IoT and Smart Skin Applications", Proc. of the 2017 IEEE 17th International Conference on Nanotechnology (IEEE-Nano), Pittsburgh, PA, July 2017, pp.911-915.

457. B.K.Tehrani, S.A.Nauroze, R.A.Bahr and M.M.Tentzeris, "On-Package mm-Wave FSS Integration with 3D-Printed Encapsulation", Proc. of the 2017 IEEE APS/URSI Symposium, San Diego, CA, July 2017, pp.9-10.

458. W.Su, R.Bahr, S.A.Nauroze and M.M.Tentzeris, "Novel 3D-Printed "Chinese Fan" Bow-Tie Antennas for Origami/Shape-Changing Configurations", Proc. of the 2017 IEEE APS/URSI Symposium, San Diego, CA, July 2017, pp.1245-1246.

459. J.Iwata, J.Bito and M.M.Tentzeris, "A Wideband and High Gain Antenna on Multilayer Insulation Blanket for RF Energy Harvesting", Proc. of the 2017 IEEE APS/URSI Symposium, San Diego, CA, July 2017, pp.1603-1604.

460. T.-H.Lin, J.Bito and M.M.Tentzeris, "Wearable Inkjet Printed Energy Harvester", Proc. of the 2017 IEEE APS/URSI Symposium, San Diego, CA, July 2017, pp.1613-1614.

461. H.Griguer, M.M.Tentzeris, A.Nauroze and M.Drissi, "A Novel Ultra-Thin Flexible Metamaterial Absorber]for Human Body Protection from EMF Hazards", Proc. of the 2017 XXXIInd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS), Montreal, CANADA, August 2017, pp.1-4.

462. S.Daskalakis, J.Kimionis, J.Hester, A.Collado, M.M.Tentzeris and A.Georgiadis, "Inkjet printed 24 GHz rectenna on paper for millimeter wave identification and wireless power transfer applications", Proc. of the 2017 IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP), Pavia, ITALY, September 2017, pp.1-3.

463. V.Palazzi, R.Bahr, B.Tehrani, J.Hester, J.Bito, F.Alimenti, P.Mezzanotte, L.Roselli and M.M.Tentzeris, "A Novel Additive-Manufactured Multiple-Infill Ultra-Lightweight Cavity-Backed Slot Antenna for UWB Applications", Proc. of the 2017 47th European Microwave Conference (EuMC), Nurnberg, GERMANY, October 2017, pp.252-255.

464. S.N.Daskalakis, A.Georgiadis, A.Collado and M.M.Tentzeris, "An UHF Rectifier with 100% Bandwidth Based on a Ladder LC Impedance Matching Network", Proc. of the 2017 12th European Microwave Integrated Circuits Conference (EuMIC)/2017 47th European Microwave Conference (EuMC), Nurnberg, GERMANY, October 2017, pp.411-414/1151-1154.

465. S.N.Daskalakis, A.Collado, A.Georgiadis and M.M.Tentzeris, "Backscatter Morse Leaf Sensor for Agricultural Wireless Sensor Networks", Proc. of the 2017 IEEE Sensors Symposium, Glasgow, Scotland, UK, October 2017, pp.1-3.

466. A.Georgiadis, J.Kimionis and M.M.Tentzeris, "3D/Inkjet-Printed Millimeter Wave Components and Interconnects for Communication and Sensing", Proc. of the 2017 IEEE Compound Semiconductor Integrated Circuit Symposium (CSICS), Miami, FL, October 2017, pp.1-4.

467. J.G.D.Hester, J.Kimionis, R.Bahr, W.Su, B.Tehrani and M.M.Tentzeris, "Radar & Additive Manufacturing Technologies: The Future of Internet of Things (IoT)", Proc. of the 2018 IEEE Radar Conference, Oklahoma City, OK, April 2018, pp.447-452.

468. A.O.Watanabe, T.-H.Lin, T.Ogawa, P.M.Raj, V.Sundaram, M.M.Tentzeris and R.Tummala, "Design and Demonstration of Ultra-Thin 3D Glass-Based 5G Modules with Low-Loss Interconnects", Proc. of the 2018 International Conference on Electronics Packaging and iMAPS All Asia Conference (ICEP-IAAC), Mie, JAPAN, April 2018, pp.180-183. IEEE CPMT Japan Chapter Young Award

469. B.Song, F.Wu, K.-S.Moon, R.Bahr, M.M.Tentzeris and C.P.Wong, "Stretchable, Printable and Electrically Conductive Composites for Wearable RF Antennas", Proc. of the 2018 IEEE ECTC Conference, San Diego, CA, May 2018, pp.9-14.

470. B.Tehrani, R.Bahr, D.Revier, B.Cook and M.M.Tentzeris, "The Principles of "Smart" Encapsulation: Using Additive Printing Technology for the Realization of Intelligent Application-Specific Packages for IoT, 5G and Automotive Radar Applications", Proc. of the 2018 IEEE ECTC Conference, San Diego, CA, May 2018, pp.111-117.

471. T.-H.Lin, R.Bahr, M.M.Tentzeris, P.M.Raj, V.Sundaram and R.Tummala, "Novel 3D-/Inkjet-Printed Flexible On-Package Antennas, Packaging Structures, and Modules for Broadband 5G Applications", Proc. of the 2018 IEEE ECTC Conference, San Diego, CA, May 2018, pp.214-220.

472.C.L.Taylor, X.He, V.Smet, M.M.Tentzeris and S.Sitaraman, "Low-Temperature Assembly of Surface-Mount Device on Flexible Substrate Using Additive Printing Process", Proc. of the 2018 IEEE ECTC Conference, San Diego, CA, May 2018, pp.379-385.

473.M.Ali, F.Liu, A.Watanabe, P.M.Raj, V.Sundaram, M.M.Tentzeris and R.R.Tummala, "Miniaturized High-Performance Filters for 5G Small-Cell Applications". Proc. of the 2018 IEEE ECTC Conference, San Diego, CA, May 2018, pp.1068-1075. Intel Best Student Paper Award

474.R.Bahr, B.Tehrani, M.M.Tentzeris and K.Byers, "A Novel Integration of Stereolithography and Inkjet Printing for Multichip Modules with High Frequency Packaging Applications", Proc. of the 2018 IEEE ECTC Conference, San Diego, CA, May 2018, pp.2498-2504.

475.A.Watanabe, T.-H.Lin, P.M.Raj, V.Sundaram, M.M.Tentzeris, R.R.Tummala and T.Ogawa, "Leading-Edge and Ultra-Thin 3D Glass-Polymer 5G Modules with Seamless Antenna-to-Transceiver Signal Transmissions", Proc. of the 2018 IEEE ECTC Conference, San Diego, CA, May 2018, pp.2026-2031.

476.S.A.Nauroze, A.Eid and M.M.Tentzeris, "n-RiM: A Paradigm Shift in the Realization of Fully Inkjet-Printed Broadband Tunable FSS Using Origami Structures", Proc. of the 2018 IEEE IMS Symposium, Philadelphia, PA, June 2018, pp.51-54.

477.W.Su, S.Wang, R.Bahr and M.M.Tentzeris, "Smart Floating Balls: 3D Printed Spherical Antennas and Sensors for Water Quality Monitoring", Proc. of the 2018 IEEE IMS Symposium, Philadelphia, PA, June 2018, pp.55-58.

478.J.Kimionis, S.Shahramian, Y.Bayens, A.Singh and M.M.Tentzeris, "Pushing Inkjet Printing to W-Band: An All-Printed 90-GHz Beamforming Array". Proc. of the 2018 IEEE IMS Symposium, Philadelphia, PA, June 2018, pp.63-66.

479.S.N.Daskalakis, R.Correia, G.Goussetis, M.M.Tentzeris, N.B.Carvalho and A.Georgiadis, "Spectrally Efficient 4-PAM Ambient FM Backscattering for Wireless Sensing and RFID Applications", Proc. of the 2018 IEEE IMS Symposium, Philadelphia, PA, June 2018, pp.266-269.

480.T.-H.Lin, W.Su and M.M.Tentzeris, "Expand Horizons of Microfluidic Systems: An Inkjet Printed Flexible Energy Autonomous Micropump System for Wearable and IoT Microfluidic Applications", Proc. of the 2018 IEEE IMS Symposium, Philadelphia, PA, June 2018, pp.812-815.

481.R.Bahr, X.He, B.Tehrani and M.M.Tentzeris, "A Fully 3D Printed Multi-Chip Module with an On-Package Enhanced Dielectric Lens for mm-Wave Applications Using Multimaterial Stereolithography". Proc. of the 2018 IEEE IMS Symposium, Philadelphia, PA, June 2018, pp.1561-1564.

482.S.A.Nauroze, B.Tehrani and M.M.Tentzeris, "An Inkjet-Printed Origami-based Frequency Selective Surface with Wide Frequency and Bandwidth Tunability", Proc. of the 2018 IEEE APS Symposium, Boston, MA, July 2018, pp.1677-1678.

483.A.Eid, J.Hester, A.Nauroze, T.-H.Lin. C.J.Costantine, Y.Tawk, A.H.Ramadan and M.M.Tentzeris, "A Flexible Compact Reclenna for 2.4GHz ISM Energy

Harvesting Applications", Proc. of the 2018 IEEE APS Symposium, Boston, MA, July 2018, pp.1887-1888.

484. S.B.Fan, T.H.Chang, X.Y.Liu, Y.Fan and M.M.Tentzeris, "A Depolarizing Chipless RFID Tag with Humidity Sensing Capability", Proc. of the 2018 IEEE APS Symposium, Boston, MA, July 2018, pp.2469-2470.

485. H.X.Zhu, Y.Fan, X.Y.Liu and M.M.Tentzeris, "A Compact Low-Profile Dual-Band Patch Filtering Antenna for Off-Body Communications", Proc. of the 2018 ACES Symposium, Beijing, CHINA, July 2018, pp.

486. B.K.Tehrani and M.M.Tentzeris, "Fully Inkjet-Printed Ramp Interconnects for Wireless Ka-Band MMIC Devices and Multi-Chip Module Packaging", Proc. of the 2018 EuMW Conference, Madrid, SPAIN, September 2018, pp.1037-1040.

487. A.Eid, B.Tehrani, J.Hester, X.He and M.M.Tentzeris, "Nanotechnology-Enabled Additively-Manufactured RF and Millimeter-Wave Electronics", Proc. of the 2018 IEEE Nanotechnology Materials and Devices Conference (NMDC), Portland, OR, October 2018, pp. Best Paper Nominee

488. S.Ghosh, M.M.Tentzeris and S.Lim, "Lightweight 3D Printed Metamaterial for Electromagnetic Wave Absorption", Proc. of the 2018 ISAP Symposium, Busan, KOREA, October 2018, pp.

489. S.Ghosh, R.Phon, M.M.Tentzeris and S.Lim, "An Improved Multifunctional Frequency Selective Surface Based on Microfluidic Technology". Proc. of the 2018 ISAP Symposium, Busan, KOREA, October 2018, pp.

490. S.I.H.Shah, S.Gosh, M.M.Tentzeris and S.Lim, "A Novel Bio Inspired Pattern Reconfigurable Quasi-Yagi Helical Antenna Using Origami DNA", Proc. of the 2018 ISAP Symposium, Busan, KOREA, October 2018, pp.

491. Y.Cui, W.Su and M.M.Tentzeris, "Fully Inkjet-Printed Tunable Flexible Microfluidic Chipless RFID Sensor". Proc. of the 2019 ACES Symposium, Miami, FL, April 2019, pp.

492. Z.Zhai, Y.Fan, X.Liu and M.M.Tentzeris, "A Frequency Tunable Wideband Circularly Polarized Antenna", Proc. of the 2019 IEEE International Conference on Microwave and Millimeter Wave Technology (ICMMT), Guangzhou, CHINA, May 2019, pp.

493. P.Sun, T.Chang, Y.Fan, X.Liu and M.M.Tentzeris, "Chipless RFID Sensor Tag for Angular Velocity and Displacement Measurement", Proc. of the 2019 IEEE International Wireless Symposium (IWS), Guangzhou, CHINA, May 2019, pp.

494. H.Yang, Y.Fan, X.Y.Liu and M.M.Tentzeris, "Single-Fed Dual-Band Circularly Polarized Patch Antenna with Wide 3-dB Axial Ratio Beamwidth for CNSS Applications", Proc. of the 2019 IEEE International Wireless Symposium (IWS), Guangzhou, CHINA, May 2019, pp.

495. M.Ali, A.Watanabe, T.-H.Lin, M.R.Pulugurtha, M.M.Tentzeris and R.R.Tummala, "3D Glass Package-Integrated High-Performance Power Dividing Networks for 5G Broadband Antennas", Proc. of the 2019 IEEE ECTC Conference, Las Vegas, NV, May 2019, pp.960-967.

496. A.O.Watanabe, Y.Wang, N.Ogura, P.M.Raj, V.Smet, M.M.Tentzeris and R.Tummala, "Low-Loss Additively Deposited Ultra-Short Copper-Paste

Interconnections in 3D Antenna-Integrated Packages for 5G and IoT Applications", Proc. of the 2019 IEEE ECTC Conference, Las Vegas, NV, May 2019, pp.972-976.

497. A.Eid, J.Hester and M.M.Tentzeris, "A Scalable High-Gain and Large-Beamwidth mm-Wave Harvesting Approach for 5G-Powered IoT", Proc. of the 2019 IEEE IMS Symposium, Boston, MA, June 2019, pp.1309-1312. Best Student Paper Honorable Mention

498. S.A.Nauroze and M.M.Tentzeris, "Fully Inkjet-Printed Multi-layer Tunable Origami ESS Structures with Integrated Thermal Actuation Mechanism", Proc. of the 2019 IEEE IMS Symposium, Boston, MA, June 2019, pp.1363-1366. Best Student Paper Honorable Mention

499. Y.Cui, S.A.Nauroze and M.M.Tentzeris, "Novel 3D-Printed Reconfigurable Origami Freguency Selective Surfaces with Flexible Inkjet-Printed Conductor Traces", Proc. of the 2019 IEEE IMS Symposium, Boston, MA, June 2019, pp.1367-1370.

500. V.Palazzi, P.Mezzanotte, F.Alimenti, M.M.Tentzeris and L.Roselli, "Microfluidics-based 3D-Printed 4x4 Butler Matrix in Coaxial Technology for Applications up to K-Band", Proc. of the 2019 IEEE IMS Symposium, Boston, MA, June 2019, pp.1371-1374.

501. T.-H.Lin, S.N.Daskalakis, A.Georgiadis and M.M.Tentzeris, "Achieving Fully Autonomous System-on-Package Designs: An Embedded-on-Package 5G Energy Harvester within 3D Printed Multilayer Flexible Packaging Structures", Proc. of the 2019 IEEE IMS Symposium, Boston, MA, June 2019, pp.1375-1378.

502. S.Jeong, T.-H.Lin and M.M.Tentzeris, "Range-Adaptive Impedance Matching of Wireless Power Transfer Systems Using a Machine Learning Strategy Based on Neural Networks", Proc. of the 2019 IEEE IMS Symposium, Boston, MA, June 2019, pp.1423-1425.

503. Y.Guan, S.Wang, M.M.Tentzeris and Y.Liu, "A Microfluidic Spherical Helix Module Using Liquid Metal and Additive Manufacturing for Drug Delivery Applications", Proc. of the 2019 IEEE IMS Symposium, Boston, MA, June 2019, pp.1446-1449.

504. X.He and M.M.Tentzeris, "Inkjet Printed Lange Coupler for Antenna Systems", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.91-92.

505. Y.Cui, W.Su and M.M.Tentzeris, "A Novel 3D and Inkjet Printed Pressure-sensing Button-shaped Resonator", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.591-592.

506. S.Wang, M.Tong, Y.Guan and M.M.Tentzeris, "3D Printed Inverted-F Antenna and Temperature Sensor Using Microfluidics Technologies", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.599-600.

507. S.N.Daskalakis, S.D.Assimonis, G.Goussetis, M.M.Tentzeris and A.Georgiadis, "The Future of Backscatter in Precision Agriculture", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.647-648.

508. M.Ali, A.Watanabe, T.-H.Lin, M.Tentzeris, R.Tummala and P.M.Raj, "Ultra-Wideband Glass Package-Integrated Power Dividers for 5G and mm-Wave Applications", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.863-864.

509. S.D.Assimonis, S.N.Daskalakis, V.Fusco, M.M.Tentzeris and A.Georgiadis, "High Efficiency RF Energy Harvester for IoT Embedded Sensor Nodes", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.1161-1162.

510. A.Eid, J.Hester, B.Tehrani and M.Tentzeris, "Flexible W-Band Rectifiers for 5G-Powered IoT Autonomous Modules", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.1163-1164.

511. A.Eid, J.Hester and M.M.Tentzeris, "A Scalable High-Gain and Large-Beamwidth mm-Wave Harvesting Approach for 5G-powered IoT", Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.1309-1312.

512. T.-H.Lin and M.M.Tentzeris, "Printed 5G Reconfigurable Wireless Modules Using Additive Manufacturing Techniques". Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.1705-1706.

513. A.O.Adeyeye, R.A.Bahr and M.M.Tentzeris, "3D Printed 2.45GHz Yagi-Uda Loop Antenna Utilizing Microfluidic Channels and Liquid Metal". Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.1983-1984.

514. S.A.Nauroze and M.M.Tentzeris, "Fully Inkjet-Printed Tunable Hybrid n-Ripple Miura (n-RiM) Frequency Selective Surfaces". Proc. of the 2019 IEEE APS Symposium, Atlanta, GA, July 2019, pp.2019-2020.

515. S.Daskalakis, A.Georgiadis, G.Goussetis and M.M.Tentzeris, "Low Cost Ambient Backscatter for Agricultural Applications", Proc. of the 2019 ICEAA-IEEE APS Topical Conference on Antennas and Propagation in Wireless Communications (APWC) Symposium, Granada, SPAIN, September 2019, pp.201.

516. A.O.Adeyeye, J.Hester and M.M.Tentzeris, "Miniaturized Millimeter Wave RFID Tag for Spatial Identification and Localization in Internet of Things Applications", Proc. of the 2019 European Microwave Week, Paris, FRANCE, October 2019, pp.105-108.

517. S.A.Alotaibi, Y.Cui and M.M.Tentzeris, "Ultrasensitive Planar Metamaterials for Material Characterization Using Tapered CSRR with Application to NDT of 3D Printed Structures", Proc. of the 2019 European Microwave Week, Paris, FRANCE, October 2019, pp.508-511.

518. E.Antonino-Daviu, A.Eid, R.Bahr and M.M.Tentzeris, "Flexible Antenna Design with Characteristic Modes", Proc. of the 2020 14th European Conference on Antennas and Propagation (EuCAP), Copenhagen, DENMARK, March 2020, pp.

519. A.Eid, J.Hester and M.M.Tentzeris, "A 5.8GHz Fully-Tunnel-Diodes-Based 20uW, 88mV and 48dB-Gain Fully-Passive Backscattering RFID Tag", Proc. of the 2020 IEEE International Microwave Symposium (IMS), Virtual/Los Angeles, CA, June 2020, pp.607-610.

520. X.He, Y.Fang, R.A.Bahr and M.M.Tentzeris, "RF Systems on Antenna (SoA): a Novel Integration Approach Enabled by Additive Manufacturing", Proc. of the

2020 IEEE International Microwave Symposium (IMS), Virtual/Los Angeles, CA, June 2020, pp.1157-1160.

521. Y.Cui, S.A.Nauroze, R.Bahr and M.M.Tentzeris, "3D Printed One-Shot Deployable Flexible "Kirigami" Dielectric Reflectarray Antenna for mm-Wave Applications", Proc. of the 2020 IEEE International Microwave Symposium (IMS), Virtual/Los Angeles, CA, June 2020, pp.1164-1167.

522. R.A.Bahr, A.O.Adeyeye, S.Van Rijs and M.M.Tentzeris, "3D-Printed Omnidirectional Luneburg Lens Retroreflectors for Low-Cost mm-Wave Positioning", Proc. of the 2020 IEEE International Conference on RFID, October 2020, pp.

523. M.Ote, S.Jeong and M.M.Tentzeris, "Foreign Object Detection for Wireless Power Transfer Based on Machine Learning", Proc. of the 2020 IEEE Wireless Power Transfer Conference (WPTC), Seoul, KOREA, November 2020, pp.476-479.

524. Y.Cui, S.Van Rijs, R.Bahr and M.M.Tentzeris, "A Novel Fully Inkjet Printed Dual-Polarization Broadband Tuneable FSS Using Origami "Eggbox" Structure", Proc. of the 2020 50th European Microwave Conference (EuMC), Virtual/Utrecht, NETHERLANDS, January 2021, pp.760-763.

525. A.Papathanasopoulos, Y.Rahmat-Samii, R.Bahr, Y.Cui and M.M.Tentzeris, "Introducing Inkjet Printing Technology to the Fabrication of Flat-Layered Meta-Lens Antennas", Proc. of the 2021 USNC-URSI NRSM Symposium, Boulder, CO, January 2021, pp.49-50.

526. C.A.Lynch, A.O.Adeyeye, J.G.D.Hester and M.M.Tentzeris, "When a Single Chip becomes the RFID Reader: An Ultra-low-cost 60 GHz Reader and mmID System for Ultra-accurate 2D Microlocalization", Proc. of the 2021 IEEE International Conference on RFID (RFID), VIRTUAL, April 2021.

527. A.Adeyeye, C.Lynch, X.He, S.Lee, J.D.Cressler and M.M.Tentzeris, "Fully Inkjet Printed 60 GHz Backscatter 5G RFID Modules for Sensing and Localization in Internet of Things and Digital Twins Applications", Proc. of the 2021 IEEE 71st Electronic Components and Technology Conference (ECTC), VIRTUAL, June 2021, pp.1193-1198.

528. C.A.Lynch, A.Eid, Y.Fang and M.M.Tentzeris, “Inkjet-/3D-/4D-Printed "Zero-Power" Flexible Wearable Wireless Modules for Smart Biomonitoring and Pathogen Sensing”, Proc. of the 2021 IEEE International Conference on Flexible and Printable Sensors and Systems (FLEPS), Manchester, UK, June 2021, pp.

529. V.Palazzi, P.Mezzanotte, F.Alimenti, M.Tentzeris and L.Roselli, “Ultra-Low-Cost Passive 3D-Printed Vibration Transducers for Condition Monitoring by means of Wireless Chipless Transponders”, Proc. of the 2021 International Microwave Symposium (IMS), Atlanta, GA, June 2021, pp.82-85.

530. Y.Cui, S.A.Nauroze, R.Bahr and M.M. Tentzeris, “A Novel Additively 4D Printed Origami-inspired Tunable Multi-layer Frequency Selective Surface for mm-Wave IoT, RFID, WSN, 5G, and Smart City Applications”, Proc. of the 2021 International Microwave Symposium (IMS), Atlanta, GA, June 2021, pp.86-89.

531. X.He and M.M.Tentzeris, “In-Package Additively Manufactured Sensors for Bend Prediction and Calibration of Flexible Phased Arrays and Flexible Hybrid

Electronics", Proc. of the 2021 International Microwave Symposium (IMS), Atlanta, GA, June 2021, pp.327-330.

532. S.Jeong, J.Hester, R.Bahr and M.M.Tentzeris, "A Machine Learning Approach-based Chipless RFID System for Robust Detection in Real-world Implementations", Proc. of the 2021 International Microwave Symposium (IMS), Atlanta, GA, June 2021, pp.661-664.

533. A.D.Boursianis, M.Salucci, S.Koulouridis, A.Georgiadis, M.Tentzeris and S.K.Goudos, "Dual-Band Frequency Selective Surface Design Using Harris Hawks Optimization", Proc. of the 2021 10th International Conference on Modern Circuits and Systems Technologies (MOCAST), Thessaloniki, GREECE, July 2021,

534. C.A.Lynch, A.O.Adeyeye, A.Eid, J.G.D.Hester and M.M.Tentzeris, "5G/mm-Wave Next Generation RFID Systems for Future IoT Applications", Proc. of the 2021 IEEE International Conference on RFID Technology and Applications (RFID-TA), Delhi, INDIA, October 2021, pp.77-80.

535. G.D.Durgin, M.A.Varner, M.A.Weitnauer, J.Cressler, M.M.Tentzeris, A.Zajic, S.Zeinolabedinzadeh, R.Zekavat, K.Pahlavan, U.Guler and K.Van der Merwe, "Digital Spectrum Twinning and the Role of RFID and Backscatter Communications in Spectral Sensing", Proc. of the 2021 IEEE International Conference on RFID Technology and Applications (RFID-TA), Delhi, INDIA, October 2021, pp.89-92.

536. A.Eid, J.G.D.Hester and M.M.Tentzeris, "Solving the Gain/Coverage Problem to enable 5G-Powered IoT", Procs. of the 2021 Antenna Measurement Techniques Association Symposium (AMTA), Daytona Beach, FL, October 2021.

537. K.Hu, X.He and M.M.Tentzeris, "Flexible and Scalable Additively Manufactured Antenna Array Tiles for Satellite and 5G Applications Using a Novel Rugged Microstrip-to-Microstrip Transition", Procs. IEEE 2021 Antennas and Propagation Symposium, SINGAPORE, December 2021, pp.37-38.

538. A.O.Adeyeye, C.A.Lynch, M.M.Tentzeris and J.Hester, "24GHz RFID for Orientation Detection and Tracking Applications in Human Activity Recognition and Motion Capture", Procs. IEEE 2021 Antennas and Propagation Symposium, SINGAPORE, December 2021, pp.171-172.

539. M.Holda, Y.Cui, A.Nauroze, M.Tentzeris and P.Dahmen, "Pop-Up Card Inspired 3D-Printed Corner Reflector Antenna – A Novel Deployable Antenna", Procs. IEEE 2021 Antennas and Propagation Symposium, SINGAPORE, December 2021, pp.751-752.

540. A.Eid, M.M.Tentzeris, J.Zhu, L.Xu and J.Hester, "UHF Tags Array for Holographic Target Localization and Wireless Health Monitoring", Procs. IEEE 2021 Antennas and Propagation Symposium, SINGAPORE, December 2021, pp.1037-1038. ***[Best Student Paper Award]***

541. A.Alreshaid, Y.Cui, R.Bahr, M.M.Tentzeris and M.S.Sharawi, "A Millimeter Wave Tri-Polarized Patch Antenna with a Bandwidth-Enhancing Parasitic Element", Procs. IEEE 2021 Antennas and Propagation Symposium, SINGAPORE, December 2021, pp.1051-1052.

542. A.Eid, J.Hester and M.M.Tentzeris, “Optimizing Rotman Lens Topologies for 5G Wireless Grids”, Procs. IEEE 2021 Antennas and Propagation Symposium, SINGAPORE, December 2021, pp.1061-1062.

543. C.A.Lynch, A.O.Adeyeye, B.Tehrani and M.M.Tentzeris, “Flexible Passive Smart Skin Temperature Sensor for Remote Sensing in Structural Health Monitoring Applications”, Procs. IEEE 2021 Antennas and Propagation Symposium, SINGAPORE, December 2021, pp.1123-1124.

544. A.Eid, J.Hester and M.M.Tentzeris, “Extending the Range of 5G Energy Transfer: Towards the Wireless Power Grid”, Procs. 2022 16th European Conference on Antennas and Propagation (EuCAP), Madrid, SPAIN, March 2022.

545. C.A.Lynch, A.O.Adeyeye and M.M.Tentzeris, “ “Smart” Packaging of Self-Identifying and Localizable mmID for Digital Twinning and Metaverse Temperature Sensing Applications”, Procs. of the 2022 IEEE 72nd Electronic Components and Technology Conference (ECTC), San Diego, CA, May 2022, pp.87-92.

546. Y.Zhou, K.Hu, M.M.Tentzeris and S.K.Sitaraman, “Mechanical and Ka-Band Electrical Reliability Testing of Interconnects in 5G Wearable System-on-Package Designs Under Bending”, Procs. of the 2022 IEEE 72nd Electronic Components and Technology Conference (ECTC), San Diego, CA, May 2022, pp.914-923.

547. S.D.Assimonis, V.Fusco and M.M.Tentzeris, “Efficient Circular Polarized Metamaterial RF Energy Harvester for Wi-Fi Applications”, Procs.2022 International Workshop on Antenna Technology (iWAT), Dublin, IRELAND, May 2022, pp.150-152.

548. C.A.Lynch III, A.Adeyeye, A.Eid, J.Hester and M.M.Tentzeris, “Ultra-Long-Range Dual Rotman Lenses-Based Harmonic mmID’s for 5G/mm-Wave IoT Applications”, Procs. of the 2022 IEEE International Microwave Symposium (IMS), Denver, CO, June 2022.

549. A.Adeyeye, C.Lynch, J.Hester and M.M.Tentzeris, “A Machine Learning Enabled mmWave RFID for Rotational Sensing in Human Gesture Recognition and Motion Capture Applications”, Procs. of the 2022 IEEE International Microwave Symposium (IMS), Denver, CO, June 2022.

550. K.Hu, G.Soto-Valle, Y.Cui and M.M.Tentzeris, “Flexible and Scalable Additively Manufactured Tile-Based Phased Arrays for Satellite Communication and 5G mmWave Applications”, Procs. of the 2022 IEEE International Microwave Symposium (IMS), Denver, CO, June 2022.

551. R.Salvati, V.Palazzi, G.Cicioni, G.Simoncini, F.Alimenti, M.M.Tentzeris, P.Mezzanotte and L.Roselli, "Zero-Power Wireless Pressure Sensor based on Backscatter Harmonic Transponder in a WPT context", Proc. of the 2022 IEEE Wireless Power Week (WPW), Bordeaux, FRANCE, July 2022, pp.199-202.

552. K.Hu, Y.Zhou, S.K.Sitaraman and M.M.Tentzeris, "Fully Additively Manufactured Flexible Dual-Band Slotted Patch Antenna for 5G/mmW Wearable Applications", Proc. of the 2022 IEEE International Symposium on Antennas and Propagation (APS), Denver, CO, July 2022, pp.878-879.

553. A.Boursianis, M.S.Papadopoulou, S.Koulouridis, A.Georgiadis, M.M.Tentzeris and S.Goudos, "Dual-Band Frequency Selective Surface Design Using Artificial Hummingbird Algorithm", Proc. of the 2022 IEEE International Symposium on Antennas and Propagation (APS), Denver, CO, July 2022, pp.982-983.

554. M.Holda, Y.Cui, M.M.Tentzeris, A.Nauroze and P.Dahmen, "A Novel FSS-Enhanced Pop-Up Card Inspired Corner Reflector Antenna", Proc. of the 2022 IEEE International Symposium on Antennas and Propagation (APS), Denver, CO, July 2022, pp.1584-1585.

555. V.Palazzi, M.Tentzeris, F.Alimenti, P.Mezzanotte and L.Roselli, "A Novel Additively-Manufactured Pressure Transducer for Zero-Power Wireless Sensing", Proc. of the 2022 European Microwave Conference (EuMC), Milan, ITALY, September 2022, pp.68-71.

556.K.Hu, Y.Zhou, S.K.Sitaraman and M.M.Tentzeris, "Additively manufactured flexible material characterization and on-demand "smart" packaging topologies for 5G/mmwave wearable applications", Procs. of the 2023 IEEE 73rd Electronic Components and Technology Conference (ECTC), Orlando, FL, May 2023.

557.A.Eid, N.Rich, A.Hattori, I.-T.Chen, J.Hester and M.M.Tentzeris, "Deployable Origami Coils for Wireless UAV in-Flight Powering", Procs. of the 2023 IEEE Wireless Power Technologies Conference & Expo (WPTCE), San Diego, CA, June 2023. ***[Second Best Contribution Award]***

558.L.Smith, C.Lynch, C.A.Kaylor, L.A.Campos, L.Cheng, S.Ralph and M.M.Tentzeris, "A Converged Optical and mm-Wave Dual-Band Multi-Beam Rotman Lens Antenna System Enabling Simplified Designs of 5G/mmW Base Stations and Network Densification", Procs. of the 2023 IEEE International Microwave Symposium (IMS), San Diego, CA, June 2023.

559.C.A.Lynch III, G.Soto-Valle, J.Hester and M.M.Tentzeris, "mmIDs Enter the 3rd Dimension: A Camera Inspired Broadbeam High-Gain Retrodirective Backscatter Tag", Procs. of the 2023 IEEE International Microwave Symposium (IMS), San Diego, CA, June 2023.

560.I.-T.Chen, C.A.Lynch III, A.Eid, J.G.D.Hester and M.M.Tentzeris, "Rotman-Lens-Based Reconfigurable Intelligent Surface mmID with Energy Harvesting Capability", Procs. of the 2023 IEEE International Microwave Symposium (IMS), San Diego, CA, June 2023.

561.K.Hu, T.Callis and M.M.Tentzeris, "Additively Manufactured Flexible On-Package Phased Antenna Arrays with Integrated Microfluidic Cooling Channels for 5G/ mmWave System-on-Package Designs", Procs. of the 2023 IEEE International Microwave Symposium (IMS), San Diego, CA, June 2023.

562.M.Joshi, C.A.Lynch III, G.Soto-Valle, A.Adeyeye, R.Bahr and M.M.Tentzeris, "Machine Learning-Enhanced Gyro mmID-Sensor for Virtual Reality and Motion Tracking Applications", accepted for presentation to European Microwave Week (EuMW) 2023, Berlin, GERMANY, September 2023.

IV.C: OTHER PUBLICATIONS

1. E.Tentzeris, N.Dib, L.P.B.Katehi, J.Oswald and P.Siegel, "Modeling of Diode Mounting Structures Using the Finite Difference Time-Domain Method", Proc. of

the 1994 International Union of Radio Science (URSI) Symposium, p.277, Seattle, WA, June 1994.

2. K.Goverdhanam, E.Tentzeris and L.P.B.Katehi, "Macromodeling of Circuit Components for High-Frequency Applications", Proc. of the 1995 URSI Symposium, p.361, Newport Beach, CA, June 1995.
3. J.-G.Yook, E.Tentzeris and L.P.B.Katehi, "Parallelization of the Finite Difference Time-Domain Code on Shared Memory Machine", Proc. of the 1996 Progress in Electromagnetics Research Symposium (PIERS), p.85, Innsbruck, AUSTRIA, July 1996.
4. G.E.Ponchak, E.Tentzeris and L.P.B.Katehi, "Finite Ground Coplanar (FGC) Waveguide: A Better Transmission Line", Proc. of the 1998 PIERS Symposium, p.86, Nantes, FRANCE, October 1998.
5. E.M.Tentzeris, D.Staiculescu, N.G.Cafaro and J.Laskar, "Design and Optimization of Novel RF Packaging Structures Using Multiresolution and Statistical Schemes", Invited Paper in the 2000 PIERS Symposium, p.384, Boston, MA, July 2000.
6. N.Bushyager, B.McGarvey and E.M.Tentzeris, "Modeling of Photonic Bandgap (PBG) Devices Using MRTD Adaptive Schemes", Invited Paper in the 2000 PIERS Symposium, p.58, Boston, MA, July 2000.
7. D.Staiculescu, J.Laskar and E.M.Tentzeris, "Flip-Chip vs. Wirebond", Printed Circuit Design Magazine, pp.12-16, June 2002.
8. M.M.Tentzeris, R.Vyas, V.Lakafosis, T.Le, A.Rida and S.Kim, "Conformal 2D/3D Wireless Modules Utilizing Inkjet Printing and Nanotechnology", ***Cover Story*** in the Microwave Magazine, February 2012.

IV.D: PRESENTATIONS (Selected)

1. Invited Presentation in theWorkshop: "Multiresolution Techniques in Electromagnetics" in the 1998 IEEE AP-S Conference, Atlanta, GA, June 1998.
2. Invited Presentation in the Workshop: "Novel Full-Wave Techniques for HF Circuit Analysis" in the 1999 IEEE IMS (MTT-S) Conference, Anaheim, CA, June 1999.
3. Invited Presentation in the Workshop: "Time-Domain Techniques for Radiation Problems" in the 1999 AP-S Conference, Orlando, FL, July 1999.
4. Invited Presentation in the Short Course: "RF Packaging State-of-the-Art" in the 2000 NEPCONWest Conference, Anaheim, CA, March 2000.
5. Invited Presentations in the Workshops: "Novel Techniques for RF Packaging Design" in the 2000 IEEE-CPMT Conference, Las Vegas, NV, May 2000, 2001 IEEE-CPMT Conference, Orlando, FL, May 2001, 2002 IEEE-CPMT Conference, San Diego, CA, May 2002, 2003 IEEE-CPMT Conference, New Orleans, LA, May 2003 and 2004 IEEE-CPMT Conference, Las Vegas, NV, June 2004.
6. Invited Presentation in theWorkshop: "Time-Domain Techniques for the Design of RF Circuits" in the 2000 IEEE IMS (MTT-S) Conference, Boston, MA, June 2000.
7. Invited Presentations at the National Technical University Athens, Greece in July 2000 ("Wavelets and Electromagnetics") and October 2001 ("RF Packaging:Challenges and Future").
8. Invited Presentation in the Workshop: "High-Density/Multilayer RF Interconnects" in the 2001 IEEE IMS (MTT-S) Conference, Phoenix, AZ, May 2001.

9. Invited Presentation at Tokyo University of Technology, Tokyo, Japan ("RF Packaging Solutions for Wireless Communication Systems"), August 2001.
10. Yamacraw Invited Speaker at Georgia Southern University ("Broadband Wireless Access Hardware"), October 2001.
11. Invited Presentation at Ferdinand-Braun Institut, Berlin, Germany, ("Multigridding Approaches for the Modeling and Optimization of Vertically Integrated RF Modules"), July 2002.
12. Invited Presentation at IMEC Research Center, Leuven, Belgium, ("Challenges in RF/Wireless Packaging"), July 2002.
13. Invited Presentation at Tsinghua University, Beijing, China, ("Novel Solutions for RF/Wireless Multilayer Transceivers"), August 2002.
14. Invited Presentation at the Technical University of Munich, Germany, April 2003.
15. Invited Presentation at University of Illinois, Urbana Champaign, IL, April 2003.
16. Invited Presentation in the Workshop: "Concurrent EM, Mechanical and Thermal Modeling of RF MEMS" in the 2003 IEEE IMS (MTT-S) Conference, Philadelphia, PA, June 2003.
17. Invited Presentation in the Workshop: "Active and Integrated Antennas" in the 2003 IEEE IMS (MTT-S) Conference, Philadelphia, PA, June 2003.
18. Invited Presentation at ASME INTERPACK 2003 Symposium, Maui, HI, July 2003.
19. Invited Presentation to the NEC Headquarters, Kansai, Japan, August 2003.
20. Invited Presentation to the National Semiconductor Headquarters, San Jose, CA, August 2003.
21. Invited Presentation to the Siemens Headquarters, Munich, Germany, ("RF/WiFi/ mm-wave Modules: 3D Solutions and Materials"), August 2003.
22. Invited Presentation at the School of Physics, National University of Athens, Greece, ("RF/Wireless Integration: Challenges of the Future"), March 2004.
23. Invited Panelist at the 2004 TI System Hardware Design Symposium and Exhibition, Dallas, TX, May 2004.
24. Invited Presentation in the Workshop: "Active and Integrated Antennas" in the 2004 IEEE IMS (MTT-S) Conference, Fort Worth, TX, June 2004.
25. Invited Presentation at the Electrochemical Society Meeting in Honolulu, HI, October 2004.
26. Invited Presentations to National Semiconductor, Motorola, TI, Infineon, Siemens in 2005-2006.
27. Invited Presentation at UCLA WINMEC Conference, LA, CA, ("Fully Integrated and Packaged RFID's for Health-Related Applications"), October 2006.
28. Invited Presentation at the University of Illinois, Urbana-Champaign, IL, ("3D RF Integration and Packaging Using Conformal Organics"), October 2006.
29. Invited Presentation to the 3M Research Headquarters, Minneapolis, MN, ("Paper-Printed RFID and Wireless Sensors"), November 2006.
30. Invited Presentation to the AAPA Port Operation, Safety and Information Technology Seminar, Jacksonville, FL, ("RFID andWireless Modules: Challenges for Port-Authority Applications"), April 2007.
31. Invited Presentation at the Symposium in Honor of Prof. W.J.R.Hoefer, ("State-of-the-Art of RF/Wireless Packaging"), Technical University of Munich, GERMANY, May 2007.

32. Invited External PhD Committee "Challenging Member"/ Invited Presentation ("State-of-the-Art of RF/Wireless Paper-printed Electronics"), Mid-Sweden University, Sundsvall, SWEDEN, May 2007.
33. Invited Presentation in the Workshop: "RFID and Printed Electronics" in the 2007 IEEE IMS (MTT-S) Conference, Honolulu, HI, June 2007.
34. Invited Presentation at IEEE PIMRC2007, Athens, GREECE, ("RF Reconfigurable Fully-Packaged Modules for Telecom, Multimedia and Sensing Applications"), September 2007.
35. Invited Presentation at IEEE Eurasia RFID, Istanbul, TURKEY, ("Global Item Tracking Using RFID's"), September 2007.
36. Invited Presentation at National Technical University of Athens, GREECE, ("Paper-Based RF Electronics"), December 2007.
37. Invited Presentation at Ain Shams University, Cairo, EGYPT, ("Flexible Wireless Sensors"), May 2008.
38. Invited Presentation at IEEE COMCAS Meeting, Tel Aviv, ("Paper-based Wearable Sensors"), May 2008.
39. Invited Presentation at Port of Savannah E-Tag Roundtable, Savannah, GA, ("RFID's in a Globalized Port Environment"), June 2008.
40. Invited Presentation at MEMSWAVE Conference, Iraklion, GREECE, ("Paper: The Solution for Ubiquitous Wireless Sensors?"), July 2008.
41. Invited Presentation at LAAS 50th Anniversary Conference, Toulouse, FRANCE, ("Inkjet-Printed Electronics and Power Scavenging: The Path for Environmentally-Friendly Cognitive Intelligence"), October 2008.
42. Invited Presentation at IEEE ISAP Symposium, Taipei, Taiwan, ("Wearable Conformal Wireless Sensor Modules"), October 2008.
43. Invited Presentation at USNC/URSI 2009 Meeting, Boulder, CO, January 2009.
44. Invited Presentation at IEEE RAWCON 2009 Conference, San Diego, CA, January 2009.
45. Invited Presentation at the University of Perugia, Perugia, Italy, March 2009.
46. Invited Presentation at Pischiello Research Center, Pischiello, Italy, March 2009.
47. Invited Presentation at EU Comission, Brussels, Belgium, March 2009.
48. Invited Presentation at IEEE RFID 2009, Orlando, FL, April 2009.
49. Invited Presentation at National Semiconductors (NSC), Norcross, GA, May 2009.
50. Invited Presentation at Dublin Institute of Technology (DIT), Dublin, Ireland, June 2009.
51. Invited Presentation at Heriott-Watt University, Edinburgh, June 2009.
52. Invited Presentation at IEEE Geoscience and Remote Sensing Conference 2009 (IGARSS), Cape Town, July 2009.
53. Invited Presentation at University of Galway, Galway, Ireland, July 2009.
54. Invited Presentation at e-Democracy Conference 2009, Athens, Greece, September 2009.
55. Invited Presentation at COST IC803 Action Meeting, Athens, Greece, October 2009.
56. Invited Presentations at CSIRO/ICT Centre, Sydney, Australia; University of New South Wales, Sydney, Australia; Macquarie University/IEEE New South Wales Section, Sydney, Australia; Monash University, Melbourne, Australia, October 2009.

57. Invited Presentation at the IEEE Sensors 2009 Conference, Christchurch, New Zealand, October 2009.
58. Invited Presentations at National University of Singapore (N.U.S.) and at IEEE RFIT 2009, Singapore, Singapore, December 2009.
59. Invited Presentation at IEEE RAWCON 2010 Conference, New Orleans, LA, January 2010.
60. Invited Presentation at NEDO workshop, Hakone, Japan, February 2010.
61. Invited Presentations at the University of Brazilia, University of Sao Paolo, University of Campinas in Brazil, March 2010.
62. Invited Presentation at the University of Wisconsin, Madison, WI, April 2010.
63. Invited Presentation at GTRI-SEAL, Smyrna, GA, April 2010.
64. Invited Presentation at the IFC-SRC Workshop at M.I.T., Cambridge, MA, May 2010.
65. Plenary IEEE DML Presentation at the European Microwave Week 2011, Paris, FRANCE, October 2010.
66. Invited Presentation at the Asian Pacific Microwave Symposium 2011, Yokohama, JAPAN, December 2010.
67. Invited Presentation at the IEEE RWS Symposium 2011, January 2012.
68. Invited Presentation at the PIERS 2011, Marrakech, MOROCCO, March 2011.
69. Invited IEEE DML Presentation at the University of Valetta, MALTA, March 2011.
70. Invited Presentation at the European Antennas and Propagation Symposium (EuCAP 2011), April 2011.
71. Invited/Featured Presentation at the URSI General Assembly 2011, Istanbul, TURKEY, August 2011.
72. Invited Presentation at the 8th IDGA Military Antennas Coference, Washington, DC, September 2011.
73. ***Plenary Talk*** at the 2011 IEEE Conference on RFID and Technical Applications (RFID-TA), Barcelona, SPAIN, September 2011.
74. ***Invited Presentation*** at IEEE MTT Dallas Section, 2011.
75. Invited Presentation at the 2011 European Microwave Conference, Manchester, UK, October 2011.
76. Invited Presentation at the 2011 CLASTECH Conference, El Segundo, CA, October 2011.
77. Invited Presentation at the IEEE Sensors 2011, Athlone, IRELAND, October 2011.
78. Invited DML Presentation at Tyndall Institute, Cork, IRELAND, November 2011.
79. Invited Presentation at 2011 IDTEX Conference on Energy Harvesting and Wireless Sensor Networks, Boston, MA, November 2011.
80. Invited Presentation at the 2011 ST Energy Harvesting Council, Aix-en-Provence, FRANCE, December 2011.
81. Invited DML Talk at the 2011 IEEE International RF and Microwave Conference (RFM 2011), Seremban, MALAYSIA, December 2011.
82. Invited Presentation at the IEEE WiSNet Symposium 2012, Santa Clara, CA, January 2012.
83. ***Keynote talk*** at the International School on Internet of Things (IoT), Aveiro, PORTUGAL, January 2012.
84. Invited Presentation at the 2012 Winter Enrichment Program (WEP) 2012, Jeddah, Saudi Arabia, January 2012.
85. Invited Presentation at the NSF/SRC/SFI Joint meeting, IRELAND, March 2012.

86. ***Keynote Prsesentation*** at the IEEE APEMC2012 Conference ("Millimeter-Wave and Nanotechnology: The path to "green" electronics?"), SINGAPORE, May 2012.
87. ***Plenary Talk*** at the 2012 Radio Conference, MAURITIUS, September 2012.
88. Invited DML Presentation at University of Alberta, Edmonton, CANADA, February 2013.
89. ***Panelist*** in the "Wireless Power" panel in IEEE Wireless Symposium, Beijing, CHINA, April 2013.
90. Invited Presentation at the 60th Anniversary NJUST Workshop on RF and Microwave/mmW Technologies and Applications, Nanjing, CHINA, September 2013.
91. ***Plenary Talk*** at the 2013 IEEE RFID-TA Conference, Malaysia, September 2013.
92. ***Plenary Talk*** at the 2013 PACO Conference, Gardanne/Aix-en-Provence, FRANCE, October 2013.
93. Invited presentation at IWS2014 Symposium, Xi'an, CHINA, March 2014.
94. Invited presentation at MIKON 2014 Conference, Gdansk, POLAND, June 2014.
95. Invited DML talks in Poland (Krakow, Gdansk, Warsaw), June 2014.
96. Invited DML Talks in Indonesia (Jakarta, Yogyakarta and Bali), September 2014.
97. Invited DML Talks in Peru (Lima, Arequippa, Chiclayo and Puno), March 2015.
98. Invited DML/CRFID-DL talk on Internet of Things, Alexandria, VA, March 2016.
99. Invited Presentation at University of Minnesota ECE Colloquium, March 2016.
    Invited Presentation at the 2016 AFRL Workshop on RF Reconfigurable Electronics, Arlington, VA, May 2016.
100. Invited Talk at Physics Colloquium, Georgia Southern University, Statesboro, GA, August 2016.
101. Keynote University Speaker at Altair/Georgia Tech Symposium, November 2016.
102. Invited IEEE MTT-S Webinar Speaker on "3D Printed RF Circuits", March 2017.
103. Invited Talks at NTU-MediaTek Workshops 2017 and 2018, SINGAPORE, January 2017 and January 2018.
104. Invited Talk at ICNC 2018 Conference, Maui, HI, March 2018.
105. Invited Talk at CMOC 2018 Symposium, Orange, CT, April 2018.
106. Invited Talk at MITRE Symposium on Additive Manufacturing of Antennas and EM Structures, McLean, VA, April 2018.
107. Invited talk at IEEE ETCMOS 2018 Conference, Whistler, CANADA, May 2018.
108. Invited Talk at 2018 TechConnect World Innovation Conference, Anaheim, CA, May 2018.
109. Invited Tutorial on Inkjet-Printed RFID-Enabled Wireless Sensors, Ottawa, CANADA, August 2018.
110. Invited SRC/GRC e-Workshop on Printed RF Elecgtronics, October 2018.
111. Distinguished Guest Lecture at ARIA European School of Antennas 2018, Beirut, LEBANON, October 2018.
112. ***Keynote Presentation*** at the IEEE WiSEE Conference 2018, Huntsville, AL, December 2018.
113. Invited Talk at ICNC 2019 Conference, Honolulu, HI, March 2019.
114. Invited Talk at University of Hawaii, Honolulu, HI, March 2019.
115. Invited Talk at the University of Alabama, Tuscaloosa, AL, April 2019.
116. Invited Talk at the University of Southern California, LA, April 2019.
117. ***Keynote Presentation*** at the 7th International Symposium on Deformation Characteristics of Geomaterials (IS-Glasgow 2019), Glasgow, UK, June 2019.

118. Invited Talk at American University of Beirut, Beirut, LEBANON, September 2019.
119. Invited Talk at 2019 EMN Meeting on Flexible Electronics, Dubrovnik, CROATIA, October 2019.
120. Invited Talk at the Workshop "Get Started with Flexible Hybrid Electronics", Fraunhofer EMFT, Munich, GERMANY, October 2019.
121. Invited Talk at European School of Antennas-ARIA, Nice, FRANCE, November 2019.
122. Invited Talk at Fraunhofer IHP, Frankfurt (Oder), GERMANY, December 2019.
123. Invited Talk at TEDxEmory 2020, February 2020.
124. Invited Talk at MIT Horizons Series 2020, June 2020.
125. Invited IEEE CRFID Distinguished Lecture, IEEE PES Kerala Chapter, INDIA, June 2020.
126. ***Keynote Talk*** at Mediterranean Microwave Symposium (MMS) 2020, MOROCCO, December 2020.
127. Invited Talk at Virtual Vertical and Topical IoT Summit at IEEE Radio and Wireless Week – RWW 2021, USA, January 2021.
128. ***Keynote Talk*** at 6th ICREGA 2021, UAE, February 2021.
129. Invited Talk at IEEE International Conference on Flexible Printable Sensors and Systems (FLEPS) 2021 Conference, June 2021.
130. Invited Presentation at 32nd Annual Electronics Packaging Symposium, Binghamton University, NY, USA, September 2021.
131. Invited Presentation at IRTG Energy Conversion System Series, FIU, GERMANY, September 2021.
132. Invited Presentation at Space Solar Power Workshop, IEEE WiSee 2021, USA, October 2021.
133. Invited Lecture at US Government Seminar on Smart Materials and Intelligent Systems (SMIS), The MITRE Corporation, October 2021.
134. ***Keynote Speech***, International Emerging Technologies Competition (IETC) 2021, Universiti Teknology PETRONAS, MALAYSIA, October 2021.
135. ***Keynote Speaker***, SBMO/IEEE International Microwave and Optoelectronics Conference (IMOC 2021), BRAZIL, October 2021.
136. Invited Lecture at Korean Institute of Electromagnetic Engineering and Science (KIEES 2022) Tutorial on Backscattering Communication, KOREA, February 2022.
137. Invited Lecture at International Workshop on Antenna Technology 2022 (iWAT 2022), Dublin, IRELAND, May 2022.
138. ***Plenary Speaker,*** IEEE SpliTech International Conference on Smart and Sustainable Technologies 2022, Split and Bol, CROATIA, July 2022.
139. ***Keynote Speaker***, International Workhop on Antenna Technologies in Shenzhen University (IWAT-SZU 2022), Shenzhen, PR China, July 2022.
140. ***Plenary Speaker,*** EMN Eurosensors 2022 Conference, Leuven, BELGIUM, September 2022.
141. Invited Talk at ICNC 2023 Conference, Honolulu, HI, February 2023.
142. ***Keynote Speaker,*** IEEE MTT-S Latin America Microwave Conference (LAMC-2023), San Jose, COSTA RICA, December 2023.

IV.E: OTHER SCHOLARLY ACCOMPLISHMENTS – PATENTS (more pending)

1. R.Li, E.M.Tentzeris and J.Laskar, "Multiband Broadband Planar Wire Antennas for Wireless Communication Handheld Terminals", US Patent 6,917,339.
2. M.G.Allen, Y.-K.Yoon, J.-W.Park, Y.-H.Joung, F.Cros, I.Papapolymeroy, E.M.Tentzeris and B.Pan, "Surface Micromachined Millimeter-Scale RF System and Method", US Patent 7,196,666.
3. E.Gebara, J.Laskar and E.M.Tentzeris, "Method and system for antenna interference cancellation", US Patent 7,366,244, US Patent 7,729,341 and EP Patent 1,687,929.
4. D.Thompson, G.Wang, N.D.Kingsley, I.Papapolymerou, E.M.Tentzeris, R.Bairavasubramanian, G.DeJean and R.L.Li, "Multilayer Electronic Component Systems and Methods of Manufacture", US Patent 7,834,808.
5. E.Gebara, A.J.Kim, J.Laskar, A.Stelliga and E.M.Tentzeris, "Method and System for Reducing Signal Interference", US Patent 7,522,883.
6. J.S.Lee, P.D.Schmalenberg, A.Rida, R.L.Li and E.M.Tentzeris, "Microwave Antenna", US Patent 8,325,092.
7. E.Gebara, A.J.Kim, J.Laskar, A.Stelliga and E.M.Tentzeris, "Reducing signal interference", US Patent 8,503,940.
8. J.S.Lee, P.D.Schmalenberg, A.Rida, R.L.Li and E.M.Tentzeris, "Antenna with tapered array", US Patent 8,743,016.
9. A.Rida, L.Yang, A.Margomenos and M.Tentzeris, "Three-dimensional array antenna on a substrate with enhanced backlobe suppression for mm-wave automotive applications", US Patent 8,786,496.
10. S.Georgakopoulos, E.Tentzeris and B.Cook, "Origami folded antennas", US Patent 9,214,722.
11. M.Tentzeris and B.Cook, « Additively deposited electronic components and methods for producing the same », US Patent 9,343,233.
12. S.Georgakopoulos and M.Tentzeris, « Misalignment Insensitive Wireless Power Transfer », US Patent 9,406,435
13. S.Georgakopoulos, M.Tentzeris and O.Jonah, « Multi-band and broadband wireless power transfer through embedded geometric configurations », US Patent 9,466,418
14. X.Yi, C.Cho, B.Cook, Y.Wang, M.Tentzeris and R.T.Leon, « Frequency doubling antenna sensor for wireless strain and crack sensing », US Patent 9,506,848.
15. H.Griguer, M.M.Tentzeris, M.Drissi, « Device for Protecting the Human Body and Equipment Against Electromagnetic Radiation », International Patent WO2018236202.
16. S.Georgakopoulos and M.Tentzeris, « Wireless power transfer through embedded geometric configurations », US Patent 9,799,443.
17. J.Hester and E.M.Tentzeris, « Inkjet Printed Flexible Van Atta Array Sensor », US Patent 10,511,100.
18. J. Bito and E.M.Tentzeris, « Hybrid Energy Harvesting Systems and Devices Incorporating the Same », US Patent 10,566,844.
19. N.Arora, G.D.Abowd, M.Gupta, D.Osorio, S.F.Shahmiri, T.E.Starner, Y.-C.Wang, Z.Wang, Z.L.Wang, S.L.Zhang, P.McAughan, Q.Xue, D.Bansal, R.Bahr and E.Tentzeris, « Thin and flexible self-powered vibration transducer employing triboelectric nanogeneration », US Patent 10,932,063.
20. A.Eid, J.G.D.Hester and M.Tentzeris, « High gain and large beamwidth rotman-lens-based and mm-wave energy harvester systems and associated methods », WIPO (PCT) W02020223486A1
21. J.G.D.Hester and E.M.Tentzeris, « System for Sensing Backscatter Tag Communications from Retrodirective Antenna Arrays », US Patent 11,474,233.

V: SERVICE
V.A. PROFESSIONAL CONTRIBUTIONS
V.A.1. Conference Leadership (Selected)

- Co-Chair in 2023 IEEE WPTCE Conference, San Diego, CA, June 2023.
- Multi-Society Panel Session Organizer and Chair in 2023 IEEE IMS Conference, San Diego, CA, June 2023.
- Co-Chair in 2019 IEEE Antenas and Propagation Conference (AP-S), Atlanta, GA, July 2019.
- ADCOM Member of IEEE CRFID, 2017-present.
- Panel Session Organizer and Chair in 2011 IEEE RFID-TA Conference, Barcelona, SPAIN, September 2011.
- Technical Program Chair in 2008 IEEE IMS hold in Atlanta, GA, June 2008.
- Technical Program Co-Chair in 2009 ACES Conference hold in Monterey, CA, March 2009.
- Interactive Forum Chair in 2009 IEEE APS Conference, Charleston, SC, May 2009.
- Panel Session Organizer in 2010 IEEE ECTC Conference, Las Vegas, NV, June 2010.
- Member of the Technical Program Committee (TPC) of the annual IEEE International Microwave Symposium (IEEE-IMS), June 2001-present.
- Member of the Technical Program Committee (TPC) of the annual IEEE Antennas and Propagation Symposium (IEEE-APS), January 2001-present.
- Member of the Technical Program Committee (TPC) of the annual IEEE Electronic Components and Technology Conference (IEEE-ECTC), June 2003-present.
- Member of the Technical Program Committee (TPC) of the annual IEEE Vehicular Technology Conference (IEEE-TC), September 2006-September 2009.
- Member of the Technical Program Committee (TPC) of the annual European Microwave Conference (EuMC), January 2008-present.
- Member of the International Advisory Committee of 2007 PIERS Conference held in Pisa, ITALY, March 2007.
- Member of the International Program Committee of annual IASTED International WOC Conference held in Banff, CANADA, June 2004-present.
- Member of the Technical Program Committee of 2007 IEEE Conference on Wireless Rural and Emergency Communications (WRECOM), Rome, ITALY, October 2007.
- Conference Chairman of 2005 IEEE CEM-TD held in Atlanta, GA, in September 2005.
- Member of the International Advisory Committee of 2007 IEEE CEM-TD Conference held in Perugia, ITALY, in October 2007.
- Technical Program Co-Chair in ARFTG Conference, Atlanta, GA, December 1999.
- Vice-Chair of the IEEE Components Packaging, and Manufacturing Technology Society (IEEE-CPMT) Technical Committee TC16 (RF Subcommittee), January 2000-2005.
- Chair: Numerous Special/Regular Sessions in IEEE IMS, RAWCON, APS, APMC and EuMW Conferences

- Organizer of 20+ Workshops/Short Courses in IEEE IMS, APS, EuMW, APMC, RWS.
- Founder and organizer of numerous panels and special sessions on mmID (millimeter-wave RFID's) and millimeter-wave automotive radars.

V.A.2. Other Conference Activities

- Member of the Student Paper Contest Committee, 2000 IEEE-IMS Conference, Boston, MA, June 2000.
- Member of the Student Paper Contest Committee, 2010 IEEE RFID-TA Conference, Guangzhou, CHINA, June 2010.
- Member of the Student Paper Contest Committee, 2011 IEEE RFID-TA Conference, Barcelona, SPAIN, September 2011.
- Member of the Student Paper Contest Committee, 2012 IEEE RWS Symposium, Santa Clara, CA, January 2012.
- Member of the Steering Committee and the Student Paper Contest Committee, 1998 IEEE-AP Conference, Atlanta, GA, June 1998.

V.A.3. Editorial/Reviewer Activity

- Member of the Editorial Board, Proceedings of IEEE, 2019-2022
- Guest Editor for the Special Issue of Proceedings of IEEE ("Energy Harvesting Systems") to be published in November 2014.
- Associate Editor for the IEEE Transactions on Microwave Theory and Techniques from June 2007-June 2009.
- Guest Editor for the Special Issue of IEEE Transactions on Microwave Theory and Techniques ("RFID Architectures") published in May 2009.
- Associate Editor for the ETRI Journal from May 2009-May 2010.
- Associate Editor at the ACES Society Newsletter from April 2001-April 2005.
- Associate Editor at the International Journal of Antennas and Propagation (IJAP) from 11/1/2006-11/1/2007.
- Guest Editor for the Special Issue on RFID's of the Proceedings of European Microwave Association published in December 2007.
- Guest Editor for the Special Issue of International Journal of Antennas and Propagation ("Conformal Antennas") to be published in December 2012.
- Guest Editor for International Journal of Numerical Modeling for 2006.
- Member of the NSF Proposal Reviewers' Panels of 5/30-5/31/00, 5/17-5/18/01, 4/15-4/16/02, 6/15-6/16/02, 12/15-12/16/03, 10/21-10/22/04, 5/15-5/16/06, 11/24-11/25/08, 6/7-6/8/10, 1/5-1/6/12, 3/13, 10/27-10/28/14, 10/25/16, 3/29-3/30/17, 2/20-2/21/18, 5/1-5/2/18, 10/23-10/24/18, 4/15-4/16/20
- Member of the Proposal Reviewers' Committee for NSERC (Canada), ISF (Israel), CRDF (U.S.A.), DFG (Germany), Singapore Research Foundation (Singapore), Hong Kong Research Committee (China), KAUST (Saudi Arabia), State of Indiana Research Committee (U.S.A.), State of S.Carolina Research Committee (U.S.A.), EPSRC (U.K.), ANR (France), Austrian Science Fund-FWF (Austria).
- *Reviewer:* IEEE Transactions on Microwave Theory and Techniques (54 papers, 1996-present), IEEE Transactions on Antennas and Propagation (36 papers, 1997-present), The International Journal of Microcircuits and Electronic Packaging (3 papers, 1998 present), IEEE Microwave and Guided Wave Letters/ Microwave and Wireless Components Letters (39 papers, 1998-present), IEEE

Transactions on Electromagnetic Compatibility (8 papers, 2000-present), International Journal of Numerical Modeling (12 papers, 2000-present), International Journal of Electronics (2 papers, 2001-present), IEEE Transactions on Advanced Packaging (58 papers, 2002-present), Journal of the Optical Society of America (5 papers, 2000-present), IEEE Transactions on Components and Packaging (6 papers, 2002-present), IEEE Transactions on Signal Processing (3 papers, 2002-present), IEEE Electron Devices Letters (4 papers, 2003-present), IEEE Transactions on Electron Devices (2 papers, 2005-present), International Journal of RF and Microwave Computer-Aided Engineering (10 papers, 2003-present), IEEE/ASME Journal on MEMS (3 papers, 2004-present), SPIE OE Journal (2 paper, 2004-present), IEEE Transactions on Circuits and Systems I, (3 paper, 2004-present) ETRI Journal (10 papers, 2006-present), Radio Science Journal (5 papers, 2004-present), Measurement Science and Technology Journal (3 papers, 2007-present), IEEE Sensors Journal (2 papers, 2007-present), International Journal of Microwave Science and Technology (1 paper, 2007-present), IEEE Microwave Magazine (1 paper, 2007-present), IEEE/ OSA Journal of Lightwave Technology (2 papers, 2007-present), IEEE Design and Test of Computers (2 papers, 2007-present), IEEE Antennas and Propagation Magazine (1 paper, 2007-present), Journal of Electronic Imaging (1 paper, 2007-present).

V.A.4. Professional Society Activity

- IEEE, Fellow, (MTT, AP, CPMT Societies), 2010-present.
- IEEE CRFID Committee/Council (IEEE Inter-Society Committee on RFID Technologies) Founding Member (2008) and Secretary-Treasurer since 2011.
- IEEE MTT TC-24 (RFID) Founder-Chair, 2009-present.
- IEEE MTT TC-25 (Nanotechnology) Founder-Member, 2010-present.
- IEEE MTT TC-26 (Wireless Power Transfer) Founding Member, 2011-present
- IEEE MTT Representative at the IEEE CRFID Committee, 2009-2015.
- URSI, Member (Commission D), 1999-present.
- PIERS, Fellow, 2007-present.
- IEEE MTT-15 Committee, Member, 2006-2008.
- IEEE CPMT TC-16 Committee, Member, 2002-present [Vice-Chair:2003].
- European Microwave Association (EuMA), Associate Member, 2005-present.
- Technical Chamber of Greece, Member, 1993-present.
- Chairman of the IEEE MTT/AP Atlanta Chapter from 1/1/02-12/31/02.
- Member of the Board Committee of the IEEE MTT/AP Atlanta Chapter from 1999-2002.

V.A.5. Professional Collaborations/Technical Advising

• Northrop, Rockwell-Collins, Raytheon, Motorola, Intel, IBM, Google, Lockheed, National Semiconductors, Kyocera, Asahi, NEDO, FHWA, Rogers, Siemens, Lucent, Hitachi, Intracom, Samsung-Techwin, ETRI, Manheim, Port of Savannah, Avery-Denison, 3M, Excelletron, Infineon, Dimatix, DELL, Microsoft Research Center, Toyota TEMA, NASA Glenn/Lewis Center, Qualcomm, Eaton Corporation, Samsung, Honeywell

• University of Michigan, Ann Arbor, MI 9/92-5/98

Graduate Research Assistant (GSRA) with the Radiation Laboratory.

• Jet Propulsion Laboratory (J.P.L.), Pasadena, CA 9/92-6/94

Collaborator on Optimization of Novel Waveguide Probes.
• National Technical University of Athens, GREECE 9/90-8/92
Research Assistant with the Microwaves Laboratory.

V.B. CAMPUS CONTRIBUTIONS

- Associate Director for RFID and Sensors Research at Georgia Electronic Design Center (GEDC), 8/1/05-12/09.
- Associate Director for RF Research at Georgia Tech Packaging Research Center (PRC), 8/1/03-8/1/05.
- Chair of ECE Electromagnetics Technical Interest Group, 2011-2012.
- Member of the ECE RPT Committee, Fall 2011.
- Active member of the Georgia Tech ORS Program, 9/2008-Present.
- Member of the ECE Graduate Recruitment Committee, 9/1/00-8/31/02.
- Leader of the Novel Integration Techniques Subthrust of the Broadband Hardware Access Thrust of the Yamacraw Initiative of the State of Georgia, 1/1/00-8/1/05.
- Member of the ECE Research Committee, 9/98-8/00, 9/02-5/2004.
- Member of the ECE Education / Research Technology Transfer Committee, 9/2004-5/2005.
- Member of the ECE Graduate Student Recruitment Committee, 9/2005-5/2006.
- Member of the ECE Undergraduate Committee, 9/2006-5/2009.
- Member of the ECE Undergraduate Curriculum Committee, 9/2009-5/2011.
- Head of the RF Alliance of Georgia Tech Packaging Research Center (PRC), 1/1/01-12/31/06.
- Member of Georgia Tech Broadband Institute (GTBI), 9/1/99-5/2004.
- Member of M.Sc. Thesis (21), Ph.D. Qualifying Exam (19), Ph.D. Thesis Proposal (62) and Ph.D. Thesis Defense (65) Committees

VI. EXPERT WITNESS/LITIGATION EXPERIENCE

- LG vs. NFCT IPR: 2014 [Fish & Richardson P.C.] / 2 patents ***(all claims accepted by IPTO)***
- HTC vs. NFCT IPR: 2014-2015 [Perkins Coie LLP]; deposed on 4/30/15, 5/1/15, 9/30/15 and 11/19/15 / 2 patents ***(all claims accepted by IPTO)***
- HID vs. Morphotrust: 2017-2018 [Finnegan]; deposed on 5/25/18 / 4 IPRs ***(all claims accepted by IPTO)***
- DeCurtis vs Carnival Cruises: 2021 [Quinn Emmanuel]; deposed on 10/25/21
- 5 Additional IPR Cases
- References: Ai Bing (Perkins Coie), Miguel Bombach (Perkins Coie), Won Yoon (Fish & Richardson), David Seastrunk (Finnegan), Patrick Schmidt (Quinn Emmanuel)

PTO/SB/57 (01-18)
Approved for use through 11/30/2024. OMB 0651-0064
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

(Also referred to as FORM PTO-1465)

REQUEST FOR *EX PARTE* REEXAMINATION TRANSMITTAL FORM

Address to:
Mail Stop *Ex Parte* Reexam
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attorney Docket No.: SKAD002

Date: October 12, 2023

1. ■ This is a request for *ex parte* reexamination pursuant to 37 CFR 1.510 of patent number 11,349,200 issued May 31, 2022. The request is made by:
   ☐ patent owner. ■ third party requester.

2. ■ The name and address of the person requesting reexamination is:
   Unified Patents, LLC
   4445 Willard Avenue, Suite 600
   Chevy Chase, Maryland 20815

3. Requester ☐ asserts small entity status (37 CFR 1.27) or ☐ certifies micro entity status (37 CFR 1.29). Only a patent owner requester can certify micro entity status. Form PTO/SB/15A or B must be attached to certify micro entity status.

4. This request is accompanied by payment of the reexamination fee as set forth in:
   ■ 37 CFR 1.20(c)(2); **or**
   ☐ 37 CFR 1.20(c)(1). **In checking this box for payment of the fee set forth in 37 CFR 1.20(c)(1), requester asserts that this request has forty (40) or fewer pages and complies with all other requirements of 37 CFR 1.20(c)(1).**

   Payment of the reexamination fee is made by the method set forth below.
   a. ☐ A check in the amount of $_____ is enclosed to cover the reexamination fee;
   b. ■ The Director is hereby authorized to charge the reexamination fee to Deposit Account No. 50-6990;
   c. ☐ Payment by credit card. Form PTO-2038 is attached; **or**
   d. ☐ Payment made via EFS-Web.

   ■ In addition, the Director is hereby authorized to charge any fee deficiencies to Deposit Account No. 50-6990.

5. ■ Any refund should be made by ☐ check or ■ credit to Deposit Account No. 50-6990. 37 CFR 1.26(c). If payment is made by credit card, refund must be to credit card account.

6. ■ A copy of the patent to be reexamined having a double column format on one side of a separate paper is enclosed. 37 CFR 1.510(b)(4).

7. ■ CD-ROM or CD-R in duplicate, Computer Program (Appendix) or large table
   ☐ Landscape Table on CD

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0064. Public burden for this form is estimated to average 18 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **If filing this completed form by mail, send to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

8. ☐ Nucleotide and/or Amino Acid Sequence Submission
If applicable, items a. – c. are required.
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM (2 copies) or CD-R (2 copies) **or**
      ii. ☐ paper
   c. ☐ Statements verifying identity of above copies.

9. ■ A copy of any disclaimer, certificate of correction or reexamination certificate issued in the patent is included.

10. ■ Reexamination of claim(s) 11-12 is requested.

11. ■ A copy of every patent or printed publication relied upon is submitted herewith including a listing thereof on Form PTO/SB/08, PTO-1449, or equivalent.

12. ■ An English language translation of all necessary and pertinent non-English language patents and/or printed publications is attached.

13. ■ The attached detailed request includes at least the following items:
   a. A statement identifying each substantial new question of patentability based on prior patents and printed publications. 37 CFR 1.510(b)(1).
   b. An identification of every claim for which reexamination is requested, and a detailed explanation of the pertinency and manner of applying the cited art to every claim for which reexamination is requested. 37 CFR1.510(b)(2).

14. ☐ A proposed amendment is included (only where the patent owner is the requester). 37 CFR 1.510(e).

15. ■ It is certified that the statutory estoppel provisions of 35 U.S.C. 315(e)(1) or 35 U.S.C. 325(e)(1) do not prohibit requester from filing this *ex parte* reexamination request. 37 CFR 1.510(b)(6).

16. Service
   a. ■ It is certified that a copy of this request (if filed by other than the patent owner) has been served in its entirety on the patent owner as provided in 37 CFR 1.33(c).

      The name and address of the party served are:
      27896 - EDELL, SHAPIRO & FINNAN, LLC
      9801 Washingtonian Blvd., Suite 750
      Gaithersburg, Maryland 20878

      Date of Service: October 12, 2023

   OR

   b. ☐ A duplicate copy is enclosed since service on patent owner was not possible. An explanation of the efforts made to serve patent owner **is attached**. See MPEP 2220.

17. Correspondence Address: Direct all communication about the reexamination to:

☐ The address associated with Customer Number:

OR

☒ Firm or Individual Name Christopher J. Coulson
(at the address identified below)

Address
Skadden, Arps, Slate, Meagher & Flom LLP, One Manhattan West, 30th Floor

City: New York | State: New York | Zip: 10001

Country: United States

Telephone: 212-735-3000 | Email: chris.coulson@skadden.com

18. ☒ The patent is currently the subject of the following concurrent proceeding(s):

a. ☐ Copending reissue Application No. _____

b. ☐ Copending reexamination Control No. _____

c. ☐ Copending Interference No. _____

d. ☒ Copending litigation styled:

Fractus, S.A. v. ADT LLC d/b/a ADT Security Services, No. 2:22-cv-00412 (E.D. Tex. filed Oct. 21, 2022)

Fractus, S.A. v. Vivint, Inc., No. 2:22-cv-00413 (E.D. Tex. filed Oct. 21, 2022)

WARNING : Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

/Christopher J. Coulson/ — Authorized Signature

October 12, 2023 — Date

Christopher J. Coulson — Typed/Printed Name

61,771 — Registration No.

☐ For Patent Owner Requester ☒ For Third Party Requester

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013). https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

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If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

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Additional USPTO uses of the information in this record may include disclosure to: 1) the International Bureau of the World Intellectual Property Organization, if the record is related to an international application filed under the Patent Cooperation Treaty; 2) the public i) after publication of the application pursuant to 35 U.S.C. 122(b), ii) after issuance of a patent pursuant to 35 U.S.C. 151, iii) if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections, or an issued patent, or iv) without publication of the application or patent under the specific circumstances provided for by 37 CFR 1.14(a)(1)(v)-(vii); and/or 3) the National Archives and Records Administration, for inspection of records.

EXHIBIT 1009
DECLARATION OF MANOS M. TENTZERIS, PH.D.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent of Carles Puente Baliarda, et al.	§ Attorney Docket No.: SKAD002
U.S. Patent 11,349,200	§
Issue Date: May 31, 2022	§
Filing Date: April 30, 2021	§ Real Party in Interest:
For: Multiple-body-configuration multimedia and smartphone multifunction wireless devices	§ Unified Patents, LLC
	§

DECLARATION OF MANOS M. TENTZERIS, PH.D.

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I. BACKGROUND AND QUALIFICATIONS

1. My name is Manos M. Tentzeris, and I am over 21 years of age and otherwise competent to make this Declaration. I make this Declaration based on facts and matters within my own knowledge and on information provided to me by others, and, if called as a witness, I could and would competently testify to the matters set forth herein.

2. I have been retained as a technical expert witness in this matter by Counsel for Unified Patents, LLC ("Requester") to provide my independent opinions on certain issues requested by counsel for Requester relating to the accompanying Request for Reexamination ("Request") of U.S. Patent No. 11,349,200 ("the '200 Patent"), challenging claims 11-12. My compensation in this matter is not based on the substance of my opinions or on the outcome of this matter. I have been informed that Fractus, S.A. ("Fractus" or "Patent Owner") is the purported owner of the '200 Patent. I note that I have no financial interest in Requester or Patent Owner, and I have no other interest in this matter's outcome.

3. Between 1991 and 1992, I was a research assistant in the Microwave Lab at the National Technical University of Athens, Greece. I received the Diploma degree in Electrical Engineering and Computer Science (Magna Cum Laude) from the that University 1992.

4. From 1992 to 1998, I was a research assistant in the Radiation Laboratory at the University of Michigan, Ann Arbor. I received M.S. and Ph.D. degrees in Electrical Engineering and Computer Science from the University of Michigan in 1993 and 1998. I became an assistant professor at the School of Electrical and Computer Engineering ("ECE") at Georgia Technical Institute in 1998, lasting until I became an Associate Professor in the same School in 2004. I then served as Associate Professor until my promotion to Professor in 2016, a title I have held since then. Also in 2016, I was appointed as the Ken Byers Professor in Flexible Electronics with the School of ECE at Georgia Tech, a role I retain today.

5. I have served as the Head of the Electromagnetics Technical Interest Group of the School of ECE, Georgia Tech. Also, I have served as the Georgia Electronic Design Center Associate Director for RFID/Sensors research from 2006-2010 and as the

GT-Packaging Research Center (NSF-ERC) Associate Director for RF research and the leader of the RF/Wireless Packaging Alliance from 2003-2006.

6. As described in my CV, I have more than 30 years of industry and academic experience. I have experience with antennas, fractal RF structures and circuit design for these systems. As a professor of Electrical and Computer Engineering, I have taught courses relating to antenna and electromagnetic technologies. A complete list of my teaching positions, honors, and classes taught is set out in my CV. As a professor, I collaborated with over 130 Undergraduate, Masters and Doctoral students, as well as visiting students, post-doctoral fellows, and other researchers.

7. Throughout my career, I have received a variety of awards. I am a Fellow of IEEE, a member of the MTT-15 Committee, an Associate Member of European Microwave Association (EuMA), a Fellow of the Electromagnetics Academy, and a member of Commission D, URSI and of the Technical Chamber of Greece. In recognition of my world-leading achievements in the area of antennas and miniaturized/fractal RF structures, I served as an IEEE C-RFID (Committee on RFID technologies) Distinguished Lecturer from 2016-2022 and I served as an IEEE MTT Distinguished Microwave Lecturer (DML) from 2010-2012. I have won awards for my contributions in developing various technologies, including numerous multiband antenna topologies operating at different frequencies and integrated RF modules up to sub-THz frequencies. My achievements include the following:

(a) IEEE fellow — a distinction reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation. IEEE, About the IEEE Fellow Program, http://www.ieee.org/membership/fellows/.

(b) 2021 IEEE Antennas and Propagation Symposium (APS) Best Student Paper Award (co-authored)

(c) 2019 Humboldt Research Prize

(d) 2019 IEEE Antennas and Propagation (APS) Conference Co-Chair

(e) 2018 Intel IEEE ECTC 2018 Best Student Paper Award

(f) 2015-present IEEE CRFID Distinguished Lecturer

(g) 2010-2012 IEEE MTT-S Distinguished Microwave Lecturer

(h) 2017 Georgia Tech Outstanding Achievement in Research Program Development Award

(i) 2017 Archimedes IP Salon Gold Medal

(j) 2016 Bell Labs Prize Third Award

(k) 2015 IET Microwaves, Antennas and Propagation Premium Award

(l) 2014 Georgia Tech ECE Distinguished Faculty Achievement Award

(m) 2014 IEEE RFID-TA Best Student Paper Award

(n) 2013 IET Microwaves, Antennas and Propagation Premium Award

(o) 2012 Finland Distinguished Professor (Fi.Di.Pro.) Award

(p) 2012 Architecture Award of Excellence, Architecture World Summit

(q) 2010 IEEE Antennas and Propagation Society Piergiorgio L. E. Uslenghi Letters Prize Paper Award

(r) 2010 Georgia Tech Senior Faculty Outstanding Undergraduate Research Mentor Award

(s) 2009 IEEE Transactions on Components and Packaging Technologies Best Paper Award

(t) 2009 IEEE Antennas and Propagation Symposium (APS) Second Best Student Paper Award

(u) 2009 E.T.S. Walton Award from Science Foundation Ireland

(v) 2007 IEEE Antennas and Propagation Symposium (APS) Best Student Paper Award

(w) 2007 IEEE International Microwave Symposium (IMS) Third Best Student Paper Award

(x) 2007 IEEE International Symposium on Antennas and Propagation (ISAP) Poster Presentation Award

(y) 2006 Asian-Pacific Microwave Conference (APMC) Award

(z) 2006 IEEE-MTT Outstanding Young Engineer Award

(aa) 2004 IEEE Transactions on Advanced Packaging Commendable Paper Award

(bb) 2003 NASA Godfrey "Art" Anzic Collaborative Distinguished Publication Award

(cc) 2003 IBC International Educator of the Year Award

(dd) 2003 IEEE-CPMT Outstanding Young Engineer Award

(ee) 2002 International Conference on Microwave and Millimeter-Wave Technology Best Paper Award (Beijing, China)

(ff) 2002 Georgia Tech-ECE Outstanding Junior Faculty Award

(gg) 2001 ACES Conference Best Student Paper Award

(hh) 2000 NSF CAREER Award

(ii) 1999 Technical Program Co-Chair of the 54th ARFTG Conference, Atlanta, GA

(jj) 1997 Best Paper Award, International Hybrid Microelectronics and Packaging Society

(kk) 1989 Papastavridios Greek Mathematics Excellence Fellowship

(ll) 1988-1992 Greek Government Academic Excellence Fellowships

8. In Google scholar, there are over 27,650 citations to my work and my work has an h-index of 83. An h-index represents the number of papers with the same number of citations, meaning I have over 83 papers with 83 citations.

9. I have authored or contributed to over 30 books and 850 refereed journal and conference papers; spoke in over 140 presentations, many of which relate to antennas, antenna arrays, RFID systems, and other modes of wireless communication and electronics design. A complete list of my publications and conference presentations is included in my curriculum vitae.

10. I am a named inventor on 20 patents in the US and in Europe. In particular, I am a named inventor on patents relating to antenna design, RF systems, and

means of reducing signal interference in RF applications. A complete list of my patents and published applications is included in my curriculum vitae.

11. In addition to gaining expertise via my academic training, professional experiences, and research accomplishments described above, I have kept abreast of various sub-disciplines within the antennas space, by reading technical literature, attending and presenting at conferences, and attending and presenting at symposia. I have served as an editor for various journals and participated in the peer review process for various technical journals and conferences, and have reviewed manuscripts submitted by other scholars relating to antenna topologies. I have contributed further to the profession by chairing conference committees and planning conferences and panels. Furthermore, I have collaborated with or have communicated with many of the scholars and engineers in the field of antennas systems.

12. I am not an attorney and offer no legal opinions, but in the course of my work, I have had experience studying and analyzing patents and patent claims from the perspective of a POSITA.

13. As part of my work in forming my opinions in connection with this proceeding, I have reviewed the following materials in the table below, which I believe those in the field would reasonably rely upon in forming opinions regarding the subject matter of this proceeding. I have further reviewed, had input into the creation of, and endorse Exhibits AA-CC (including the appendix and the calculations and grid drawings at the end of each chart, which I do not repeat herein), which are claim charts mapping the references discussed below to the challenged claims:

Exhibit	Description
Ex. 1001	U.S. Patent No. 11,349,200 ("'200 Patent")
Ex. 1002	File History (U.S. Patent Application No. 17/246,192) of U.S. Patent No. 11,349,200
Ex. 1003	Excerpt of File History (U.S. Patent Application No. 11/614,429) of U.S. Patent No. 8,738,103
Ex. 1004	U.S. Provisional Patent Application No. 60/856,410
Ex. 1005	U.S. Provisional Patent Application No. 60/831,544
Ex. 1006	(intentionally omitted)

Exhibit	Description
Ex. 1007	(intentionally omitted)
Ex. 1008	(intentionally omitted)
Ex. 1009	(intentionally omitted)
Ex. 1010	(intentionally omitted)
Ex. 1011	U.S. Patent Publication No. 2004/0137950 to Bolin, et al. ("Bolin")
Ex. 1012	U.K. Patent Publication No. GB2416625 to Langley, et al. ("Langley")
Ex. 1013	European Patent Publication No. EP1294049 to Ollikainen, et al. ("Ollikainen")
Ex. 1014	U.S. Patent Publication No. 2004/0051669 to Rutfors, et al. ("Rutfors")
Ex. 1015	Ang, et al., Compact Internal Quad-Band Antenna for Mobile Phones, Microwave and Optical Technology Letters, Vol. 38, No. 3 (Aug. 5, 2003).
Ex. 1016	ETSI TS 136 104 V8.8.0 (2010-02) Technical Specification
Ex. 1017	Rohde & Schwarz, LTE Release 9, Technology Introduction White Paper, 1MA191
Ex. AA	Claim Chart comparing the combination of Bolin and Langley to claims 11-12 (Ground 1)
Ex. BB	Claim Chart comparing the combination of Bolin, Langley and Rutfors to claims 11-12 (Ground 2)
Ex. CC	Claim Chart comparing the combination of Ollikainen, Bolin and Langley to claims 11-12 (Ground 3)

II. LEGAL FRAMEWORK

A. Obviousness

14. I am a technical expert and, as I mention above, I do not offer any legal opinions. However, I have been informed about certain legal principles regarding patentability and related matters under United States patent law, which I have applied in performing my analysis and arriving at my technical opinions in this matter.

i General Framework

15. I am informed that a person cannot obtain a patent on an invention if the differences between the invention and the prior art are such that the subject matter as a

whole would have been obvious to a person having ordinary skill in the art at the time of the invention. I am informed that a conclusion of obviousness may be founded upon more than a single item of prior art. I am also informed that obviousness is determined by evaluating the following factors: (1) the scope and content of the prior art; (2) the differences between the prior art and the claim at issue; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations of non-obviousness. In addition, the obviousness inquiry should not be done in hindsight. Instead, the obviousness inquiry should be done through the eyes of a person having ordinary skill in the art at the time of the alleged invention.

16. In considering whether certain prior art renders a particular patent claim obvious, I am informed that one must consider the scope and content of the prior art, examples of which include disclosures in patents, trade publications, journal articles, conference papers, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting organizations, and materials from industry conferences.

17. I am informed that for a patent claim to be found obvious, the proper perspective to consider is that of a person having ordinary skill in the art (often referred to as a "PHOSITA," "POSITA," or "POSA") at the time of the alleged invention. I am informed that the factors to consider in determining the level of ordinary skill in the art include: (1) the educational level and experience of people working in the field at the time the invention was made; (2) the types of problems faced in the art and the solutions found to those problems; and (3) the sophistication of the technology in the field.

ii Analogous Art

18. I am informed that for a prior art reference to be proper for use in an obviousness analysis, the reference must be "analogous art" to the claimed invention. I am informed that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). In order for a reference to be "reasonably pertinent" to the problem, it must logically have commended itself to an inventor's attention in considering his problem. In determining

whether a reference is reasonably pertinent, one should consider the problem faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that all of the references I considered in forming my opinions in support of the Request are well within the range of references a person having ordinary skill in the art would have consulted by the time of the invention to address the type of problems described in the challenged claims.

iii Combining Known Elements in the Art, Common Sense

19. I am informed that, in order to establish that a claimed invention was obvious based on a combination of prior art elements, a clear articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I am informed that, under the U.S. Supreme Court's *KSR* decision, a combination of multiple items of prior art renders a patent claim obvious when there was an apparent reason for a person having ordinary skill at the time of the invention to combine or modify the prior art. I am informed that such reason may include, but is not limited to, one or more of the following rationales: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine the prior art references to arrive at the claimed invention.

20. I am informed that the test for obviousness is *not* whether the features of a secondary reference may be *bodily incorporated* into the structure of the primary reference, but rather whether one of skill would have been motivated to combine the teachings of the prior art references to achieve the claimed invention. Nevertheless, I am informed that an invention that is a combination of prior art must do more than yield

predictable results to be non-obvious and that, even where one or more motivations to combine exist, claims are not necessarily obvious unless a person having ordinary skill in the art would have had a reasonable expectation of success in implementing or applying the proposed combination at the time of the invention.

21. I also am informed that in conducting an obviousness analysis, a precise teaching directed to the specific subject matter of the challenged claim need not be sought out because it is appropriate to take account of the inferences and creative steps that a person having ordinary skill in the art at the time of the invention would employ. In other words, the prior art need not be directed towards solving the same specific problem as the problem addressed by the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem. The prior art considered can be directed to any need or problem known in the field of endeavor at the time of invention and can provide a reason for combining the elements of the prior art in the manner claimed. Common sense teaches that familiar items may have obvious uses beyond their primary purposes, and a person having ordinary skill in the art will often have been able to fit the teachings of multiple prior art references like pieces of a puzzle. I am informed that, under the *KSR* standard, common sense is important and should be considered in assessing obviousness.

22. I also am informed that the fact that a particular combination of prior art elements was "obvious to try" may indicate that the combination was obvious even if no one attempted the combination. If the combination was obvious to try (regardless of whether it was actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than innovation. I am further informed that in many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive the design of an innovation. When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person having ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation, but of ordinary skill and common sense.

iv Teaching Away

23. I am informed that it is improper to combine references where the references teach away from their combination. I am informed that a reference may be said to teach away when a person of skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the patent applicant. In general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the patentee. I am informed that a reference teaches away, for example, if (1) the combination would produce a seemingly inoperative device; or (2) the references leave the impression that the product would not have the property sought by the patentee. However, I am informed that a reference does not teach away if it merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed. Further, a person of skill will often appreciate that different courses of action frequently have simultaneous advantages and disadvantages, and I am informed the existence of such does not necessarily obviate a motivation to combine.

v Secondary Considerations

24. I am informed that even if a *prima facie* case of obviousness is established, the final determination of obviousness must also consider "secondary considerations" if presented. I am informed that in most instances, the patentee raises these secondary considerations of non-obviousness. In that context, the patentee argues an invention would not have been obvious in view of these considerations, which include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; and (h) teaching away from the invention in the prior art.

25. I am further informed that secondary-considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be based on prior art features. For example,

suppose commercial success of products allegedly embodying the claims is presented as a secondary indicium of non-obviousness. In that case, the patent owner must show that such success is due to the claimed invention's features, and not features unrelated to the claimed invention or that already existed in the prior art. The establishment of a nexus is a question of fact.

26. It does not appear that the Patent Owner has previously offered any secondary considerations of non-obviousness during prosecution of the '200 Patent. Should any such considerations be offered with respect to the '200 Patent itself, in my opinion, the clear teachings of the prior art herein and discussed in the Request would overcome such "secondary considerations," if any were offered.

B. Claim Construction

27. I am informed that in performing an obviousness analysis, it is necessary to understand the scope of the claims. I have also been informed the first step in an unpatentability analysis, therefore, involves construing the claims. Second, the construed claim language is then compared to the disclosures of the prior art.

28. I am informed that while during reexamination, unexpired patent claims must be given their "broadest reasonable interpretation consistent with the specification."

29. For purposes of this proceeding, I have applied the claim constructions set forth in the claim construction section of the Request that this declaration accompanies when analyzing the prior art and the claims, which is plain and ordinary meaning.

III. OPINION

A. Level of Skill of a Person Having Ordinary Skill in the Art

30. I was asked to provide my opinion as to the level of skill of a person having ordinary skill in the field of the '200 Patent at the time of the claimed invention (referred to herein as a "POSITA"). I have been instructed to assume that the time of the claimed invention of the '200 Patent is July 18, 2006. I have also been asked to provide my opinion on the assumption that the time of the claimed invention is July 18, 2006 (which I understand is the earliest claimed priority date of the '200 Patent).

31. In determining the characteristics of a POSITA, I was told to consider several factors, including the type of problems encountered in the art, the solutions to those problems, the rapidity with which innovations are made in the field, the

sophistication of the technology, and the education level of active workers in the field. I also placed myself back in the time frame of the claimed invention and considered the colleagues with whom I had worked at that time.

32. In my opinion, a POSITA would be a person having, as of July 18, 2006: (1) an undergraduate degree in electrical engineering or closely related field, or similar advanced post-graduate education in this area; or (2) three years of experience in electrical engineering; and also 2 years of experience in antenna and wireless device design and development. Such a person of ordinary skill in the art would have been capable of understanding the '200 Patent and the prior art references discussed herein. It is from this lens that I offer my opinions below.

33. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a POSITA. Additionally, I met at least these minimum qualifications at least as of July 18, 2006. I also closely supervised numerous graduate students throughout my career who met or exceeded these minimum qualifications. Although my qualifications may exceed those of the hypothetical person defined above, my analysis and opinions regarding the '200 Patent have been rendered from the perspective of a POSITA during the relevant time frame. My mentorship and supervision of graduate and undergraduate students assists me in providing my opinion from the perspective of a POSITA during the relevant time frame, as I am aware of the abilities and backgrounds of students and early-career professionals at various stages of their academic and professional development.

B. Summary of My Opinions

34. I have reviewed the claims of the '200 Patent, the prior art cited in the Request, and the mapping of the prior art charted against claims 11-12 in Exhibits AA through CC, and I agree with Requester that each of claims 11-12 recite concepts that either are disclosed by, or are obvious variations of, the prior art grounds cited in the Request. The concept of a wireless device that includes two antennas; a first antenna that operates on four wireless bands with a contour that includes at least 20 segments, and that further has a width and height ratio of at least two; and a second antenna that is proximate to a side of a ground plane rectangle for the wireless device was well-known prior to the earliest claimed priority date of the ’200 Patent.

35. Although the Patent Owner appears to have defined a way of graphically analyzing antennas using the physical shape of the antenna contour and parameterized the results of this analysis as "complexity factors" F21 and F32, antennas were disclosed in the prior art that exceed the complexity factor thresholds for F21 and F32 when those factors are calculated based on the method provided by the '200 Patent.

36. Claims 11-12 of the '200 Patent cover any antenna that, when evaluated in accordance with the calculation method disclosed in the '200 Patent, have a shape that results in complexity factors F21 and F32 that exceed a certain threshold, regardless of how such an antenna was developed in the prior art. Claims 11-12 do not cover the method of performing the complexity factor calculation. Therefore, whether or not that calculation method it itself novel, the fact that prior-art antennas were disclosed that satisfy the complexity factor threshold when evaluated according to the method of the '200 Patent, in conjunction with other prior art disclosures, renders the claims obvious , for the reasons stated in Charts AA-CC.

37. In Section III.C, below, I provide some background regarding the state of the art related to the '200 Patent. This background is based on my recollection and experience around the time of the '200 Patent, reflected in certain references cited below. I cite the Unified exhibit page number for non-patent/patent application references unless otherwise indicated for ease of reference. I note that the background information I have provided is non-exhaustive, and there may be many additional materials that would reflect the common knowledge and skill of a POSITA by July 2006 in the context of a the antenna system design choices available and in common use for wireless devices.

C. Background of the Technology

i The '200 Patent

38. The '200 Patent is directed to a wireless device that includes an antenna system that has a level of complexity above a certain threshold. Ex. 1001 at Abstract. The field of the invention is a multifunction wireless device and antenna designs for such devices. *Id.* at 1:29-38.

39. The '200 Patent coins two terms in order to parameterize the level of complexity of antennas. *Id.* at 16:64-17:4. The two terms that the applicant created are the complexity factors F21 and F32, which "capture and characterize certain aspects of

the geometrical details of the antenna contour (such as for instance its edge-richness, angle-richness and/or discontinuity-richness) when viewed at different levels of scale." *Id.* at 16:67-17:4. The '200 Patent presents a method of calculating these complexity factors F21 and F32 by drawing a series of grids onto the physical structure of the antenna, counting which of the boxes of each grid intersect with a contour (i.e. edge) of the antenna structure, and performing a calculation based on the count of boxes for each grid. *Id.* at 17:5-20:17.

40. Independent claim 11 of the '200 Patent recites as follows:

11. A wireless device comprising:

an antenna system comprising a ground plane and at least two antennas within the wireless device, the antenna system comprising:

a first antenna configured to provide operation in at least three frequency bands being used by 4G communication standards, the first antenna defining an antenna contour comprising an entire perimeter of the first antenna, the antenna contour comprising at least twenty segments, wherein the antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20 and complexity factor F32 having a value of at least 1.35, and wherein the first antenna defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna, an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining an antenna rectangle, an aspect ratio of the antenna rectangle being defined as a ratio between a width and a height of the antenna rectangle, wherein the aspect ratio has a value of at least 2; and

a second antenna configured to provide operation in a first wireless service, the second antenna being proximate to a side of a ground plane rectangle enclosing the ground plane.

41. I note that, although claim 11 refers to "4G communication standards," as of the date that I have been asked to assume is the earliest claimed priority date of the '200 Patent, which is the earliest date listed on the face (page 1) of the '200 Patent, September 2006, 4G standards had not been formally defined. The '200 Patent provides several examples of frequency bands that fall within those being used by 4G communication standards (I note that 4G standards were announced almost 2 years after the earliest claimed priority date of the '200 Patent, as I explain in Paragraph 53): "A MFWD incorporating 3.5G or 4G features (i.e. comprising 3G and other advanced services such as for instance HSDPA, WiBro, WiFi, WiMAX, UWB or other high-speed wireless standards, hereinafter 4G services) might require operation in additional frequency bands corresponding to said 4G standards (for instance, bands within the frequency region 2-11 GHz and some of its sub-regions such as for instance 2-11 GHz, 3-10 GHz, 2.4-2.5 GHz and 5-6 GHz or some other bands)." Ex. 1001 at 25:14-23. As I explain in the section regarding Langley, I have reviewed the frequencies covered by the antenna of Langley and it is my opinion that the antenna of Langley covers at least three frequencies that would fall within the plain meaning of those being used by 4G communication standards as this term is used by the claims of '200 Patent (I again note that 4G standards were announced almost 2 years after the earliest claimed priority date of the '200 Patent, as I explain in Paragraph 53).

42. The '200 Patent generally describes a wireless device that includes an antenna system with a level of complexity (as calculated by the method provided in the '200 Patent) above a certain threshold. The '200 Patent explains that complex antennas can be made smaller (i.e., miniaturized) while offering multiband capabilities. Ex. 1001 at 32:42-33:3. The '200 Patent asserts that the complexity factors F21 and F32 that are coined and explained in the patent "are very useful tools for the modern antenna design for MFWD and similar devices. Use of these tools in accordance with the invention yields antenna designs, as well as MFWD devices having antennas, with enhanced performance characteristics." *Id.* at 32:66-33:3.

43. The patent explains at length how to calculate these newly-defined factors for a particular antenna in order to assess whether the particular antenna design is sufficiently complex and therefore, as the patent claims, more likely to offer improved

bandwidth performance in a small-sized antenna. *See* Ex. 1001 at 17:5-20:17, 29:45-32:26, 33:65-35:44 and Figs. 3-4, 6A-12A, 13A-18.

44. Briefly, in order to calculate the complexity factor for an antenna system, the '200 Patent explains, we first draw a three-dimensional antenna box around the physical antenna system, and then project the largest-area side of that box into two dimensions, as shown in Figure 3 of the '200 Patent. Ex. 1001 at 7:10-11, 14:14:6-24, 27:57-28:28. The two-dimensional representation (shown on the bottom of Figure 3 below) is called the antenna rectangle. Ex. 1001 at 14:21-30.

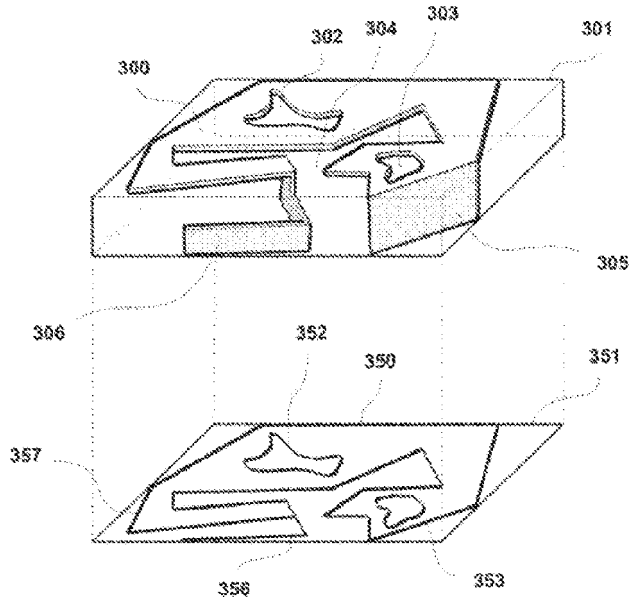


FIG. 3

'200 Patent at Figure 3.

45. The antenna contour is the perimeter (i.e., outline or edge) of all of the antenna elements that fall within the antenna box 351. Ex. 1001 at 15:14-47. Said simply, in the example of Figure 3 of the '200 Patent, above, the antenna contour is comprised of the lines that make up the outline of the antenna structure, including the lines inside of the "hole" in the antenna structure (item 352). *Id.* at 28:8-17. The antenna box 351 can also be called the antenna rectangle. In accordance with the procedure set forth in

the ’200 Patent, the antenna rectangle is drawn such that it just touches the sides of the antenna contour, as seen in Figure 3 of the ’200 Patent.

46. Three grids (a small, medium, and large grid) are drawn on the antenna rectangle, as shown in the example of Figures 6A-6C of the ’200 Patent. Ex. 1001 at 7:22-28.

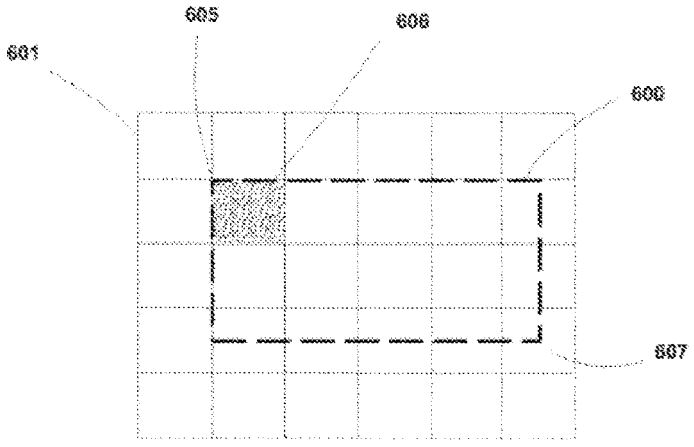


FIG. 6A

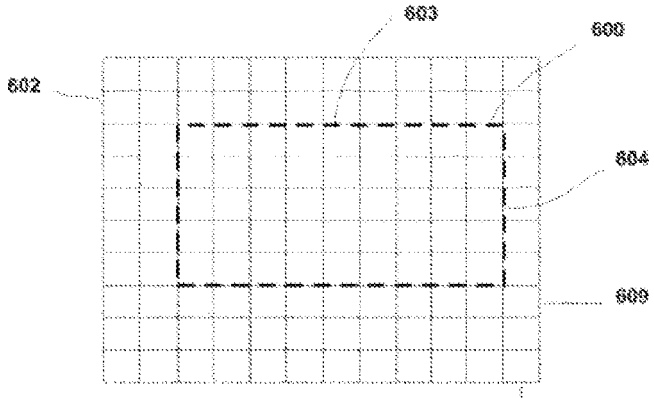
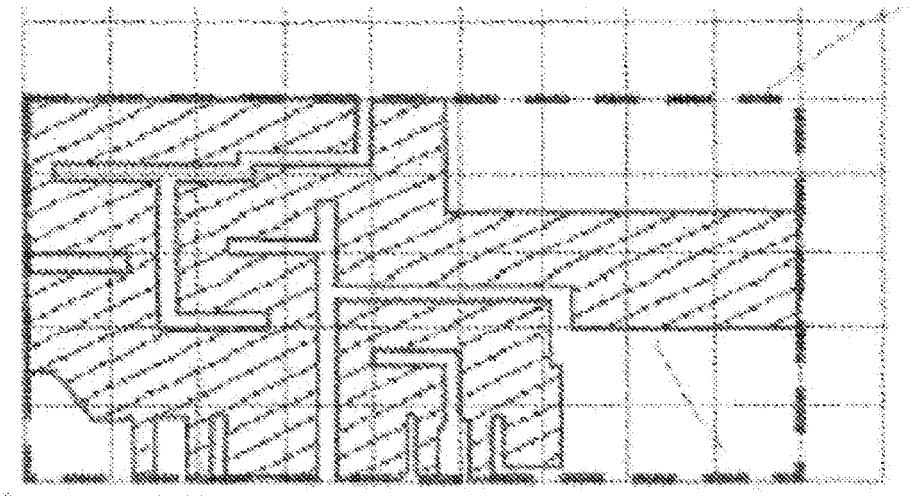


FIG. 6B



FIG. 6C

47. The process begins with the drawing of the medium grid. The medium grid is drawn on top of the antenna rectangle to tesselate the rectangle into nine columns and an odd number of rows. *Id.*, 17:49-51. The cells that make up the grid should be as square as possible. See the below excerpt of Figure 13B of the '200 Patent, showing the medium grid (with nine cells across the width of the grid) drawn on an example antenna. Ex. 1001 at 8:1-9.



'200 Patent, Figure 13B (except)

48. Four cells of this Figure 13B grid are then combined to make one larger cell, which can be used to tesselate the rectangle on a coarser level (the larger cell-sized

grid). On the other hand, one cell from the Figure 13B grid can be split into four cells, which can tesselate the rectangle on a finer level (the smaller cell-sized grid). These three grids – one with small squares, one with medium squares, and one with large squares – are used to find numbers for the following equations:

$$F_{21} = -\frac{\log(N_2) - \log(N_1)}{\log(1/2)} \qquad F_{32} = -\frac{\log(N_3) - \log(N_2)}{\log(1/2)}$$

Ex. 1001 at 19:3-20:17.

49. In these equations, N1, N2, and N3 are all values that represent the number of cells that intercept some point of the antenna contour grid. Ex. 1001 at 19:12-20, 20:5-12. For instance, in Figure 13B, the top row of the antenna rectangle counts five cells out of nine. N1 is for the coarsest grid, N2 is for the original grid with nine columns, and N3 represents the finest grid.

50. In essence, the allegedly novel concept disclosed by the '200 Patent is the fact that antennas with increased complexity (i.e., more edges, turns in the contour of the antenna, and holes within the antenna structure) may offer performance advantages over less-complex antenna shapes. However, as shown herein, numerous prior-art antennas, when evaluated using the calculation method explained in the patent, exceed the complexity threshold for the complexity factors F21 and F32 claimed by Claim 11 of the '200 Patent.

51. Whether by trial-and-error or otherwise, some prior art antennas that offer high performance also have a "complex" shape rather than a simple shape. While it may be that the listed inventors of the '200 Patent developed a method that is helpful in evaluating antenna systems, that method is not what is claimed. Any antenna that is sufficiently complex satisfies the complexity-factor elements of claims 11-12 of the '200 Patent.

ii State of the Technology

52. The field of endeavor of the invention of the '200 Patent is a multifunction wireless device and antenna designs for such devices. Ex. 1001 at 1:29-38.

53. As of 2006, the 4G standards had not yet been formally defined. The ITU (International Telecommunication Union) first defined 4G standards in 2008. The 4G

standards were defined in the 3GPP Release 8 that was released in 2008, with the first commercial deployment in 2009.

54. The 4G standard continued to be updated in future releases. For example, 3GPP TS (Technical Specification) Version 8.8.0 of Release 8, dated February 2010, indicates frequency ranges including 900 MHZ (e.g., 880-915 MHz) and between 1805 MHz - 2400 MHz inclusive, and additional frequencies. Ex. 1016 at 13-14. I obtained Exhibit 1016 from the ETSI website etsi.org. Specifically, I downloaded Exhibit 1016 from the URL https://www.etsi.org/deliver/etsi_ts/136100_136199/136104/08.08.00_60/ts_136104v080080p.pdf.

55. And as another example, a white paper discussing 3GPP Release 9 (2011) also lists 4G frequency ranges including 900 MHZ (e.g., 880-915 MHz) and between 1805 – 2400 MHz (1.8 – 2.4 GHz) inclusive, and additional frequencies. Ex. 1017 at 32-33.

56. I obtained Exhibit 1017 by downloading it from the website https://www.rohde-schwarz.com/us/applications/lte-release-9-technology-introduction-white-paper-white-paper_230854-15541.html.

57. It is important to note that the 3GPP Release 8 was not promulgated as of 2006. Of course, later releases (such as Release 9) were also not promulgated as of 2006.

58. The problem purportedly solved by the '200 Patent, the need for antennas systems with both a small form factor and multi-band capability, (Ex. 1001, 3:28-33, 5:1-26) was well-known and well-understood in the prior art. Wireless devices that incorporated multi-band capabilities, including those that employed two antennas, were also well-known. See generally Rutfors, Bolin. Market forces had begun driving mobile telephones to include three-band antenna systems as early as 2003. Ex. 1014 (Ang) at 217 (proposing a four-band antenna).

59. As explained by Ollikainen, a 2003 European patent publication, the need for compact multi-band antennas for use in wireless devices was a well-known problem: "The development of small antennas for mobile phones has recently received much attention due to size reduction of the handsets, requirements to keep the amount of radiofrequency (RF) power absorbed by a user below a certain level regardless of the

handset size, and introduction of multi-mode phones. It would be advantageous, desirable and even necessary to provide internal multi-band antennas to be disposed inside a handset body, and these antennas should be capable of operating in multiple system such as E-GMS900 (880 MHz - 960 MHz), GSM1800 (1710 MHz - 1880 MHz), and PCS1900 (1859 MHz - 1990 MHz)." Ollikainen at [0002]. The trade-off between antenna size and performance was also well-known: "Currently, the antenna is one of the largest parts in a mobile phone. In order to fit more antenna elements with acceptable performance in the available space, there is an ongoing effort to reduce their physical size. As the size of the mobile phone decreases, the radiation efficiency of traditional small internal handset antennas also decreases, particularly in an antenna system that has wavelengths corresponding to a resonance frequency below 1GHz." *Id.* at [0004].

60. Ollikainen discloses an antenna system (1) that operates in three wireless bands. Ollikainen at [0006] – [0008]. Ollikainen is an example of an antenna system design element in a wireless device that was ubiquitous in the art in which the antenna system was placed near the top or bottom edge of the wireless device, near the edge of a ground plane. Ollikainen at [0017] – [0018], Figs. 2 and 3. As a POSITA would have understood, placing the antenna system towards the edge of the wireless device, near the edge of the ground plane, was a common design choice at the time of the purported invention. I note that Rutfors and Bolin are other examples of a wireless device design with the antenna system located near the edge of both the device and the ground plane, as I explain further in the sections regarding each reference herein.

61. A 2004 U.S. Patent publication, Rutfors, disclosed a wireless device with two antennas located near each other. Rutfors at Figures 1-2. As Rutfors explains, the need for multiple-antenna systems in a wireless device was well known. "In a portable radio communication device the space for an internal antenna arrangement is limited. With the growing need for greater functionality and better radio channel quality it is often necessary to utilize more than one antenna element in a portable radio communication device, such as a mobile telephone." *Id.* at [0001] – [0002].

62. Rutfors identifies the problem of potential interference between two closely-spaced antennas, which is solved in Rutfors by employing a shield between the antennas and further by placing the feed points of the two antennas away from each other.

Id. at [0002], [0005], [0007], [0010], [0019]. In Figures 1 and 2, Rutfors provides two examples of the first and second antenna separated by the shield (item 4).

63. Bolin, a 2004 U.S. Patent publication, as disclosed a two-antenna system that includes one multi-band antenna and a separate Bluetooth antenna. Bolin at [0019] – [0020] and Figures 1-2 Bolin also explains that the need for smaller form factor antenna systems that provide good multi-band performance in wireless devices was well-known. Bolin at [0002], [0006]. Bolin explains that, by providing a high-impedance parasitic element between two closely-spaced antennas, the size of the antenna system can be reduced while providing good multi-band performance. Bolin at [0021], [0023] - [0024]. The parasitic element provides good isolation between the closely-spaced antennas which allows each antenna to provide good wireless performance. *Id.* at [0032].

64. As Bolin explains, the two-antenna system is in a preferred embodiment located towards the edge of the wireless device. *See* Bolin at Figures 3-5.

65. A 2005 U.S. Patent, Jarmuszewski, is another example of a wireless communications device that includes both a multi-band antenna (see Figure 8 of Jarmuszewski) and a separate short-range communication module to provide Bluetooth or WiFi connectivity. Jarmuszewski at 8:66 – 10:7, 12:61 – 13:4, 14:61 – 15:1.

66. A 2006 U.K. Patent publication, Langley, also disclosed a compact and efficient multi-element, multi-band antenna that operates on five frequency bands. Langley at 2:24-26, 4:29-7, 8:12-13. As Langley explains, the need for a compact, efficient multi-band antenna was well-known and well-understood. Langley at 2:21-22, 3:4-17.

67. As illustrated above, the prior art disclosed numerous examples of compact, multi-band wireless antenna systems in a wireless device, and the advantages of compact, multi-band antenna systems were well known.

D. Ground 1: The Combination of Bolin and Langley (Claims 11-12)

i Overview of Bolin

68. Bolin, a 2004 U.S. Patent publication, disclosed "[a] build-in, multi band, multi antenna system (1) for a protable [sic, portable] communicaiton [sic, communication] device (10) has a first antenna (2, 4, 5), which is resonant in first an [sic, and] second frequency band. A second[d] antenna (3) is resonant in a fourth frequency

bank [sic, band]. The first antenna, the papasitic [sic, parasitic] element and the second antenna are provided on a common flexible substrate." Bolin at Abstract.

69. Bolin identifies the known problem of the need for compact antennas with good multi-band performance in wireless devices. "A basic problem of today is to be able to put one or several very small antennas on e.g. a mobile telephone. Main emphasis is put on size, but a good electrical performance is also important." Bolin at [0002]. Bolin further identifies the need to add coverage for additional frequency bands, in particular Bluetooth, to mobile devices due to proliferating wireless standards. *Id.* Bolin identifies as a solution the implementation of multiple antennas located near to each other, preferably at the "top of the telephone." *Id.* Bolin explains that it is important to get "good isolation" between these closely-spaced antennas. *Id.*

70. Bolin provides a solution to the problem of providing a compact antenna with good multi-band performance in a wireless device by providing for a parasitic element as a high impedance block between two closely-spaced antennas. The parasitic element acts to isolate the two closely-spaced antennas. "It is an object of the present invention to propose a very compact multi band, multi antenna system, with a cheap and sophisticated mechanical concept to get good isolation by clever design of a parasitic element as a high impedance block." *Id.* at [0006].

71. Bolin provides, as an illustration of its invention, a compact two-antenna system. "A simplified illustration of the antenna system 1 according to the invention is given in FIGS. 1 and 2. The antenna system has a main antenna 2 for GSM/DCS/PCS and a separate smaller Bluetooth™ antenna 3 positioned very close to the main antenna 2. . . . The main antenna 2 is a built-in patch with parasitic element, whereas the smaller Bluetooth™ antenna 3 is a PIFA, however folded a little bit to fit the small space available." Bolin at [0019] – [0020]

72. Bolin explains that its design is advantageously compact. "A significant advantage with the antenna system according to the present invention is the size reduction that obtained by placing the antennas close together as well as the folding of the antenna patterns." *Id.* at [0021]. Bolin explains that the parasitic element allows for a more compact design while maintaining good isolation between the two closely-spaced antennas. "By arranging the antennas in this manner, it is possible to reduce the overall

size of the antenna system compared to if the parasitic element was not present. As can be understood, moving the antennas further apart, which would be necessary in the absence of the parasitic element, would increase the isolation between the main antenna and the Bluetooth™ antenna." *Id.* at [0024]. Bolin reports that the "isolation is very good, even in the highest band despite the short distance between the antennas." *Id.* at [0032].

73. The antenna system of Bolin is illustrated in Figure 1:

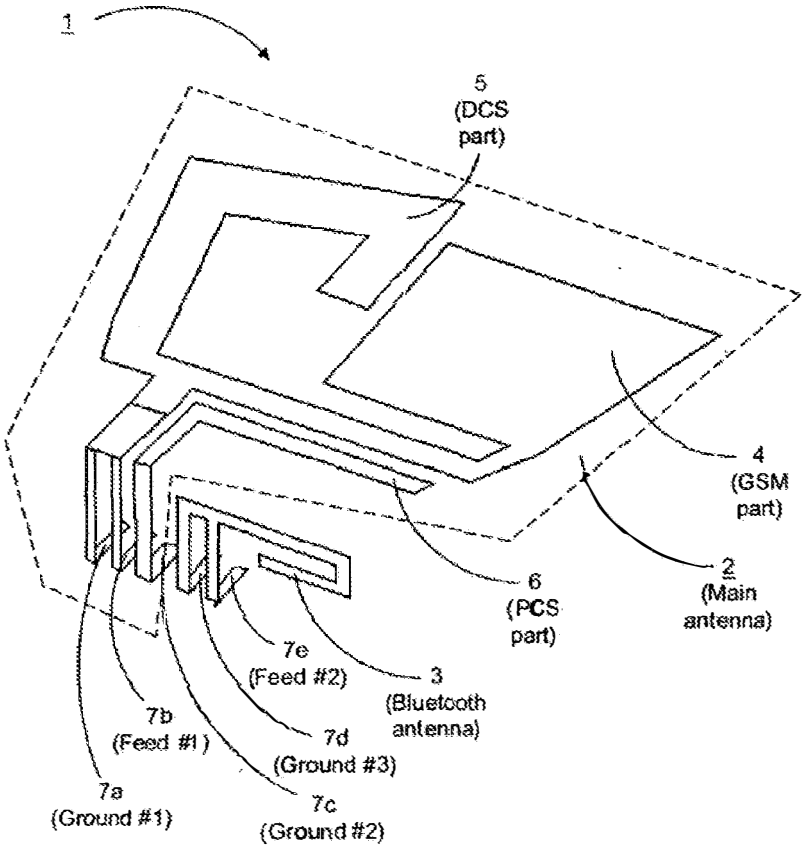


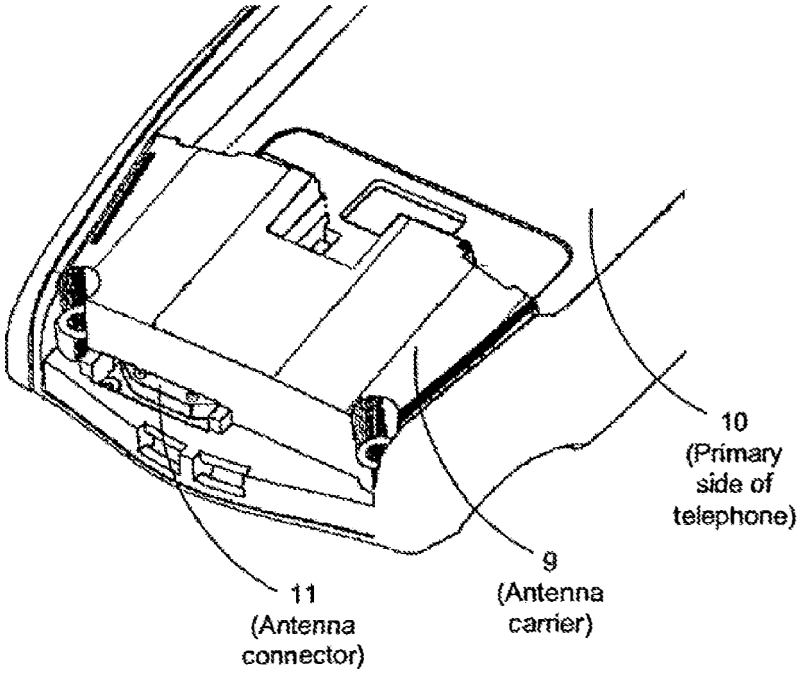
Fig 1

Bolin at Figure 1.

74. The main antenna (item 2) is surrounded by the dotted line in Figure 1. A smaller, Bluetooth antenna is shown as item 3, which is positioned "very close" to the main antenna. Bolin at [0019]. The PCS part (item 6) is the parasitic part between the

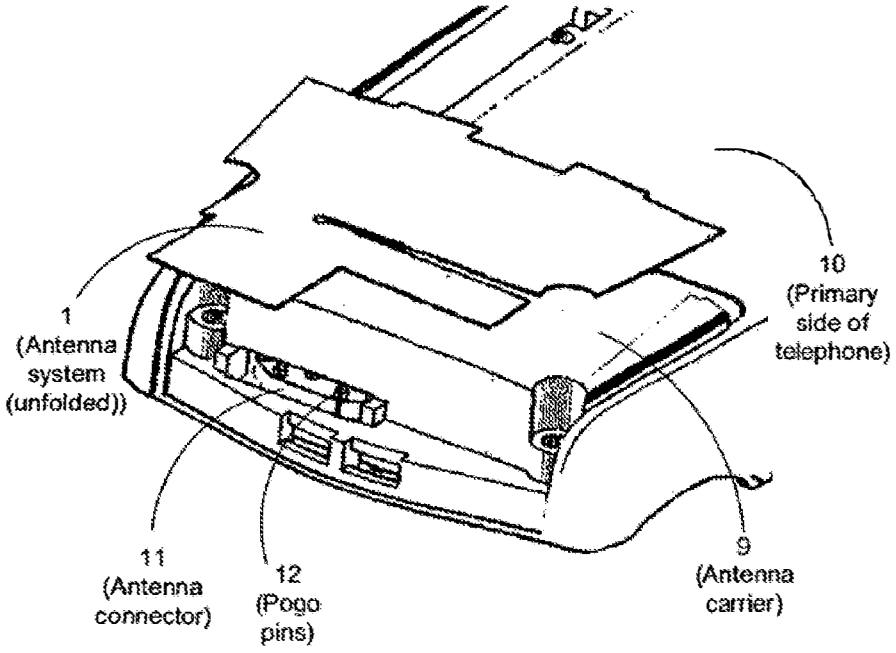
main and Bluetooth antennas that provides "high impedance blocking" between the two antennas. *Id.* at [0023].

75. As Bolin explains, the two-antenna system is in a preferred embodiment located towards the bottom edge of the wireless device. The antenna system is connected to radio circuitry on a printed circuit board (13) via an antenna connector (11). See Figure 3 of Bolin:



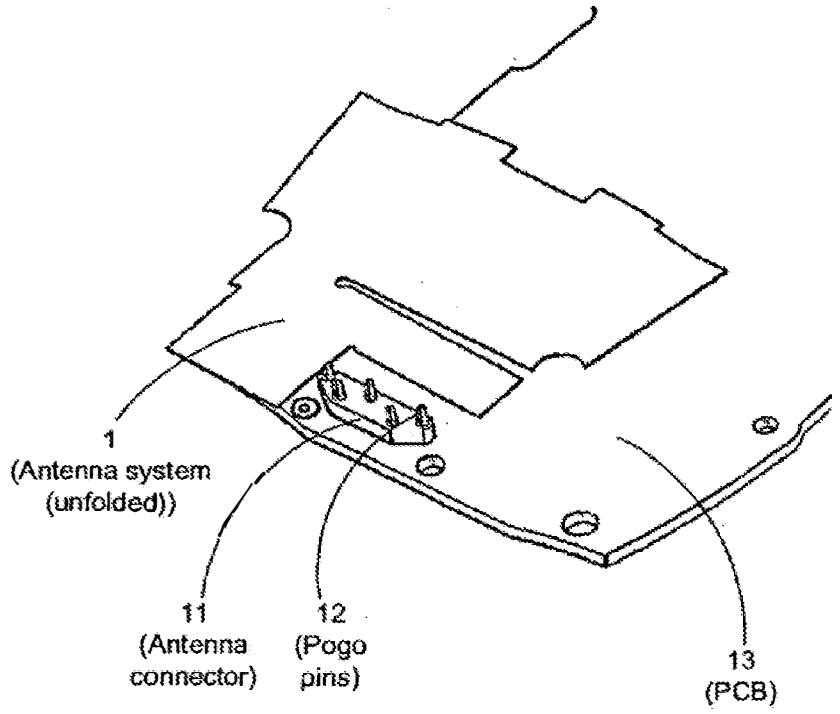
Bolin at Figure 3

76. See also Figure 4 of Bolin, which shows the antenna system unfolded:



Bolin at Figure 4

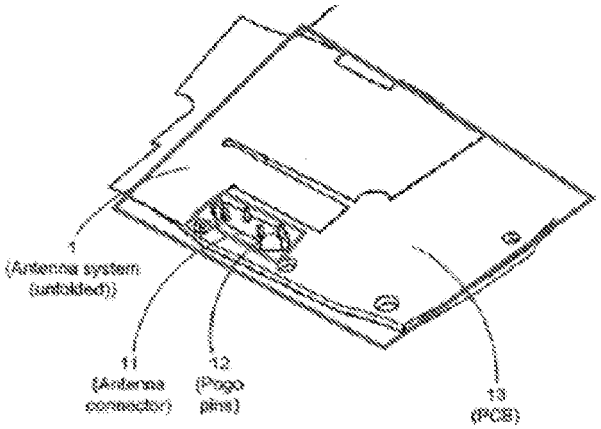
77. Figure 5 of Bolin shows the antenna system (unfolded) and the antenna connector and naked PCB in order to illustrate the connection and relative location between the antenna system and the connector/PCB:



Bolin at Figure 5.

78. Bolin provides numerous other embodiments of various antenna shapes (Figs. 9-12 of Bolin), and explains that "different parts of the antenna system may look different depending on e.g. the amount of space available inside the portable communication device." *Id.* at [0034].

79. The ground plane disclosed by Bolin is the antenna connector and any grounding metal to which it is connected. The annotated diagram below illustrates this ground plane. As shown in the annotations, whether the ground plane is essentially the antenna connector, or extends to additional grounding metal beyond the ground plane, the antenna system is located near the edge of the ground plane because the antenna connector is located near the edge of the PCB and device.



Bolin at Figure 5 (annotations added).

80. As explained above, because the antenna system is proximate to the bottom of the PCB and of the wireless device, however the grounding metal extends from the antenna connector, the second antenna will be proximate to a side of a rectangle enclosing the ground plane.

81. For example, Figures 9-10 of Bolin, which are each alternative embodiments of its antenna system, are reproduced below:



Fig 9



Fig 10

Bolin Figures 9-10

82. A POSITA would have understood Bolin to be analogous art to the '200 Patent. The field of endeavor of the invention of the '200 Patent is a multifunction wireless device and antenna designs for such devices. Ex. 1001 at 1:29-38. Bolin discloses an antenna arrangement for a wireless device, which is within the same field of endeavor. Bolin at Abstract, Figure 1.

83. Also, Bolin is reasonably pertinent to at least one problem concerning the inventors of the '200 Patent. The problem purportedly solved by the '200 Patent is the need for, and difficulty in attaining, an antenna system for a wireless device that has both a small form factor and also good wireless performance in multiple wireless bands. Ex. 1001, 3:28-33, 5:1-26. Bolin recognizes this problem, and provides the solution of a compact antenna system that offers good wireless performance in multiple wireless bands. Bolin at [0002], [0006], [0024], [0032].

ii Overview of Langley

84. A 2006 U.K. Patent publication, Langley, disclosed a compact and efficient multi-element, multi-band antenna that operates on five frequency bands. Langley at 2:24-26, 4:29-7, 8:8-13. As Langley explains, the need for a compact, efficient multi-band antenna was well-known and well-understood. Langley at 2:21-22. "The invention [of Langley] provides a compact and efficient multi-band antenna capable of supporting a variety of frequency bands for cellular telecommunications and wireless connectivity." Langley at 3:4-6. Langley advantageously allows independent tuning of each frequency band for its multi-band antenna via tuning individual elements of the multi-element antenna. Langley at 3:8-17. Langley provides several example of its efficient, compact, multi-band antenna. The first example is shown in Figures 1 and 2 of Langley, with Figure 1 showing a schematic of the example antenna without dimensions, and Figure 2 showing conductive elements of the same example antenna with dimensions:

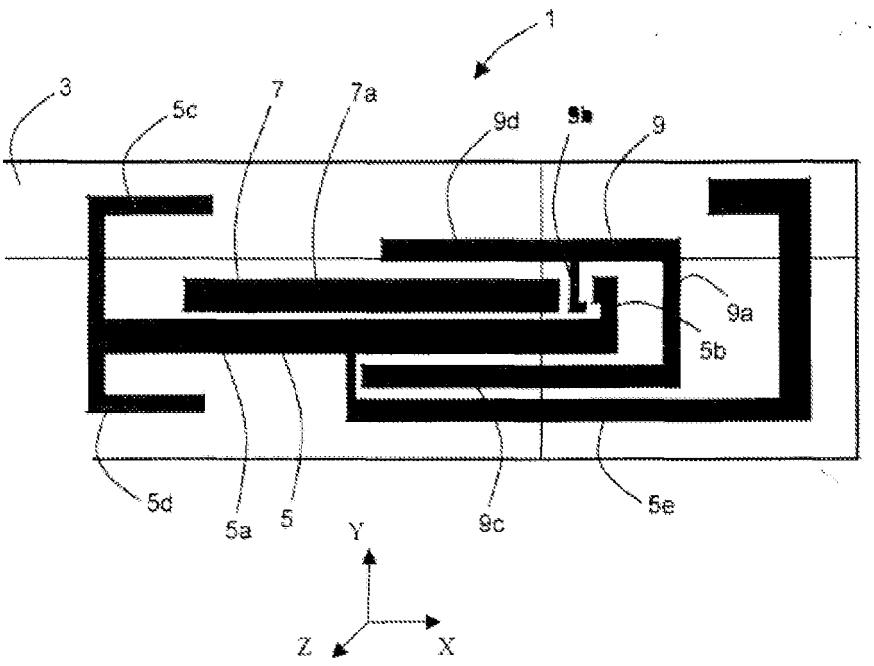


Fig. 1

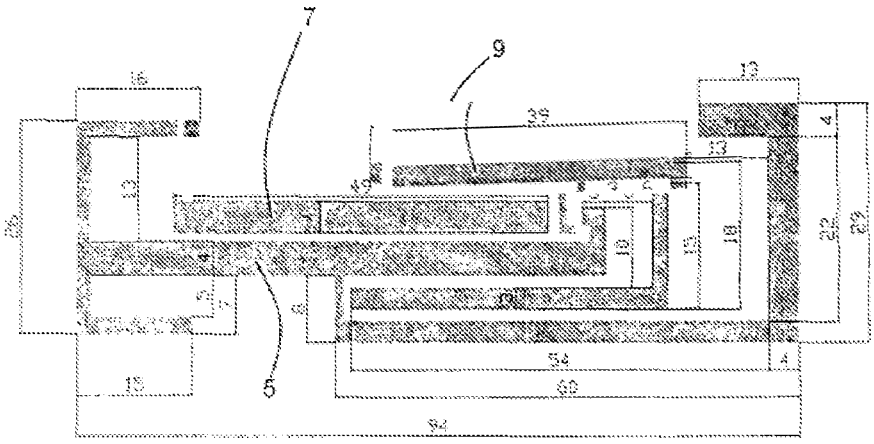


Fig. 2

Langley at Figs. 1-2.

85. The first example antenna of Langley (shown in Figures 1-2 above) covers six commercially-useful frequency bands:

System	Frequency Band
GSM 900	890 – 960 MHz
DCS1800	1710 – 1880 MHz
DECT	1900 MHz
UMTS	1920 – 2170 MHz
Bluetooth	2400 – 2483.5 MHz
Hiperlan 1/2	5150– 5725 MHz

Langley at 8:12-13.

86. As Langley explains, "Coverage of these commercially useful frequency bands is provided by the Invention within the following three frequency bands, for which the measured return loss is less than -10dB" Langley at 8:14-16. Generally, as a POSITA would have understood, a return loss of 10 or more on a negative scale for a particular frequency band indicates a commercially useful antenna for that frequency band, as evidenced by Langley's reference to this 10 decibel threshold.

87. Langley summarizes the frequency bands covered by the antenna of example 1 as follows:

Frequency band (MHz)	Bandwidth	System covered
885 – 973	88 MHz	GSM900
1530 – 2590	1060 MHz	DCS1800 UMTS Bluetooth DECT
4630 – 5970	1340 MHz	Hiperlan 1 Hiperlan 2

Langley at p.8 (bottom).

88. As shown in the two tables disclosed by Langley, above, Langley discloses that its antenna invention covers frequencies including 1920-2170 Mhz, 2400-2483.5 MHz and 5150-5725.

89. Langley further explains that antennas of the invention of Langley of which the embodiment of example 1 (shown in Figure 2 of Langley and the embodiment of example 2 (shown in Figure 13 of Langley) are examples preferably cover "frequencies of 900MHz, 1800MHz, 2000MHz, 2400MHz and 5400MHz." Langley at 4:29-32.

90. Although, as I explain above, no official 4G standards were established in September 2006. the antenna disclosed by Langley covers at least three frequencies that a POSITA would have understood to fall within the range of frequencies being used by 4G communication standards as that term is used by the '200 Patent. As to the frequencies listed in the two charts of Langley that are reproduced above, 1920-2170 Mhz, 2400-2483.5 MHz and 5150-5725 MHz of which fall within the range of frequencies that a POSITA would have understood to be included among those in the frequencies being used by 4G communication standards under the plain and ordinary meaning of that term as it was used by the '200 Patent (the 4G standard was announced almost 2 years after the earliest claimed priority date of the '200 Patent, as I explain above). As to the preferred frequencies disclosed by Langley for its antenna invention, three of these frequencies (2000, 2400 and 5400 MHz) fall within fall within the range of frequencies that a POSITA would have understood to be among those being used by 4G communication standards.

91. I note that, even if a POSITA were to apply 4G communications standards as set forth in 3GPP Release 8 or later that includes the frequency ranges of 900 MHZ (e.g., 880-915 Mhz) and between 1805 – 2400 MHz (1.8 – 2.4 GHz) inclusive, Langley would still disclose that its antenna provides operation in three bands that fall within 4G communications standards, those being 900MHz, 2000MHz, 2400MHz.

92. Based on either the charts reproduced above or Langley's disclosure of preferred frequencies of operation of its antenna inventions, the antenna invention disclosed by Langley provides that the antenna covers at least three frequencies that fall within those that a POSITA would have understood as those being used by 4G

communications standards under the plain and ordinary meaning of that term as it was used by the '200 Patent (the 4G standard was announced almost 2 years after the earliest claimed priority date of the '200 Patent, as I explain above). And even if a POSITA were to apply the later-released 3GPP Release 8 4G communications standards, Langley still discloses that its antenna provides coverage for at least three bands that a POSITA would have understood were being used by 4G communications standards under the plain and ordinary meaning of that term as it was used by the '200 Patent. Again, the 4G standard was announced almost 2 years after the earliest claimed priority date of the '200 Patent, as I explain above.

93. A POSITA would have understood that the antenna of Langley could be readily modified to operate in commercially-useful frequency bands. A POSITA would have understood that the elements of the antenna of Langley could be tuned (that is, adjusted) in order to operate in the antenna system of Bolin. Langley explains that the one method (although not the only method) to adjust the resonant frequencies of its antenna is to adjust the thickness of the antenna—Langley states that its antenna can be "easily and ***predictably altered*** by changing the thickness if [sic, of] the substrate." Langley at 10:8-10. (The thickness referred to by Langley is the thickness of the printed circuit board substrate, Langley at 6:21-24, and therefore changing this thickness would not affect the dimensions used to calculate complexity factor. The antenna examples of Langley shown in Figures 2 and 13 are x-y dimensions whereas the thickness is the z dimension.) A POSITA would also have understood that it was advantageous to provide an antenna that operates within the frequencies being used by 4G communication standards (under the plan and ordinary meaning of that term as it was used in the '200 Patent) in order to provide compatibility with wireless standards. Again, the 4G standard was announced almost 2 years after the earliest claimed priority date of the '200 Patent, as I explain above.

94. Langley also claims: "19. A multi-band antenna comprising a substrate having three electrically conductive elements formed on a first surface, wherein: two of the elements define antenna terminals for connection to an electronic circuit, the other element not defining any antenna terminals; and the antenna provides frequency bands

having a return loss of less than -10dB, the bands including frequencies of 900MHz, 1800MHz, 2000MHz, 2400MHz and 5400MHz." Langley at 13:14-20.

95. Langley provides a graphical representation of the return loss for the antenna of Example 1 as follows (the -10db line has been annotated with the box):

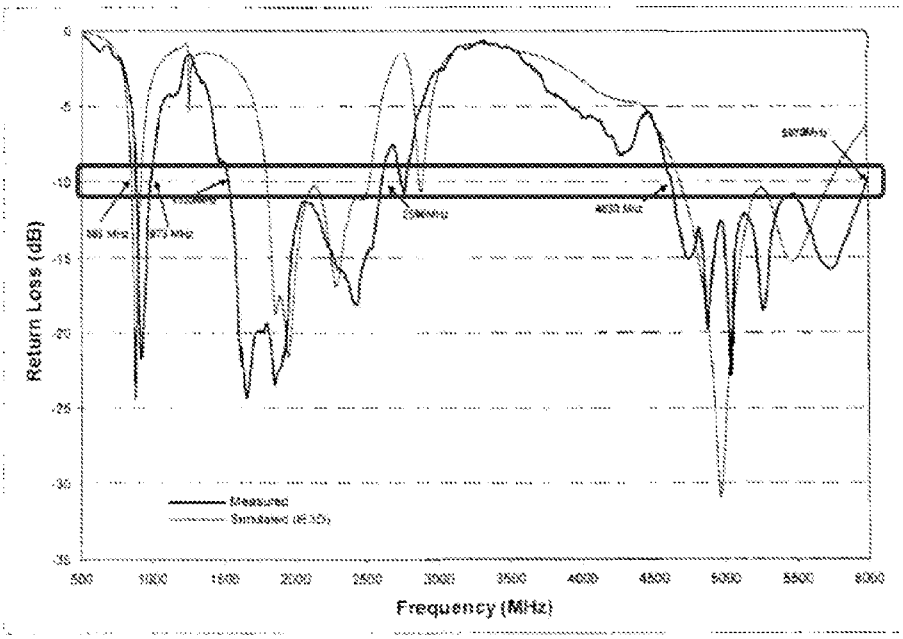


Fig. 4

Langley at Figure 4.

96. Langley provides a second example of its invention as shown with dimensions of the conductive elements in Figure 13. "Apart from the slightly different element dimensions, the second example is similar to the first example, except also that the substrate is 1.6mm thick." Langley at 10:2-4.

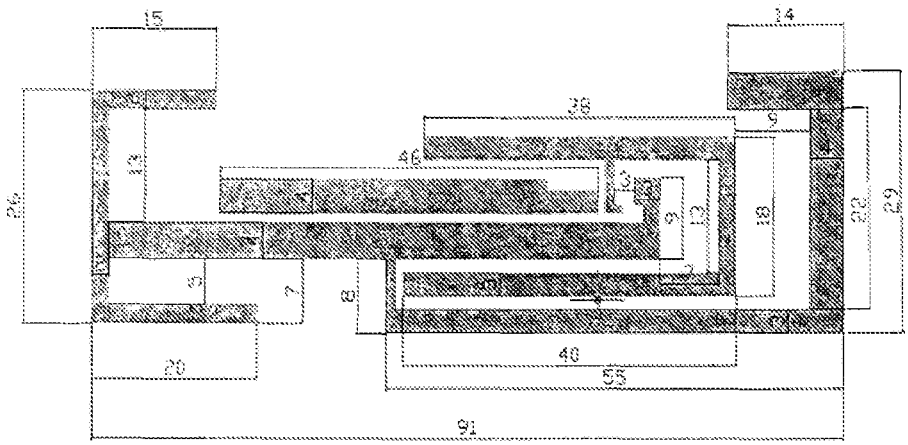


Fig. 13

Langley at Figure 13.

97. As illustrated by Figure 14, a return-loss diagram provided by Langley, the antenna of example 2 offers similar multi-band performance with "resonant frequencies [that] occur at lower frequencies" than the first example. Langley at 10:6-8.

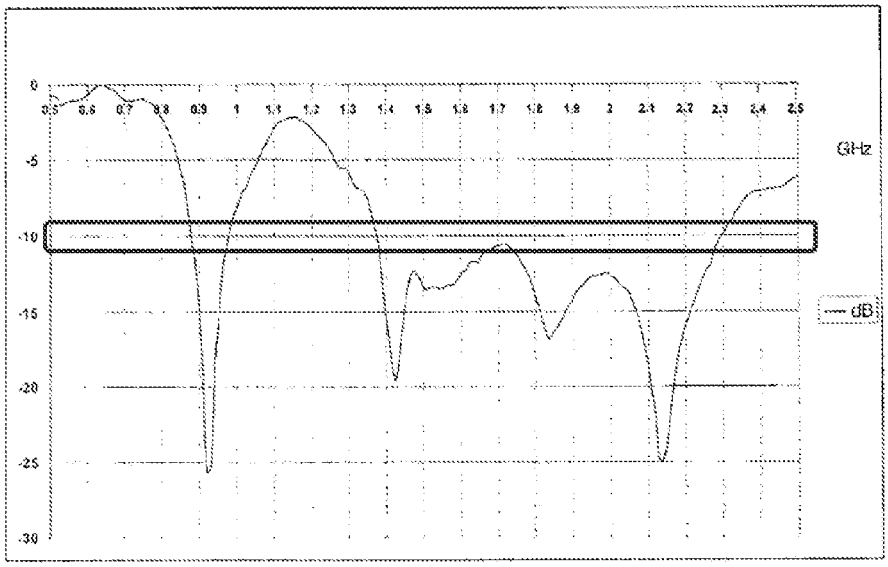


Fig. 14

Langley at Figure 14.

98. The frequency scale of Figure 4 is megahertz (MHz), while the frequency scale of Figure 14 is gigahertz (GHz). One gigahertz is 1,000 megahertz. Thus, the frequencies shown on Figure 14 are roughly equivalent to the left portion of those shown in Figure 4, 500 through 2,500 megahertz.

99. As Langley explains, "[t]he position of the resonant frequencies of the antenna can thus be easily and predictably altered by changing the thickness if the substrate." *Id.* at 10:8-10.

100. A POSITA would have understood Langley to be analogous art to the '200 Patent. As explained above, the field of endeavor of the invention of the '200 Patent is a multifunction wireless device and antenna designs for such devices. Ex. 1001 at 1:29-38. Langley discloses an antenna arrangement for a wireless device, which is within the same field of endeavor. Langley at 2:24-26, 4:29-7, 8:8-13.

101. Also, Langley is reasonably pertinent to at least one problem concerning the inventors of the '200 Patent. As explained above, the problem purportedly solved by the '200 Patent is the need for, and difficulty in attaining, an antenna system for a wireless device that has both a small form factor and also good wireless performance in multiple wireless bands. Ex. 1001, 3:28-33, 5:1-26. Langley recognizes this problem, and provides the solution of a compact antenna system that offers good wireless performance in multiple wireless bands. Langley at 2:21-26, 3:4-17, 4:29-7, 8:8-13.

iii Motivation to Combine Bolin and Langley

102. In my opinion, a POSITA would have been motivated to apply the multi-band antenna of Langley to the wireless device of Bolin because the antenna of Langley advantageously covers five wireless bands and is compact and efficient. *See* Langley at 1:3-5, 2:21-22. A POSITA would have incorporated the multi-band antenna of Langley into the wireless device of Bolin in order to get the benefit of a compact antenna that operates on multiple bands and is efficient. A POSITA would have also have been motivated to combine Bolin and Langley in order to achieve a wireless device with both multi-band coverage and a separate Bluetooth antenna that provides good Bluetooth coverage. Bluetooth, in general, operated in 2006 at a higher power level than cellular signals and therefore a POSITA would have understood that it would be advantageous to

have a separate Bluetooth antenna such that the separate Bluetooth antenna could operate at higher power levels with less interference with the multi-band antenna.

103. As explained above, a POSITA would have substituted the multi-band antenna of Langley for the main antenna of Bolin. The resulting antenna system of Bolin/Langley comprises: (i) the multi-band antenna of Langley; (ii) the separate Bluetooth antenna of Bolin; (iii) the high-impedance blocking element of Bolin that provides for good isolation between the multi-band antenna of Langley and the Bluetooth antenna of Bolin. See Ex. AA.

104. The multi-band antenna of Bolin operates in three bands (a two-band antenna plus a third parasitic element that covers the third band while also functioning as a high-impedance block). Bolin at [0022] – [0023] and Claim 1. The need for additional bandwidth coverage in wireless devices is disclosed by Bolin. Bolin at [0001]. Langley advantageously offers an antenna that covers five bands, which is more than the three bands covered by the main antenna of Bolin. *See* Langley at 4:29-32. A POSITA would have understood that coverage of additional wireless bands was advantageous, given the known need at the time of the alleged invention for wireless devices that covered as more wireless bands. See Bolin at [0001].

105. A POSITA would have considered substituting the multi-band antenna of Langley for the main antenna elements of Bolin, while retaining the high-impedance blocking element (item 6 of Figure 1 of Bolin) and the Bluetooth antenna of Bolin (item 3 of Figure 1 of Bolin) to be a simple substitution of one known element (the antenna of Langley) for another (the Bolin main antenna components) to obtain predictable results of increasing the number of wireless bands that the antenna system covers. As a POSITA would have understood, the antenna of Langley was developed to be used as a multi-band antenna in a wireless device to provide coverage of additional wireless bands, and indeed the antenna disclosed by Langley covers five wireless bands. Langley at 2:24-26, 4:29-7, 8:8-30, 13:7-20.

106. As Bolin discloses in alternative embodiments shown in Figures 9-12, various main antenna component shapes were compatible with the antenna system of Bolin including the high-impedance blocking element (item 6) and the Bluetooth antenna (item 3). Bolin at [0018], [0034] and Figures 9-12.

107. Bolin teaches that, through the use of a parasitic element (item 6) between the antennas, high-impedance blocking can be achieved that results in good isolation between the two antennas even when they are closely spaced. *Id.* at [0015] – [0016], [0023] – [0024], Figs. 6-7. It would have been obvious to a POSITA to substitute the multi-band antenna of Langley for the main antenna components of Bolin, while retaining the benefit of the good isolation between the multi-band antenna components and its separate Bluetooth antenna that is offered by the high-impedance blocking element (item 6).

108. A POSITA would have looked to the teachings of Langley to modify Bolin because a POSITA would have considered Langley to be a compatible reference that is within the same field of endeavor as the '200 Patent because Bolin describes a wireless device with multiple antennas, while Langley provides an improved wireless antenna. Ex. 1001 at 1:29-38. A POSITA would have understood that Langley enhances the wireless performance of Bolin by enabling the wireless device to cover more wireless bands.

109. A POSITA would have expected that the combination of Bolin with Langley described in Exhibit AA would be successful because Bolin discloses a multi-antenna system including a multi-band antenna and Langley discloses an improved multi-band antenna that a POSITA would have understood to be operable in the antenna system of Bolin. A POSITA would further have expected that substituting the multi-band antenna of Langley for the main antenna components of Bolin while retaining the high-impedance blocking element of Bolin would result in good isolation between the multi-band antenna of Bolin and the separate Bluetooth antenna of Bolin.

110. Accordingly, it would have been obvious to a POSITA to combine the teachings of Bolin with those of Langley to modify Bolin's system according to the teachings of Langley. A POSITA would have recognized that the combination would provide multi-antenna wireless device of Bolin with the ability to operate on additional wireless bands.

111. A POSITA would have recognized that such a combination would have been nothing more than the use of a known technique to improve similar devices and methods in the same way. Bolin discloses the base wireless device that offers multiple

antennas (a multi-band antenna and a separate Bluetooth antenna) with good isolation between the antennas in a compact configuration. Langley offers an improved multi-band antenna that covers more wireless bands than does the multi-band antenna of Bolin. A POSITA would have applied the improvement of the multi-band antenna of Langley to Bolin to achieve the predictable result of a wireless device that is capable of operating on additional wireless bands while offering good isolation between its multi-band antenna and its Bluetooth antenna.

112. A POSITA would have recognized that applying the multi-band antenna of Langley to the wireless device of Bolin as a routine design choice that could be readily implemented in a wireless device such as Bolin. As mentioned above, Langley provides an explicit motivation and reasons to implement its multi-band antenna in that Langley explains that the antenna is compact and efficient. Langley at 2:21-22. 3:4-6. Langley also explains that its multi-band antenna offers "near independent control of the different bands" by tuning its multiple limbs and fingers. Langley at 3:8-10.

113. I have reviewed, and had input to, and endorse the explanations found in the chart Exhibit AA that maps the combination of Bolin and Langley to the limitations of claims 11-12 of the '200 Patent, including the appendix to Exhibit AA that explains the manner in which the complexity factors were calculated for the antenna embodiments of Langley. In summary, the combination discloses a wireless device that includes two antennas; a first antenna that operates on four wireless bands with a contour that includes at least 20 segments that exceeds complexity factor thresholds for F21 and F32 when those factors are calculated based on the method provided by the '200 Patent, and that further has a width and height ratio of at least two; and a second antenna that is proximate to a side of a ground plane rectangle for the wireless device.

E. Ground 2: The Combination of Bolin, Langley and Rutfors (Claims 11-12)

i Overview of Bolin

114. An overview of Bolin is provided in Ground 1.

ii Overview of Langley

115. An overview of Langley is provided in Ground 1.

iii Overview of Rutfors

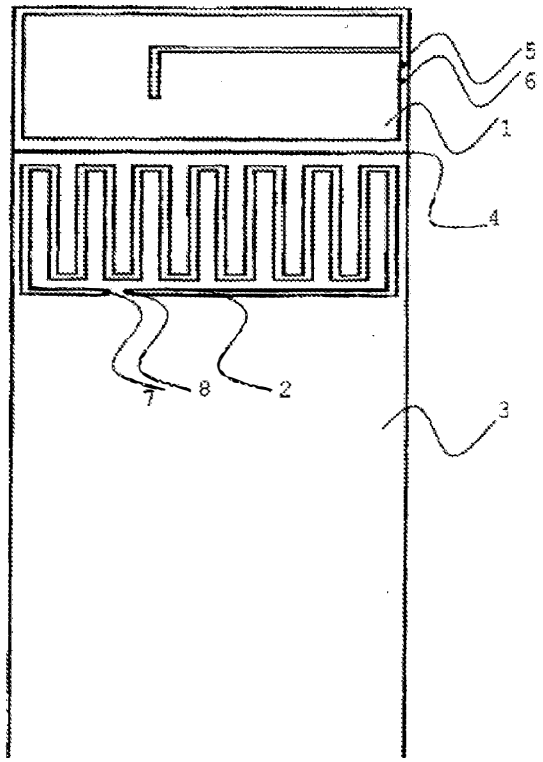
116. Rutfors discloses "[a]n antenna arrangement for a portable radio communication device, comprising a first (1) and a second (2) antenna element, and a conductive shield (4) connectable to a ground plane device (3), said first (1) and second (2) antenna elements are located on opposite sides of the shield (4), wherein said first (1) and second (2) antenna elements are of different types." Rutfors at Abstract.

117. Rutfors explains that "[t]he present invention relates generally to antenna arrangements and particularly to coupling between closely spaced antennas in portable radio communication devices. . . . In a portable radio communication device the space for an internal antenna arrangement is limited. With the growing need for greater functionality and better radio channel quality it is often necessary to utilize more than one antenna element in a portable radio communication device, such as a mobile telephone." *Id.* at [0001] – [0002].

118. Rutfors identifies the problem of potential interference between two closely-spaced antennas. "With closely spaced antenna elements unwanted coupling between the antennas can arise." *Id.* at [0002]. Rutfors also provides a solution to this problem of a shield between the internal antennas. "An object of the present invention is to provide an antenna arrangement that offers improved isolation, i.e. decreased coupling, between antennas in a portable radio communication device, such as a mobile telephone. . . . A further object of the present invention is to provide a portable radio communication device, such as a mobile telephone, that offers improved isolation between antennas inside said device. . . . With a shield between internal antennas in a portable radio communication device the coupling between the antennas is reduced and therewith it is possible to place the antennas close to each other. Further, with internal antennas of different types, such as meander antenna and PIFA, the coupling between the antennas are less than with two antennas of the same type, such as PIFA and PIFA. Thus two antennas of different types and separated by a shield can be positioned closer together than two of the same type separated by a shield, still providing the same amount of isolation." *Id.* at [0005], [0007], [0010].

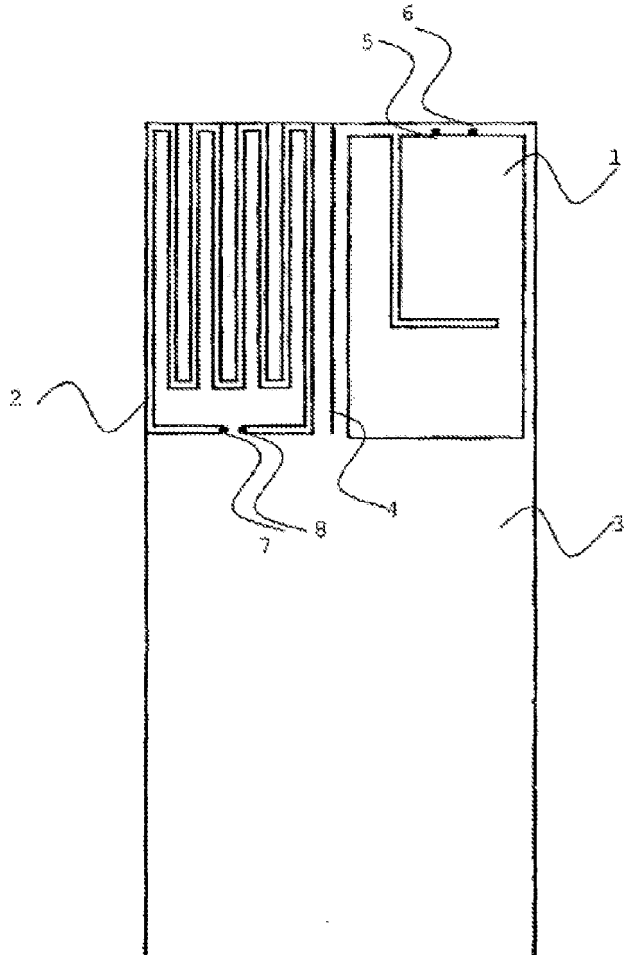
119. In Figures 1 and 2, Rutfors provides two examples of the first and second antenna separated by the shield (item 4). For each example, the "first and a second

antenna element 1, 2 are connected to a ground plane device 3, i.e. the PCB of a portable radio communication device, such as a mobile telephone," *Id.* at [0016], which is also shown on the figures. The antennas are each located near the top edge (and also the side edges) of the ground plane:



Rutfors at Figure 1.

120. In the embodiment shown in Figure 1, "The screen 4 [i.e., the shield separating the two antennas] is grounded and elevated over the ground plane device 3, forcing the currents passing it to change direction (up onto the screen). This additionally reduces the amount of current flowing on the PCB from one antenna to the other, thus minimizing the coupling between the antennas." *Id.* at [0018].



Rutfors at Figure 2.

121. In the embodiment of Figure 2, the feed point placement and the shield (4) both improve the isolation between the two antennas that are closely-spaced in the single wireless device. "The feeding of the PIFA antenna element 1 is positioned at the top of the PCB 3, while the meander antenna element 2 is fed at its lower end. The separation of feeding points has the effect that the current distribution from each antenna is different, which provides isolation between the antennas. This effect is further enhanced by the shield 4 between the antennas." *Id.* at [0019].

122. Rutfors explains that its embodiments can be modified to include different antenna designs, including designs that operate on multiple frequency bands. "In these

embodiments, the antennas 1, 2 are suitable for dual-band operation. It is possible to reduce or extend the number of frequency bands of the antennas by changing the design of the antenna patterns." Rutfors also explains that both antennas can be transmission or reception antennas, and may operate in frequency bands including GSM or Bluetooth bands.

123. "In the embodiments described above the PIFA antenna 1 is preferably optimized as a receiver antenna and the meander antenna 2 as a transmit antenna. However, with slightly different designs, both antennas could be optimized for transmission or reception, providing a transmitter or a receiver antenna diversity system, respectively. The antennas may further be optimized individually in different frequency bands, such as GSM900 and GSM1800, or in different communication systems, such as GSM and Bluetooth." *Id.* at [0021] – [0022]. Rutfors further explains that various types of antennas may be used in its design, and "[t]he important part is that the antennas are somewhat different, having different current distributions on the ground plane device, e.g. the PCB, so that the coupling between the antennas is low. The conductive screen helps to alter the current distribution, which makes the coupling even lower." *Id.* at [0025].

124. A POSITA would have understood Rutfors to be analogous art to the '200 Patent. As explained above, the field of endeavor of the invention is a multifunction wireless device and antenna designs for such devices. Ex. 1001 at 1:29-38. Rutfors discloses an antenna arrangement for a wireless device, which is within the same field of endeavor. Rutfors at [0001] – [0002] and Figures 1-2.

125. Also, Rutfors is reasonably pertinent to at least one problem concerning the inventors of the '200 Patent. As explained above, the problem purportedly solved by the '200 Patent is the need for, and difficulty in attaining, an antenna system for a wireless device that has both a small form factor and also good wireless performance in multiple wireless bands. Ex. 1001, 3:28-33, 5:1-26. Rutfors recognizes this problem, and provides for an antenna configuration that enables a compact antenna system that offers good wireless performance in multiple wireless bands. Rutfors at [0005], [0007], [0010] and Figures 1-2.

iv Motivation to Combine Bolin, Langley and Rutfors

126. A POSITA would have been motivated to apply the multi-band wireless antenna of Langley to the wireless device of Bolin. For this combination, however, instead of retaining the high-impedance blocking element of Bolin, a POSITA would have employed the antenna shield of Rutfors. Specifically, a POSITA would have been motivated to further modify the wireless device of Bolin/Langley to incorporate Rutfor's antenna shield to get the benefit of improved isolation between the main antenna of Langley and the Bluetooth antenna of Bolin. The POSITA would have been further motivated to incorporate the antenna shield of Rutfors to get the additional benefit of the compact design of the antenna system of Rutfors. See Rutfors at [0017 – 0018] (disclosing compact antenna system enabled by the antenna shield). To the extent that Bolin is found not to disclose a ground plane, a POSITA would have been motivated to incorporate the ground plane of Rutfors. A POSITA would have understood, as explained by Rutfors, that he combination of the antenna shield and ground plane of Rutfors offers further minimization of coupling between closely-spaced antennas and thus provides a further benefit over the antenna shield alone. See Rutfors at [0016].

127. As explained in Ground 1, the combination of Bolin and Langley disclose each of the elements of claims 11-12. A POSITA would have substituted the multi-band antenna of Langley for the main antenna of Bolin. However, for this combination, instead of retaining the high-impedance blocking element of Bolin, a POSITA would have employed the antenna shield of Rutfors to provide improved isolation between the multi-band antenna of Langley and the Bluetooth antenna of Bolin.

128. To the extent that Bolin is found not to disclose a ground plane, Rutfors provides a ground plane. Rutfors at [0016]. As Rutfors explains, the ground plane in combination with the antenna shield minimizes coupling (that is, improves isolation) between the two antennas of the antenna system. Rutfors at [0018]. Rutfors also explains that its antenna system is suitable for two antennas for different systems such as GSM and Bluetooth. Rutfors at [0009].

129. The resulting antenna system of Bolin/Langley/Rutfors comprises: (i) the multi-band antenna of Langley; (ii) the separate Bluetooth antenna of Bolin; (iii) the antenna shield of Rutfors to provide good isolation between the multi-band antenna of Langley and the separate Bluetooth antenna of Bolin. See Ex. BB.

130. The motivation to combine Bolin and Langley is explained in Ground 1. A POSITA would have been motivated to apply the wireless antenna of Langley to the wireless device of Bolin in order to provide the wireless device with improved multi-band coverage, and to provide the device with a compact and efficient antenna system.

131. A POSITA would have considered substituting the multi-band antenna of Langley for the main antenna elements (item 2) of Bolin to be a simple substitution of one known element (the antenna of Langley) for another (the Bolin main antenna) to obtain predictable results of increasing the number of wireless bands that the antenna system covers.

132. A POSITA would have been further motivated to add the antenna shield Rutfors (including the ground plane of Rutfors, to the extent that the combination of Bolin/Langley is found not to disclose a ground plane) to the wireless device of Bolin to improve the isolation between the two antennas and thus improve overall wireless performance of the antenna system while maintaining a compact design. A POSITA would have understood that employing the antenna shield of Rutfors for its intended purpose in the device of Bolin/Langley would have been nothing more than the use of known techniques to improve similar devices and methods in the same way.

133. As explained above, a POSITA would have looked to the teachings of Langley to modify Bolin because a POSITA would have considered Langley to be a compatible reference that is within the same field of endeavor as the '200 Patent, as Bolin describes a wireless device with multiple antennas, while Langley provides an improved wireless antenna. Ex. 1001 at 1:29-38. A POSITA would have understood that Langley enhances the wireless performance of Bolin by enabling the wireless device to cover more wireless bands.

134. A POSITA would further have looked to the teachings of Rutfors to modify the wireless device of Bolin/Langley because a POSITA would have considered Rutfors to be a compatible reference that is within the same field of endeavor as the '200 Patent, as Rutfors describes an improved antenna arrangement in a wireless device. Ex. 1001 at 1:29-38.

135. To the extent that the combination of Bolin and Langley is found to not disclose a ground plane and therefore to not disclose a "second antenna . . . proximate to

a side of a ground plane rectangle enclosing the ground plane," a POSITA would have included the teachings of Rutfors and modified the Bolin/Langley device to include the ground plane of Rutfors.

136. A POSITA would have understood that the combination of the ground plane and the antenna shield of Rutfors further improves isolation between the antennas. Rurfors at [0017 – 0018] ("A conductive shield 4, extending from the ground plane device 3, is positioned between the antennas 1, 2. The shield 4 provides additional isolation, and thereby reduces the coupling between the antennas 1, 2, which is usually present between closely spaced antennas. . . . The screen 4 is grounded and elevated over the ground plane device 3, forcing the currents passing it to change direction (up onto the screen). This additionally reduces the amount of current flowing on the PCB from one antenna to the other, thus minimizing the coupling between the antennas.")

137. The antenna system of Bolin is located near the edge of the ground plane and also near the edge of the device, as is the antenna system of Rutfors. See Bolin at Figure 1; Rutfors at Figures 1-2. A POSITA would have understood that locating the antenna system near the edge of the device (which for this combination would locate the antenna system near the edge of the ground plane) to be a standard design practice that was an obvious design choice. A POSITA would have thus located the antenna system and ground plane in the device of Bolin/Langley/Rutfors such that the antenna system was located near the edge of the ground plane.

138. Accordingly, it would have been obvious to a POSITA to combine the teachings Langley and Rutfors to modify the wireless device of Bolin to provide a wireless device with improved multi-band performance with a compact and efficient antenna system design.

139. Both Bolin and Rutfors disclose an antenna system that is located near the edge of the ground plane, and further near the edge of the device. Bolin at Fig. 1; Rutfors at Figs. 1-2. A POSITA would have further have understood the location of the antenna system at the edge of ground plane as disclosed by Bolin (and to the a ground plane is found to be absent from Bolin, as disclosed by Rutfors) to be a typical design choice that a POSITA would have expected to result in a successful device.

140. Such a combination would have been nothing more than the use of known techniques to improve similar devices and methods in the same way. As explained in Ground 1, Bolin discloses the base wireless device with a multi-antenna system, and Langley discloses a comparable wireless antenna for a wireless device that offers improved multi-band performance. Rutfors discloses a comparable multi-antenna configuration for a wireless device that provides improved isolation between the antennas and thus improved wireless performance in a compact configuration.

141. A POSITA would have applied the improvement of the antenna configuration of Rutfors to Bolin/Langley to achieve the predictable result of wireless device with an antenna system with improved isolation between the antennas and thus improved wireless performance in a compact configuration. A POSITA would have recognized that applying the antenna configuration of Rutfors a routine design choice that could be readily implemented in a wireless device such as Bolin/Langley. As mentioned above, Rutfors itself provides an explicit motivation and reasons to implement the antenna configuration of Rutfors in a wireless device to reduce unwanted coupling between antennas and allow for a more compact antenna configuration. *See* Ex. BB; Rutfors at [007], [0010], [0019].

142. A POSITA would have applied the known technique of antenna shielding and optimizing feed point placement of Rutfors to achieve the predictable result of reduced unwanted coupling between closely-spaced antennas in a wireless device. A POSITA would have recognized that antenna shielding and optimizing feed point placement advantageously allows the wireless device antenna system to be more compact and offer improved wireless performance.

143. A POSITA would have understood that the teachings of Rutfors advantageously allows the wireless antennas to be placed closer together in a compact configuration without unwanted coupling between the antennas.

144. A POSITA would have expected that the combination of Bolin with Langley and Rutfors described in Exhibit BB would be successful because Bolin discloses a multi-antenna system including a multi-band antenna, Rutfors discloses a multi-antenna antenna system, and Langley discloses an improved multi-band antenna that a POSITA would have understood to be operable in the antenna system of Bolin. A

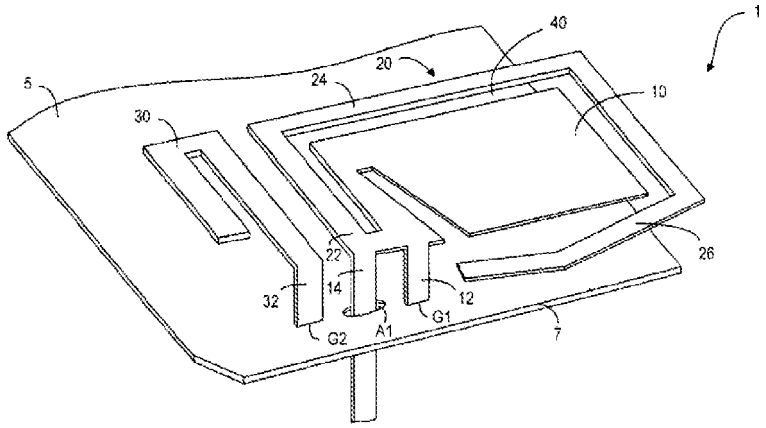
POSITA would have expected the antenna shield of Rutfors to provide good isolation between the multi-band antenna of Langley and the separate Bluetooth antenna of Bolin. A POSITA would have further expected the antenna shield of Rutfors in combination with the ground plane of Rutfors to provide good isolation between these two antennas.

145. I have reviewed, and had input to, and endorse the explanations found in the chart Exhibit BB that maps the combination of Bolin, Langley and Rutfors to the limitations of claims 11-12 of the '200 Patent, including the appendix to Exhibit BB that explains the manner in which the complexity factors were calculated for the antenna embodiments of Langley. In summary, the combination discloses a wireless device that includes two antennas; a first antenna that operates on four wireless bands with a contour that includes at least 20 segments that exceeds complexity factor thresholds for F21 and F32 when those factors are calculated based on the method provided by the '200 Patent, and that further has a width and height ratio of at least two; and a second antenna that is proximate to a side of a ground plane rectangle for the wireless device.

F. Ground 3: The Combination of Ollikainen, Langley and Bolin (Claims 11-12)

i Overview of Ollikainen

146. Ollikainen discloses an antenna system (1) that operates in three wireless bands. As Ollikainen explains, the first resonance frequency is substantially in a frequency range of 1710 MHz to 1880 MHz, the second resonance frequency is substantially in a frequency range of 880 MHz to 960 MHz, and the third resonance frequency is substantially in a frequency range of 1850 MHz to 1990 MHz. The third resonance frequency, in general, is higher than the first frequency, but their frequency ranges have an overlapping section. Ollikainen at [0006] – [0008]. The antenna is shown in Figure 1:



Ollikainen at Figure 1.

147. Ollikainen is an example of an antenna system design element in a wireless device that was ubiquitous in the art in which the antenna system was placed near the top or bottom edge of the wireless device, near the edge of a ground plane. Ollikainen explains that "Preferably, the antenna 1 is located near the top end 102 of a hand-held telecommunication device, such as a mobile phone 90, as shown in Figures 2 and 3." Ollikainen at [0017]. As shown in Figure 3 of Ollikainen, the antenna system (1) is positioned near the top edge of the wireless device and also near the top edge of the ground plane (5). *See Id.*

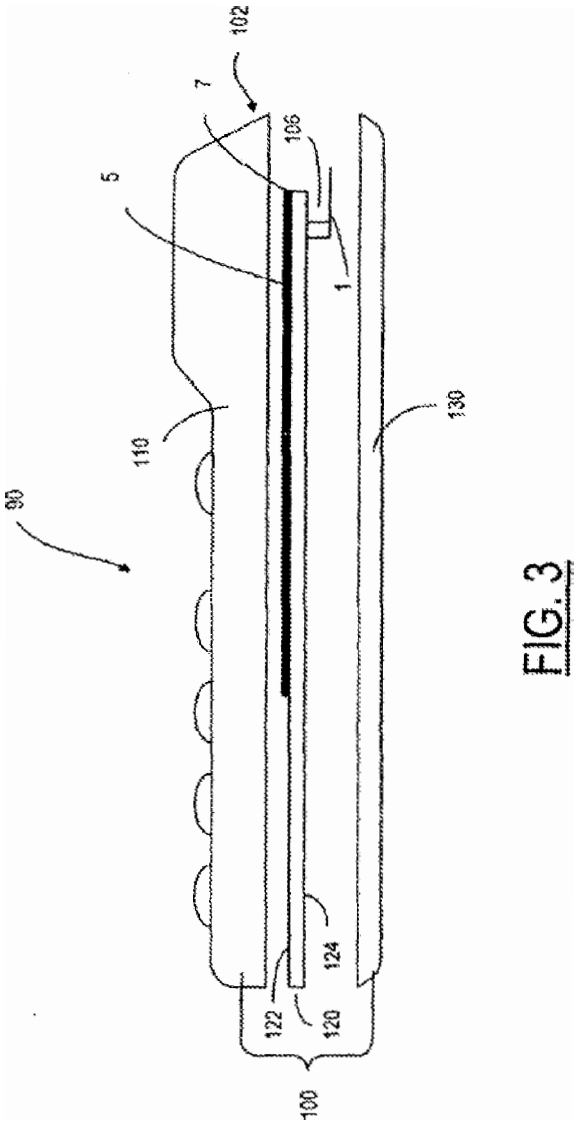


FIG. 3

Ollikainen at Figure 3.

148. As shown above in Figure 3 of Ollikainen, the antenna system (1) is located near the edge of the device, and at the edge of the ground plane (5). As shown in more detail in Figure 2 of Ollikainen, and as can also be seen from the side view presented in Figure 3, the antenna system is partially inside and partially outside the rectangle that enclose the ground plane, that is, the antenna system, when viewed from the plane in which the antenna rectangle would be drawn on the thin, roughly rectangular ground plane, is at the edge of the antenna rectangle. See Figure 2 below:

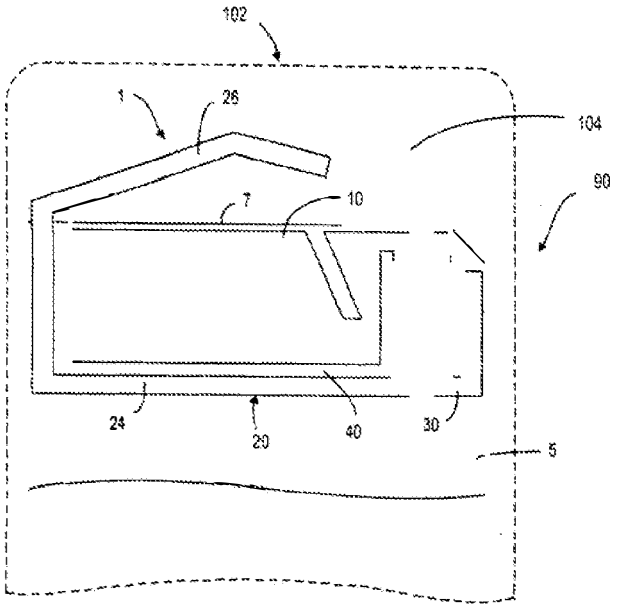


FIG. 2

Ollikainen at Figure 2.

149. A POSITA would have understood Ollikainen to be analogous art to the '200 Patent. As explained above, the field of endeavor of the invention is a multifunction wireless device and antenna designs for such devices. Ex. 1001 at 1:29-38. Ollikainen discloses a wireless device with an antenna system, which is within the same field of endeavor. Ollikainen at [0001] – [0002] and Figures 1-3.

150. Also, Ollikainen is reasonably pertinent to at least one problem concerning the inventors of the '200 Patent. As explained above, the problem purportedly solved by the '200 Patent is the need for, and difficulty in attaining, an antenna system for a wireless device that has both a small form factor and also good wireless performance in multiple wireless bands. Ex. 1001, 3:28-33, 5:1-26. Ollikainen recognizes the need for small, multi-band wireless antennas for wireless devices. Ollikainen at [0002], [0004] – [0005]. Ollikainen provides a wireless antenna configuration for a wireless device that offers good multi-band wireless performance even in a small form factor. *Id.* at [0004] – [0005].

ii Overview of Langley

151. An overview of Langley is provided in Ground 1.

iii Overview of Bolin

152. An overview of Bolin is provided in Ground 1.

iv *Motivation to Combine Ollikainen, Langley, and Bolin*

153. A POSITA would have been motivated to apply the multi-band antenna of Langley to the wireless device of Ollikainen because the antenna of Langley advantageously covers at five wireless bands and is compact and efficient. *See* Langley at 1:3-5, 2:21-22. A POSITA would have incorporated the multi-band antenna of Langley into the wireless device of Ollikainen in order to get the benefit of a compact antenna that operates on multiple bands and is efficient. A POSITA would have also been motivated to incorporate the multi-antenna system of Bolin that includes a separate Bluetooth antenna into the Ollikainen/Langley device in order to achieve a wireless device with improved Bluetooth coverage. As a POSITA would understand, including the dedicated Bluetooth antenna of Bolin would allow for tuning of the multi-band antenna of Langley to cover additional wireless bands. Also, the dedicated Bluetooth antenna of Bolin in combination with the multi-band antenna of Langley would offer improved Bluetooth performance, in those embodiments of the antenna of Langley such as example 1 in which the multi-band antenna of Langley provides Bluetooth coverage.

154. A POSITA would have included the following antenna system in place of the antenna (element 1) of Ollikainen, while retaining the location of the antenna (1) at the edge of the ground plane: An antenna system comprising (i) the multi-band antenna of Langley; (ii) the separate Bluetooth antenna of Bolin; (iii) the high-impedance blocking element of Bolin in order to provide good isolation between the multi-band antenna of Langley and the Bluetooth antenna of Bolin. See Ex. CC. As explained below and in Exhibit CC, the antenna location of Ollikainen was a common design choice, as a POSITA would have understood.

155. A POSITA would have looked to the teachings of Langley to modify Ollikainen because a POSITA would have considered Langley to be a compatible reference that is within the same field of endeavor as the '200 Patent because Ollikainen describes a wireless device with a wireless antenna, while Langley provides an improved

wireless antenna. Ex. 1001 at 1:29-38. A POSITA would have understood that Langley enhances the wireless performance of Ollikainen by enabling the wireless device to cover more wireless bands.

156. A POSITA would have been further motivated to apply the multi-antenna system including the separate Bluetooth antenna and the high-impedance blocking element (item 6 Figure 1 of Bolin) as taught by Bolin to the wireless device of Ollikainen/Langley because the antenna system of Bolin offers the advantage of size reduction of the antenna system and the ability to place the two antennas in close proximity while providing improved isolation between the two antennas. Bolin at [0021], [0023] – [0024]. That is, a POSITA would have retained the high-impedance blocking element (6) of Bolin to provide improved isolation between the multi-band antenna of Langley and Bluetooth antenna (3) of Bolin.

157. A POSITA would have looked to the teachings of Bolin to modify Ollikainen/Langley because a POSITA would have considered Bolin to be a compatible reference that is within the same field of endeavor as the '200 Patent because Ollikainen describes a wireless device with a wireless antenna, while Bolin provides an improved wireless antenna system that includes a separate Bluetooth antenna to provide Bluetooth functionality in the wireless device. Ex. 1001 at 1:29-38. A POSITA would have understood that Bolin enhances the wireless performance of Ollikainen/Langley by enabling the wireless device to cover Bluetooth via a dedicated antenna, while providing for improved isolation between the main multi-band antenna and the Bluetooth antenna.

158. Accordingly, it would have been obvious to a POSITA to combine the teachings of Ollikainen with those of Langley and Bolin to modify Ollikainen's system according to the teachings of Langley and Bolin. A POSITA would have recognized that the combination would provide the wireless device of Ollikainen with the ability to operate on more wireless bands, including the Bluetooth band.

159. Such a combination would have been nothing more than the use of a known technique to improve similar devices and methods in the same way. Ollikainen discloses the base wireless device where the antenna system is located at the edge of the device and the ground plane, which, as a POSITA would have understood, was a common design choice. Langley offers an improved multi-band antenna that covers more

wireless bands than does the multi-band antenna of Ollikainen. A POSITA would have applied the improvement of the multi-band antenna of Langley to Ollikainen to achieve the predictable result of a wireless device that is capable of operating on additional wireless bands. Likewise, Bolin offers an improved antenna system that enables the use of a dedicated Bluetooth antenna along with a main multi-band antenna while providing good isolation between the two antennas and a compact design, due to the high-impedance blocking element (item 6 Figure 1 of Bolin) of Bolin which improves isolation between the closely-spaced antennas.

160. A POSITA would have recognized that applying the multi-band antenna of Langley to the wireless device of Ollikainen as a routine design choice that could be readily implemented in a wireless device such as Ollikainen. As mentioned above, Langley provides an explicit motivation and reasons to implement its multi-band antenna in that Langley explains that the antenna is compact and efficient. Langley at 2:21-22, 3:4-6. Langley also explains that its multi-band antenna offers "near independent control of the different bands" by tuning its multiple limbs and fingers. Langley at 3:8-10.

161. A POSITA would also have recognized that applying the multi-antenna system of Bolin (that is, including a separate Bluetooth antenna as taught by Bolin) to the wireless device of Ollikainen/Langley as a routine design choice that could be readily implemented in a wireless device such as Ollikainen/Langley. Bolin provides an explicit motivation and reasons to implement its multi-antenna system that Bolin explains that the antenna system is compact; provides good isolation between the two antennas that are in close proximity in the antenna system of Bolin; and advantageously provides Bluetooth coverage in the wireless device. Bolin at [0002] – [0004].

162. A POSITA would have expected that the combination of Ollikainen with Langley and Bolin described in Exhibit CC would be successful because Ollikainen discloses a wireless device with a multi-band antenna, Langley discloses an improved multi-band antenna, and Bolin discloses an antenna system that includes both a multi-band antenna and also a separate Bluetooth antenna while providing for good isolation between the two antennas. A POSITA would have expected the high-impedance blocking element (6) of Bolin to provide improved isolation between the multi-band antenna of Langley and Bluetooth antenna (3) of Bolin.

163. I have reviewed, and had input to, and endorse the explanations found in the chart Exhibit CC that maps the combination of Ollikainen, Langley, and Bolin to the limitations of claims 11-12 of the '200 Patent, including the appendix to Exhibit CC that explains the manner in which the complexity factors were calculated for the antenna embodiments of Langley. In summary, the combination discloses a wireless device that includes two antennas; a first antenna that operates on four wireless bands with a contour that includes at least 20 segments that exceeds complexity factor thresholds for F21 and F32 when those factors are calculated based on the method provided by the '200 Patent, and that further has a width and height ratio of at least two; and a second antenna that is proximate to a side of a ground plane rectangle for the wireless device.

IV. CONCLUSION

164. For the reasons stated above, it is my opinion that claims 11-12 of the '200 Patent would have been obvious to a POSITA as of the earliest claimed priority date of that patent, which is July 18, 2006.

165. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: OCTOBER 12, 2023

By: 

Name: Manos M. Tentzeris, Ph.D.

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PATENT AND TRADEMARK OFFICE

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
90/019,275	**10/12/2023 06:07:18 PM ET**	**SKAD002**

Title of Invention

Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices

Application Information

APPLICATION TYPE	Utility / ex parte reexam	PATENT #	11349200
CONFIRMATION #	7433	FILED BY	christopher coulson
PATENT CENTER #	62986473	FILING DATE	-
CUSTOMER #	27896	FIRST NAMED INVENTOR	Carles PUENTE BALIARDA
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 23

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
_Ex Parte Reexamination Request of U.S. Patent No. 11,349,200.pdf	68	Receipt of Petition in a Reexam	1042 KB
_Transmittal Form.pdf	4	Transmittal Letter	247 KB
_Power of Attorney.pdf	2	Power of Attorney	127 KB
_Patent Information Disclosure Statement.pdf	2	Reexam - Info Disclosure Statement Filed by 3rd Party	760 KB
_Non-Patent Information Disclosure Statement.pdf	2	Reexam - Info Disclosure Statement Filed by 3rd Party	259 KB
Ex. 1001.pdf	80	Copy of patent for which	6380 KB

		reexamination is requested	
Ex. 1002 [Part 1 of 2].pdf	486	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	14333 KB
Ex. 1002 [Part 2 of 2].pdf	484	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	11829 KB
Ex. 1003.pdf	325	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	14032 KB
Ex. 1004.pdf	100	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	4557 KB
Ex. 1005.pdf	89	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	3398 KB
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Ex. 1014.pdf	7	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	367 KB
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		Filed by 3rd Party	
Ex. 1016.pdf	80	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	975 KB
Ex. 1017.pdf	45	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	1453 KB
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Ex. 1011.pdf	15	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	476 KB
Ex. 1010.pdf	96	Reexam - Affidavit/Declaration/Exhibit Filed by 3rd Party	853 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Claim Chart for Fractus '200 Patent

I. GROUNDS OF UNPATENTABILITY

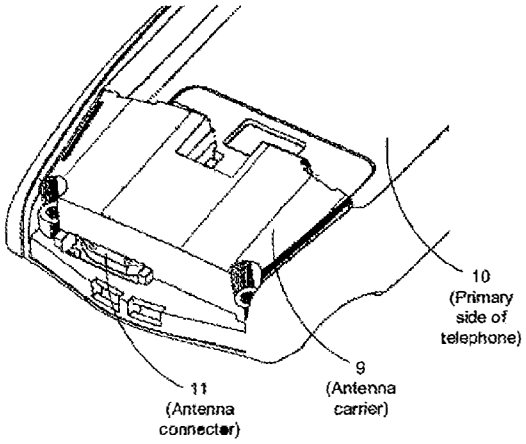
Ground	Claim(s)	Statute(s)	Prior Art
1	Claims 11-12	103	Bolin, Langley

A. Prior Art Relied Upon

Primary Reference
Ex. 1011 ("Bolin") (U.S. Patent Publication No. 2004/0137950) was filed March 20, 2002 and published July 15, 2004 and is prior art to the '200 Patent under pre-AIA 35 U.S.C. 102(b).
Ex. 1012 ("Langley") (U.K. Patent Publication No. GB2416625) was filed July 22, 2004 and published January 2, 2006 and is prior art to the '200 Patent under pre-AIA 35 U.S.C. 102(b).

B. Claim Chart

'200 Patent Claim Language	Ground 1: Bolin and Langley
Claim 11	
11[pre]. A wireless device comprising:	Claim 11 (and the other claim in this chart) are obvious over the combination of Bolin and Langley. *See* Request at Section I.E.1. A Person of Ordinary Skill in the Art ("POSITA") would have been motivated to incorporate the antenna of Langley into the wireless device of Bolin because Langley discloses an antenna for use in a wireless device, and because Langley offers the advantage of an antenna that operates on multiple bands (5 bands) and also is compact and efficient. *See* Langley at 1:3-5, 2:21-22; Ex. 1009, ¶¶ 84, 104, 112. A POSITA would have incorporated the multi-band antenna of Langley into the wireless device of Bolin in order to get the benefit of a compact antenna that operates on additional bands and is efficient. Ex. 1009, ¶¶ 84, 104, 112. To the extent 11[pre] is limiting, Bolin discloses element 11[pre].

'200 Patent Claim Language	**Ground 1: Bolin and Langley**
11[pre]. A wireless device comprising:	Bolin discloses in Figure 3 a wireless device that includes an antenna system.  *Fig 3* Bolin at [0001]: The "invention relates to…portable communication devices that need…a built-in, multi band, multi antenna system."
[11.1] an antenna system comprising a ground plane and at least two antennas within the wireless device, the antenna system comprising:	Bolin discloses element [11.1]; alternatively, any differences would have been obvious to a POSITA. Bolin discloses an antenna system (item 1) in Figure 1 with two antennas; a first antenna is the main antenna (item 2 surrounded by dashed lines in Figure 1 of Bolin, which is reproduced below) and the second antenna is a separate Bluetooth antenna (item 3 in Figure 1 of Bolin):

'200 Patent Claim Language	**Ground 1: Bolin and Langley**

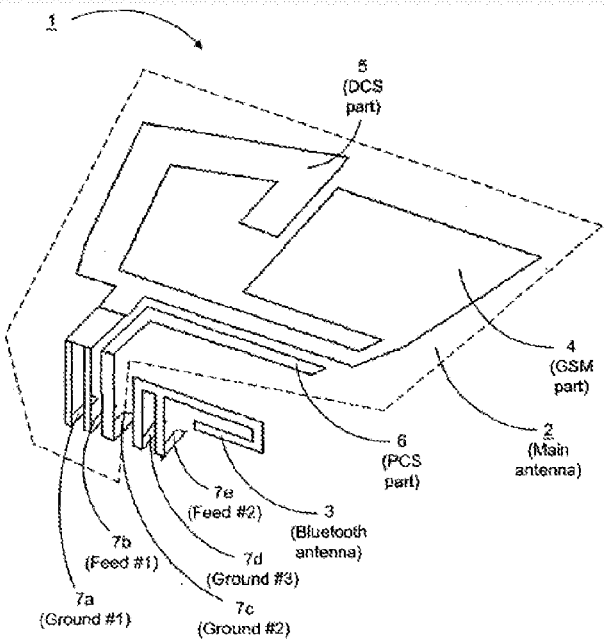
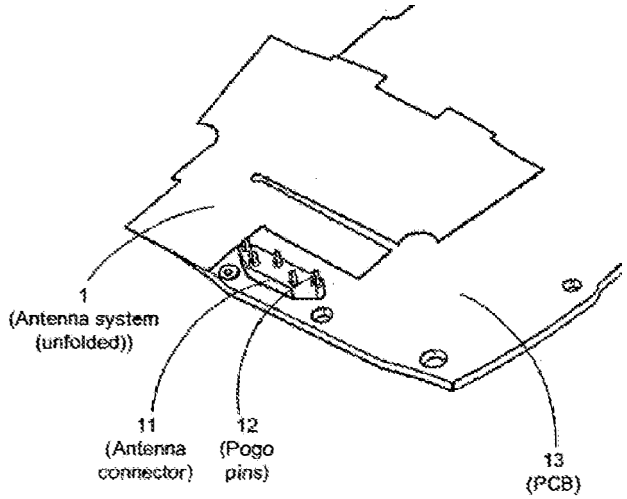


Fig 1

Bolin at [0019]:
"The antenna system has a main antenna 2 for GSM/DCS/PCS and a separate smaller Bluetooth™ antenna 3 positioned very close to the main antenna 2."

"The antenna system 1 has five connection traces…" Bolin at [0025].

Bolin also discloses a ground plane, which is the antenna connector, and the grounding metal to which it is connected. Ex. 1009 at ¶¶ 79-80. The main antenna (2), parasitic part (6) and Bluetooth antenna (3) each have ground traces that connect to the antenna connector (11). Bolin at [0025] ("The antenna system 1 has five connection traces 7a-7e, which all are located in the third plane. Of these connection traces, the main antenna 2 has a ground trace 7a ("Ground #1") and a feed trace 7b ("Feed #1") for the GSM part 4 and the DCS part 5. The parasitic PCS part 6 has only a ground trace 7c ("Ground #2"), whereas the Bluetooth™ antenna 3 has a ground trace 7d ("Ground #3) as well as a feed trace 7e ("Feed #2"), as shown in FIG. 1.")

'200 Patent Claim Language	Ground 1: Bolin and Langley
	Bolin discloses that various shapes of the main antenna elements may be combined with the PCS part (6) and the Bluetooth antenna (3) that are shown in Figure 1 of Bolin. Ex. 1009 at ¶ 78. These various antenna element shapes are disclosed in Figures 9-12 of Bolin. Bolin at [0034]. Bolin Figure 5 shows the antenna connector (to which the antenna is connected when the system is assembled) and the PCB board to which the antenna connector is attached. The antenna connector has five pins, which match to the five connections shown on Figure 1 of Bolin (above). Therefore, the ground traces are connected through the antenna connector to grounding metal (not further shown in Bolin). Ex. 1009 at ¶¶ 79-80.  Bolin Figure 5
[11.2] a first antenna configured to provide operation in at least three frequency bands being used by 4G communication standards,	Bolin in view of Langley discloses element [11.2]; alternatively, any differences would have been obvious to a POSITA. A POSITA would have substituted the multi-band antenna of Langley for the multi-band antenna of Bolin, while retaining the high-impedance blocking element (6) and the Bluetooth antenna (3) of Bolin, for the reasons below. The antenna of Langley employed in the combined device of Bolin/Langley is the first antenna.

'200 Patent Claim Language	Ground 1: Bolin and Langley
	Langley discloses an antenna that is configured to provide operation on five frequency bands, which exceeds the required at least three frequency bands. Ex. 1009 at ¶¶ 84, 102, 104-105. The antenna invention of Langley is the first antenna that is configured to provide operation in at least three frequency bands. A POSITA would have considered it obvious to substitute the antenna of Langley for the main antenna components of Bolin, while retaining the high-impedance blocking element (item 6) and Bluetooth antenna (item 3) of Bolin, for the reasons explained below. A POSITA would have understood that the multi-band antenna of Langley could be used in place of the main antenna components of the antenna system of Bolin. Ex. 1009 at ¶¶ 84, 102, 104-105. Langley discloses a compact antenna. Langley at 3:4-6. A POSITA would consider it obvious to substitute the antenna of Langley for the main antenna components of Bolin, while retaining the LCS part (6) and Bluetooth antenna (3) of Bolin. Ex. 1009 at ¶¶ 84, 102, 104-105. The multi-band antenna of Bolin operates in three bands (a two-band antenna plus a third parasitic element that covers the third band while also functioning as a high-impedance block). Bolin at [0022] – [0023] and Claim 1. The need for additional bandwidth coverage in wireless devices is disclosed by Bolin. Bolin at [0001]. Langley advantageously offers an antenna that covers five bands, which is more than the three bands covered by the main antenna of Bolin. *See* Langley at 4:29-32. A POSITA would have understood that coverage of additional wireless bands was advantageous, given the known need at the time of the alleged invention for wireless devices that covered more wireless bands. Ex. 1009 at ¶¶ 102-113. Because Bolin shows various shapes of main antenna elements that are combined with the high-impedance blocking element (6), Bolin at [0034] and Figures 9-12, a POSITA would have understood that the compact multi-band antenna of Langley could readily be incorporated into the antenna system of Bolin while retaining the high-impedance blocking element (6) and the Bluetooth antenna (3) of Bolin. Ex. 1009 at ¶ 112. Langley discloses a compact antenna. Langley at 3:4-6. As Bolin explains, "[a]s can be seen from the figures different parts of the antenna system may look different depending on e.g. the amount of space available inside the portable communication device." Bolin at [0034]. The resulting antenna system would include: (i) the compact multi-band antenna of Langley

'200 Patent Claim Language	Ground 1: Bolin and Langley
	(which is satisfies the complexity factor criteria of the claim); (ii) the high-impedance blocking element of Bolin; and (iii) the Bluetooth antenna of Bolin. Bolin teaches that, through the use of a parasitic element between the antennas, high-impedance blocking can be achieved that results in good isolation between the two antennas even when they are closely spaced. Bolin at [0015] – [0016], [0023] – [0024], Figs. 6-7. A POSITA would have recognized that the improved isolation between the main antenna of Langley (the first antenna as claimed) and the Bluetooth antenna of Bolin could be maintained because the high-impedance blocking element could be retained in the antenna system of Bolin/Langley. Ex. 1009 at ¶ 103. A POSITA would have considered the substitution of the antenna of Langley for the main antenna of Bolin (item 2 of Figure 1 of Bolin) to be the simple substitution of one known element (the Langley Antenna) for another (the Bolin main antenna) to obtain predictable results of increasing the number of wireless bands that the antenna system covers. Ex. 1009 at ¶ 105. A POSITA would have understood that the elements of the antenna of Langley could be tuned (that is, adjusted) in order to operate in the antenna system of Bolin. Ex. 1009 at ¶ 93. Langley explains that the resonant frequencies of its antenna can be "easily and ***predictably altered*** by changing the thickness if [sic, of] the substrate." Langley at 10:8-10. (The thickness referred to by Langley is the thickness of the printed circuit board substrate, Langley at 6:21-24, and therefore changing this thickness would not affect the dimensions used to calculate complexity factor. Ex. 1009 at ¶ 93. The antenna examples of Langley shown in Figures 2 and 13 are x-y dimensions whereas the thickness is the z dimension. Ex. 1009 at ¶ 93. Langley explains that the antenna invention of Langley operates on five frequency bands. Langley at 4:29-5:7. Therefore these two antenna embodiments each operate on five frequency bands. *See* Langley at 5:12-6:13. The antennas of Figure 2 (embodiment example 1) and Figure 13 (embodiment example 2) are two examples of the invention of Langley, and therefore these two antennas operate on five frequency bands. *See* Langley at 5:12-6:13. Ex. 1009 at ¶¶ 102, 104-105. The invention of Langley is shown, for example, in Figure 13 of Langley:

'200 Patent Claim Language	Ground 1: Bolin and Langley

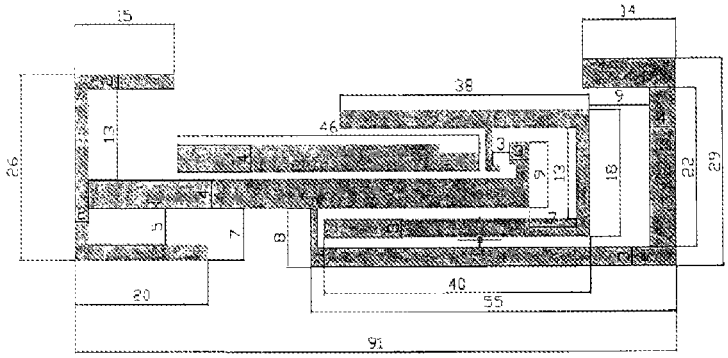


Fig. 13

Langley at [4:29-30]:
"Another aspect of the invention provides an antenna for use with five separate frequency bands, comprising the antenna described above."

Langley explains that the antenna shown in Figure 13 is an example of the invention (which, as described above, the invention is an antenna that operates on five bands). Langley at 5:12-6:13.

Langley discloses the following chart:

System	Frequency Band
GSM 900	890 – 960 MHz
DCS1800	1710 – 1880 MHz
DECT	1900 MHz
UMTS	1920 – 2170 MHz
Bluetooth	2400 – 2483.5 MHz
Hiperlan 1/2	5150-5725 MHz

Langley at 8:12-13.

As Langley explains, "Coverage of these commercially useful frequency bands is provided by the Invention within the following

'200 Patent Claim Language	Ground 1: Bolin and Langley

three frequency bands, for which the measured return loss is less than -10dB." Langley at 8:14-16. (Generally, as a POSITA would have understood, a return loss of 10 or more on a negative scale for a particular frequency band indicates a commercially useful antenna for that frequency band. Ex. 1009 at ¶ 85. Langley summarizes the frequency bands covered by the antenna of example 1 as follows:

Frequency band (MHz)	Bandwidth	System covered
885 – 973	88 MHz	GSM900
1530 – 2690	1060 MHz	DCS1800 UMTS Bluetooth DECT
4630 – 5970	1340 MHz	Hiperlan 1 Hiperlan 2

Langley at p.8 (bottom).

Langley discloses two charts (Langley p.8 and 8:12-13) that disclose that the antenna of Langley covers frequencies including 1920-2170 Mhz, which overlaps the 2-11 GHz range, and 2400-2483.5 MHz and 5150-5725 MHz, both of which fall within the 2-11 GHz range. Ex. 1009 at ¶¶ 85-88, 90.

Langley also explains that antennas of the invention (of which the antennas of example 1 (shown by Figure 2 of Langley) and example 2 (shown by Figure 13 of Langley are two embodiments) preferably cover "frequencies of 900MHz, 1800MHz, 2000MHz, 2400MHz and 5400MHz." Langley at 4:29-32.

Langley discloses an "antenna configured to provide operation in at least three frequency bands being used by 4G communication standards." Three frequencies in the above charts (Langley p.8 and 8:12-13) fall within the 2-11 GHz range that is identified by the '200 Patent as being used by 4G standards: 1920-2170 Mhz, which overlaps the 2-11 GHz range, and 2400-2483.5 MHz and 5150-5725 MHz, both of which fall within the 2-11 GHz range. Also, based on the disclosure of frequencies in which the antenna invention of Langley preferably operates as disclosed as above, at least three of the wireless bands (2000MHz, 2400MHz and 5400MHz) in which the antenna of Langley operates (as explained above) fall within the range of 2-11 GHz that the '200 Patent explains is a range that is used by 4G communications standards. *See* Ex. 1001 at 25:14-23. A POSITA would have understood the plain and ordinary meaning of

'200 Patent Claim Language	Ground 1: Bolin and Langley
	"frequency bands being used by 4G communication standards" to include at least three of the frequency ranges that the antenna of Langley is disclosed to cover. Ex. 1009 at ¶¶ 85-90. Even if a POSITA were to apply post-2006 (that is, after the alleged date of the invention) 4G communications standards, Langley still discloses an antenna configured to provide operation in at least three bands of those communications standards. Ex. 1009 at ¶ 91. The 3GPP Version 8 which formalized the 4G standard includes frequency bands of 900 MHZ (e.g., 880-915 MHz) and between 1805 MHz - 2400 MHz inclusive. Ex. 1016 at 13-14; Ex. 1017 at 32-33; Ex. 1009 at ¶¶ 54-56. Langley discloses that its antenna invention operates in three bands, 900MHz, 2000MHz, 2400MHz, that fall within these ranges. Langley at 4:29-32. To the extent that Patent Owner argues that Langley does not satisfy the claim element of an "antenna configured to provide operation in at least three frequency bands being used by 4G communication standards," it would have been obvious to modify Langley to provide this functionality. Ex. 1009 at ¶ 93. A POSITA would also have understood that the frequency bands of Langley could be readily tuned to provide coverage for 4G wireless standards bands, and a POSITA would have understood that it was advantageous for the wireless device to operate in 4G wireless standards bands. Ex. 1009 at ¶ 93. Langley at [3:15-17]: "The positional relationship between the different conductive elements provides a number of useful frequency bands." Langley at [3:4-5]: "The invention provides a compact and efficient multi-band antenna capable of supporting a variety of frequency bands." Langley also emphasizes the importance of its disclosed five-band antenna invention as it claims this functionality: "[Langley claim] 17. An antenna for use with five separate frequency bands, comprising the antenna of any preceding claim. [Langley claim] 18. The antenna of claim 17, wherein the five separate frequency bands comprise frequencies of 900MHz, 1800MHz, 2000MHz, 2400MHz and 5400MHz respectively" Langley at 13:7-12.

'200 Patent Claim Language	**Ground 1: Bolin and Langley**
	As explained by Langley, "[a] number of antenna designs that are capable of operating in at least two defined frequency bands have been proposed. One approach for providing a multiple band antenna is to use separate antennas, each corresponding to a different frequency band. Another approach is to use a single antenna capable of resonance in a plurality of frequency bands. **However, there remains a need for a compact and efficient multi-band antenna.**" Langley at 2:17-22 (emphasis added).
[11.3] the first antenna defining an antenna contour comprising an entire perimeter of the first antenna, the antenna contour comprising at least twenty segments,	Bolin in view of Langley discloses this element [11.3]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that defines an antenna contour comprising its entire perimeter that comprises at least 20 segments. As discussed above, a POSITA would have substituted the antenna of Langley for the main antenna of Bolin, while retaining the high-impedance blocking element (6) and the Bluetooth antenna (3) of Bolin, for the reasons explained in [11.2]. Langley discloses at least two antenna embodiments that include at least 20 segments. Langley discloses the antenna of example 1 (shown in Figure 2 of Langley) and the antenna of example 2 (shown in Figure 13 of Langley), each of which, when calculations are performed using the procedure set forth in the '200 patent, have a contour with at least 20 segments. *See* Langley at 5:15-16, 6:12-13, 6:21-7:33, 10:2-4 (generally describing the two embodiments represented by these figures); Ex. 1009 at ¶ 113. The antenna of the embodiment of example 1 of Langley (shown in Figures 1 and 2 of Langley, reproduced below, which have been faded to show annotations) discloses at least 25 segments in the antenna contour, as shown in the annotated versions 1 below. (Figure 2 is Figure 1 with dimensioning).

'200 Patent Claim Language	Ground 1: Bolin and Langley

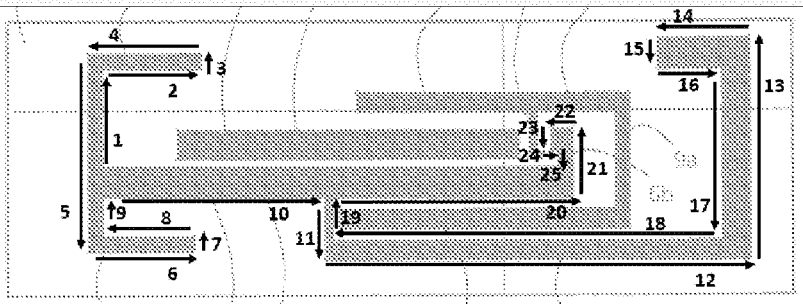


Figure 1

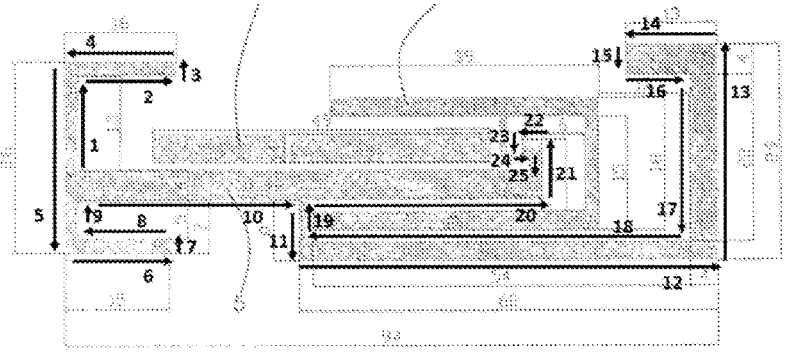


Figure 2

The antenna of the embodiment of example 2 of Langley (shown in Figure 13, faded to show annotations) also discloses at least 25 segments in the antenna contour:

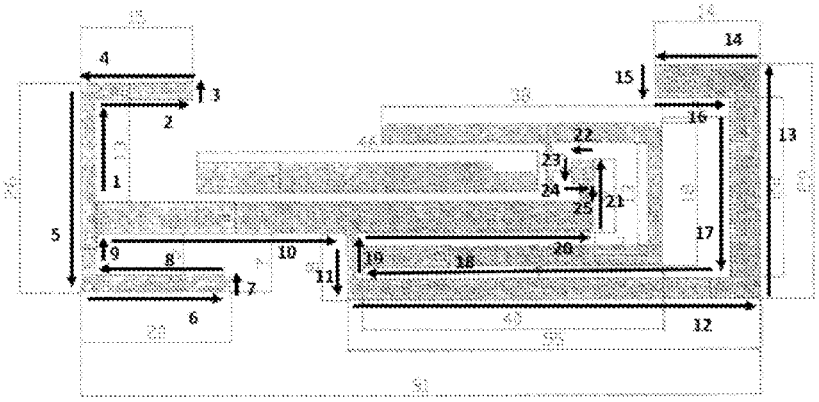


Figure 13

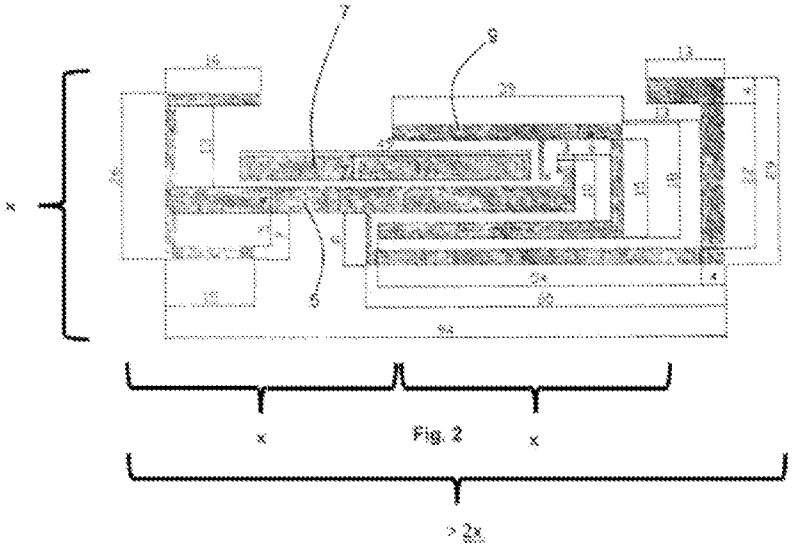
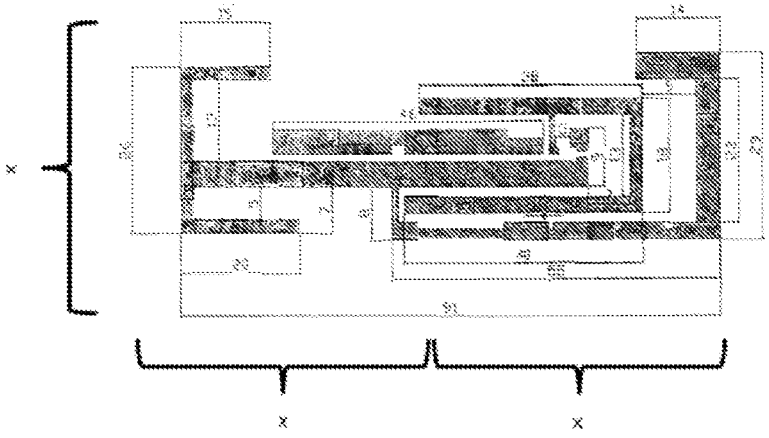
See Ex. 1009 at ¶ 113.

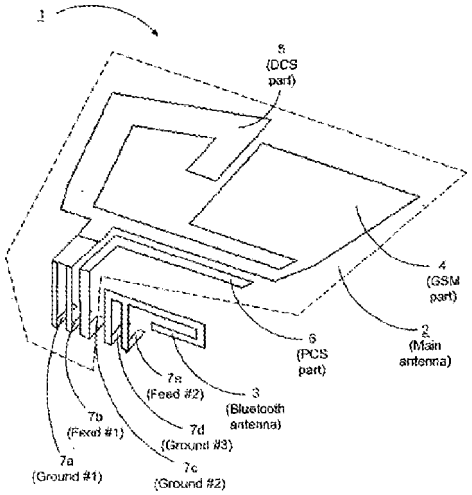
'200 Patent Claim Language	**Ground 1: Bolin and Langley**
[11.4] wherein the antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20	Bolin in view of Langley discloses element [11.4]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that has an antenna contour with a level of complexity defined by a complexity factor F21 having a value of at least 1.20. A POSITA would have substituted the antenna of Langley for the main antenna of Bolin while retaining the high-impedance blocking element (6) and the Bluetooth antenna (3) of Bolin for the reasons explained in [11.2]. Langley discloses at least two antenna embodiments that have an antenna contour with a complexity factor F21 with a value of at least 1.20. Langley discloses the antenna of example 1 (shown in Figure 2 of Langley) and the antenna of example 2 (shown in Figure 13 of Langley), each of which, when calculations are performed using the procedure set forth in the '200 patent, have an F21 value of at least 1.20. *See* Langley at 5:15-16, 6:12-13, 6:21-7:33, 10:2-4 (generally describing the two embodiments represented by these figures). As shown in the appendix to this chart below at page 34-37, the antenna embodiment of example 1 (shown in Figure 2 of Langley) has an F21 value of at least **1.38** (greater than 1.2) when F21 is calculated according to the procedure set forth in the '200 Patent. For avoidance of doubt, the calculation was performed using all four corners of the antenna box as a feed corner, and also, the calculation was performed both including and excluding "close call" boxes of the respective grids, and the lowest calculated value is reported. As shown in the appendix to this chart below at page 40-42, the example antenna of Figure 13 of Langley has an F21 value of at least **1.32** (greater than 1.2). The calculation was performed using the same procedure described above for the antenna of Figure 2 of Langley. As shown in the appendix to this chart below at pages 21-42: **Calculation for Antenna Example 1 (Figure 2 of Langley):** *When using N2 = 26 and N1 = 10, we get the following:* $F21 = -\frac{\log(26)-\log(10)}{\log(0.5)} = 1.378512 = 1.38$

'200 Patent Claim Language	Ground 1: Bolin and Langley
	Calculation for Antenna Example 2 (Figure 13 of Langley): *When using N2 = 26 and N1 = 10, we get the following:* $F21 = -\frac{\log(26)-\log(10)}{\log(0.5)} = 1.378512 = 1.38$ *When using N2 = 26 and N1 = 9, we get the following:* $F21 = -\frac{\log(26)-\log(9)}{\log(0.5)} = 1.530515 = 1.53$ *When using N2 = 25 and N1 = 10, we get the following:* $F21 = -\frac{\log(25)-\log(10)}{\log(0.5)} = 1.321928 = 1.32$ *Finally, when using N2 = 25 and N1 = 9, we get the following:* $F21 = -\frac{\log(25)-\log(9)}{\log(0.5)} = 1.473931 = 1.47$
[11.5] and complexity factor F32 having a value of at least 1.35,	Bolin in view of Langley discloses element [11.5]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that has an antenna contour with a level of complexity defined by a complexity factor F32 having a value of at least 1.35. A POSITA would have substituted the antenna of Langley while retaining the high-impedance blocking element (6) and the Bluetooth antenna (3) of Bolin for the main antenna of Bolin for the reasons explained in [11.2]. As shown in the appendix to this chart below at page 36-37, the example 1 antenna of Langley, shown in Figure 2 of Langley has an F32 value of at least **1.58** (greater than 1.35) when F32 is calculated according to the procedure set forth in the '200 Patent. For avoidance of doubt, the calculation was performed using all four corners of the antenna box as a feed corner, and also, the calculation was performed both including and excluding "close call" boxes of the respective grids, and the lowest calculated value is reported. As shown in the appendix to this chart below at pages 38-39, the example 2 antenna of Langley, shown in Figure 13 of Langley has an F32 value of at least **1.64** (greater than 1.35). The calculation was

'200 Patent Claim Language	Ground 1: Bolin and Langley
	performed using the same procedure described above for the antenna of Figure 2 of Langley. As shown in the appendix to this chart below at pages 21-42: **Calculation for Antenna Example 1 (Figure 2 of Langley):** *When using N3 = 76 and N2 = 26, we get the following:* $F32 = -\frac{\log(78)-\log(26)}{\log(0.5)} = 1.584963 = 1.58$ **Calculation for Antenna Example 2 (Figure 13 of Langley):** *When using N3 = 76 and N2 = 26, we get the following:* $F32 = -\frac{\log(76)-\log(26)}{\log(0.5)} = 1.547488 = 1.55$ *When using N3 = 76 and N2 = 25, we get the following:* $F32 = -\frac{\log(76)-\log(25)}{\log(0.5)} = 1.604071 = 1.60$ *When using N3 = 78 and N2 = 26, we get the following:* $F32 = -\frac{\log(78)-\log(26)}{\log(0.5)} = 1.584963 = 1.58$ *Finally, when using N3 = 78 and N2 = 25, we get the following:* $F32 = -\frac{\log(78)-\log(25)}{\log(0.5)} = 1.641546 = 1.64$
[11.6] and wherein the first antenna defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the	Bolin in view of Langley discloses element [11.6]; alternatively, any differences would have been obvious to a POSITA. The antenna invention of Langley is the first antenna that defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna, an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna

'200 Patent Claim Language	Ground 1: Bolin and Langley
minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna, an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining an antenna rectangle, an aspect ratio of the antenna rectangle being defined as a ratio between a width and a height of the antenna rectangle, wherein the aspect ratio has a value of at least 2; and	defining an antenna rectangle, an aspect ratio of the antenna rectangle being defined as a ratio between a width and a height of the antenna rectangle, wherein the aspect ratio has a value of at least 2. A POSITA would have substituted the antenna of Langley for the main antenna of Bolin for the reasons explained in [11.2]. The rectangle that is the outer perimeter of the grid G2 shown in the appendix to this chart at page 28 (for Langley example 1 shown in Figure 2 of Langley) and page 22 (for Langley example 2 shown in Figure 13 of Langley) is the antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna, an orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining an antenna rectangle. The aspect ratio of the antenna rectangle is the ratio between the width and height of that rectangle that is the outer perimeter of the grid G2 shown in the appendix to this chart at pages 28 (for Langley example 1 shown in Figure 2 of Langley) and 22 (for Langley example 2 shown in Figure 13 of Langley). Langley discloses a width to height ratio of at least 2 for the example antennas disclosed in Figure 2 (example 1 embodiment, *see* Langley at 5:15-16, 6:21-7:33) and Figure 13 (example 2 embodiment, *see* Langley at 6:12-13, 10:2-4), as shown in the annotated diagrams below. *See* Ex. 1009 at ¶ 163. Langley provides dimensions for the antennas of Figures 2 and 13 that are the same as the dimensions of the antenna rectangle discussed above. As shown in Figure 2 of Langley, the width is 94 and the height is 29. The ratio is **94 / 29, or 3.24**, which is at least 2. Langley at Figure 2 (annotations added):

'200 Patent Claim Language	Ground 1: Bolin and Langley
	 As shown in Figure 13 of Langley, the width is 94 and the height is 29. The ratio is **94 / 29, or 3.24**, which is at least 2. Langley at Figure 13 (annotations added): 
[11.7] a second antenna configured to provide operation in a first wireless service,	Bolin discloses element [11.7]; alternatively, any differences would have been obvious to a POSITA. The second antenna configured to provide operation in a first wireless service is the separate Bluetooth antenna that is disclosed by Bolin. *See* Ex. 1009 at ¶¶ 102-103. Bolin discloses at Figure 1 the

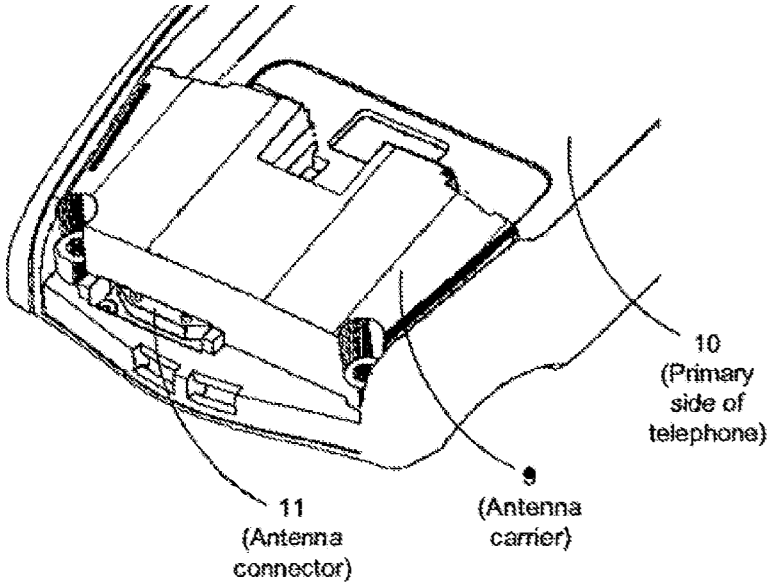
'200 Patent Claim Language	Ground 1: Bolin and Langley
	location of the Bluetooth antenna 3, which lies outside the rectangular dotted line that encloses the first antenna. "[T]he second antenna (3) is a Bluetooth™ antenna." *See* Bolin Claim 4.  *Fig 1* The first wireless service for which the second antenna (item 3 in Figure 1 of Bolin as shown above) is Bluetooth. *See* Ex. 1009 at ¶¶ 102-103. Figure 1 shows how "[t]he main antenna 2 is a built-in patch with parasitic element, whereas the smaller Bluetooth™ antenna 3 is a PIFA, however folded a little bit to fit the small space available." Bolin at [0020]. "The combination of the antennas, their individual positions, and the folding together with the electrical connection are noteworthy features." *Id.*
[11.8] the second antenna being proximate to a side of a ground plane rectangle enclosing the ground plane.	Bolin discloses element [11.8]; alternatively, any differences would have been obvious to a POSITA. The second antenna (which is the Bluetooth antenna, item 3 of Figure 1 of Bolin) is proximate to a side of a ground plane rectangle enclosing the ground plane. Ex. 1009 at ¶¶ 78-80.

'200 Patent Claim Language	Ground 1: Bolin and Langley

Bolin discloses that the Bluetooth antenna (item 3 in Figure 1 of Bolin) is connected to the antenna connector (11) to the PCB board (13), as shown in Figures 3-5 of Bolin.

"As seen in FIG. 2, the antenna system 1 is connected to radio circuitry on a printed circuit board 13 (FIG. 5) through electrical feeding 8. As appears from FIGS. 3-5, the electrical feeding 8 is implemented as an antenna connector 11, which is mounted to the printed circuit board 13 and comprises a group of five pogo pins 12 (one for each connection trace 7a-7e)." Bolin at [0026].

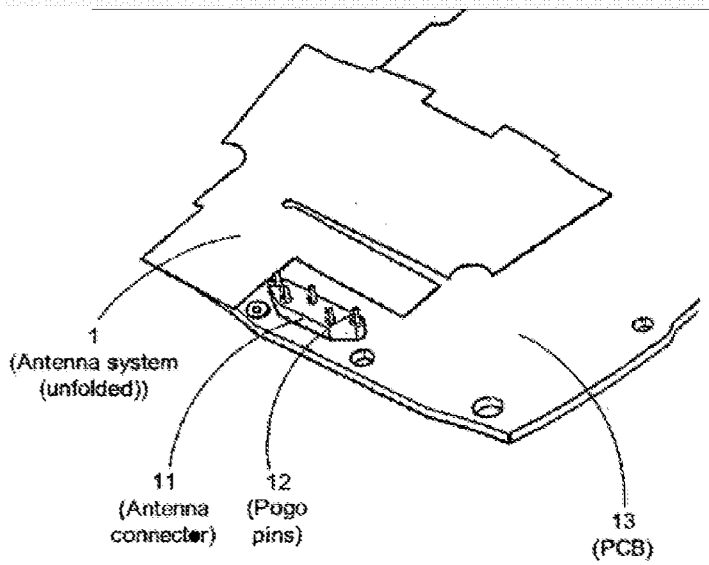
Bolin Figure 3 shows the antenna carrier (that encloses the antenna system) and the antenna connector):



Bolin Figure 3.

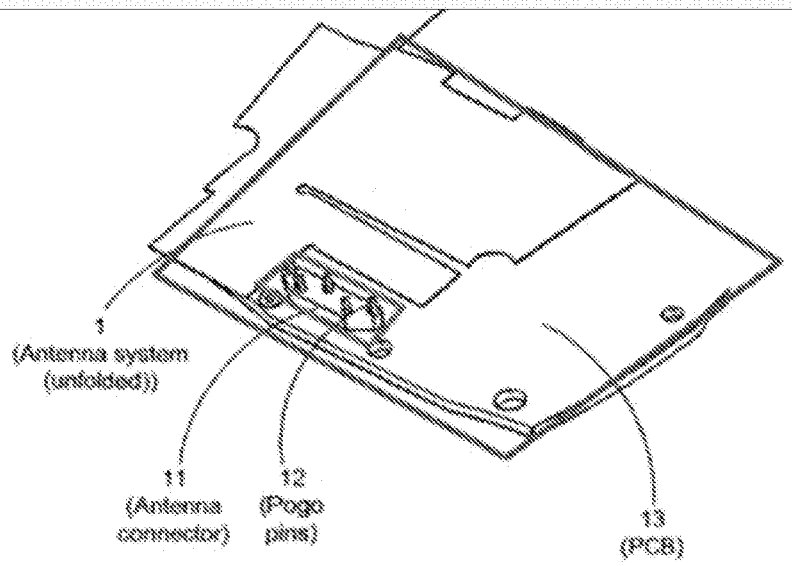
Bolin Figure 5 shows the antenna connector (to which the antenna is connected when the system is assembled) and the PCB board to which the antenna connector is attached:

'200 Patent Claim Language	Ground 1: Bolin and Langley



Bolin at Figure 5.

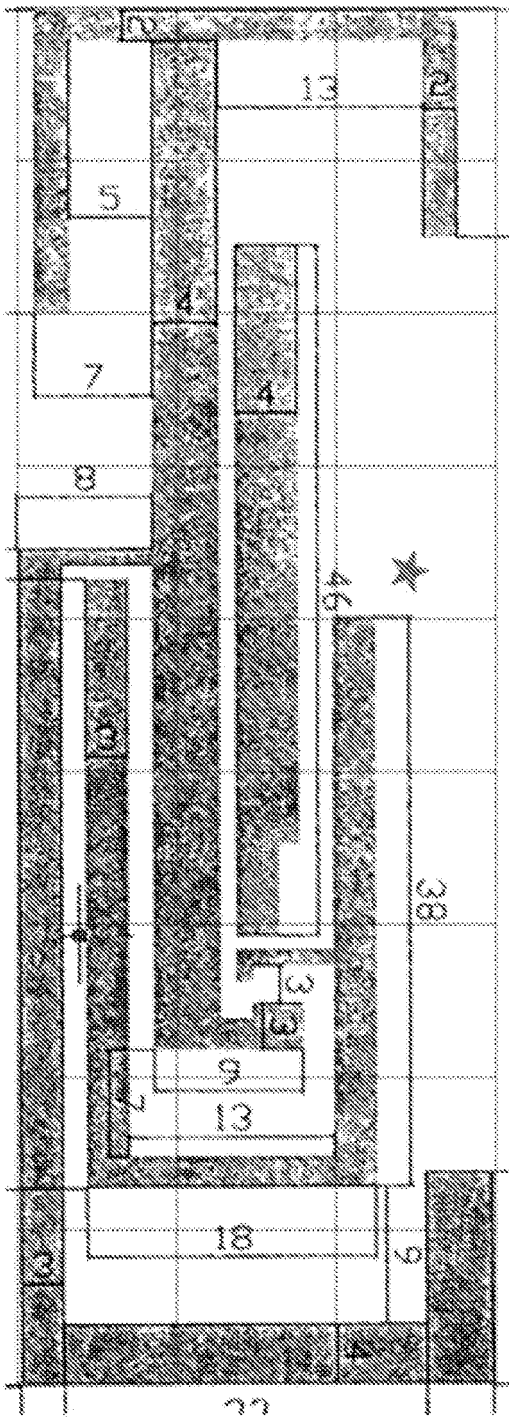
As drawn in the below figure, whether the ground plane rectangle is substantially drawn around the antenna connector (small box), or whether it is drawn around the PCB board (including the antenna connector area, large box), in either case a side of the ground plane will be proximate to the second Bluetooth antenna. Ex. 1009 at ¶¶ 78-80. This is because the Bluetooth antenna that is disclosed by Bolin is located near the bottom edge of the wireless device, as shown in Figures 3-5 of Bolin.

'200 Patent Claim Language	Ground 1: Bolin and Langley
	 Bolin at Figure 5 (annotations added). The ground plane disclosed by Bolin is the antenna connector and any grounding metal to which it is connected. Ex. 1009 at ¶¶ 78-80. Because the second antenna (the Bluetooth antenna) is proximate to the bottom of the PCB and of the wireless device, however the grounding metal extends from the antenna connector, the second antenna will be proximate to a side of a rectangle enclosing the ground plane, as shown in the two example ground plane rectangles drawn to annotate Bolin Figure 5 above. Ex. 1009 at ¶¶ 78-80.
Claim 12	
12. The wireless device of claim 11, wherein the first antenna is configured to support at least four frequency bands.	Bolin in view of Langley discloses [12]; alternatively, any differences would have been obvious to a POSITA. Langley discloses that its antenna invention that is configured to support five bands, which satisfies the "at least four" frequency bands requirement. Langley at 4:29-30. *See* [11.2], above.

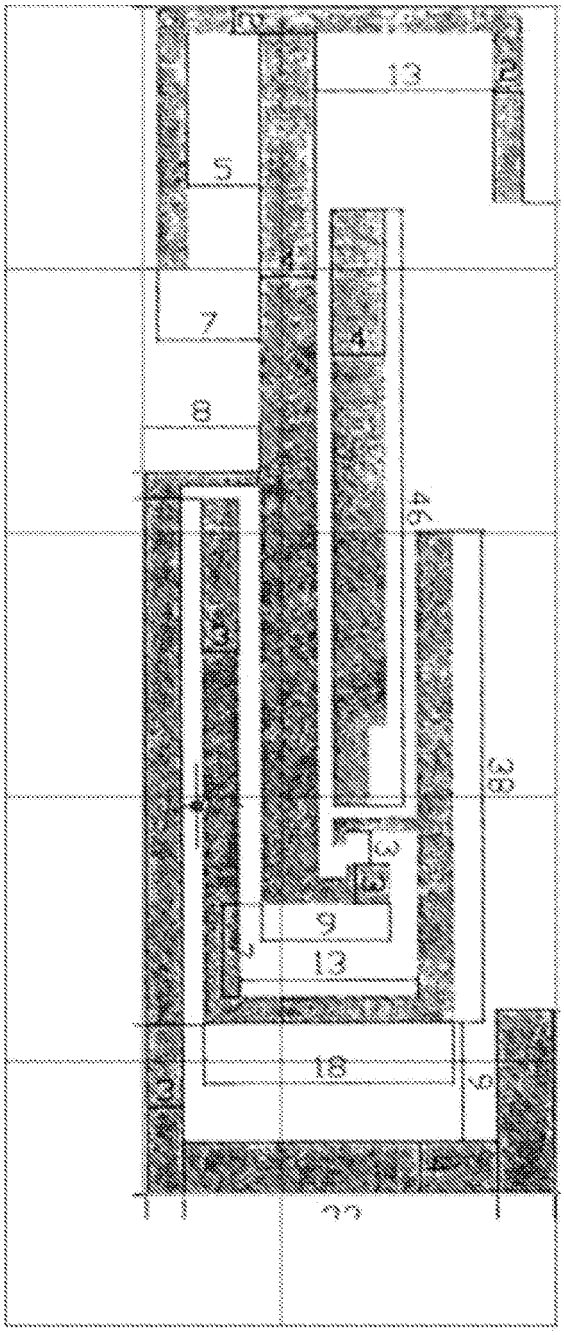
APPENDIX TO CLAIM CHARTS FOR FRACTUS '200 PATENT

COMPLEXITY FACTOR CALCULATION FOR TWO EMBODIMENTS OF LANGLEY (the antennas of examples 1 and 2, as reflected in Figures 2 and 13 of Langley respectively)

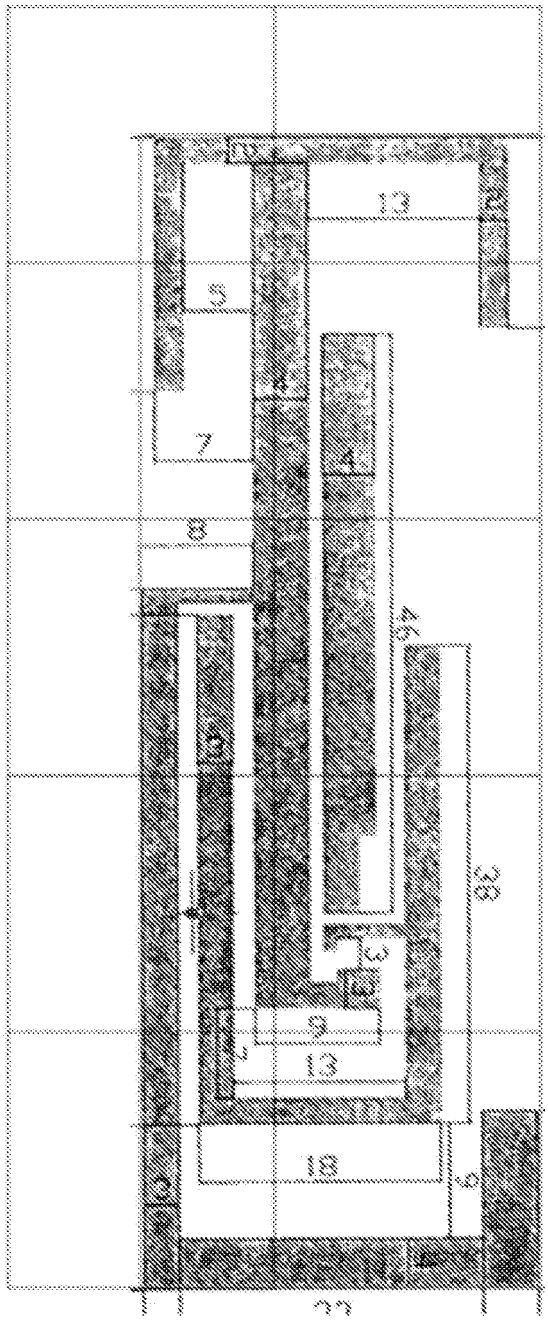
Langley Fig. 13 –G2



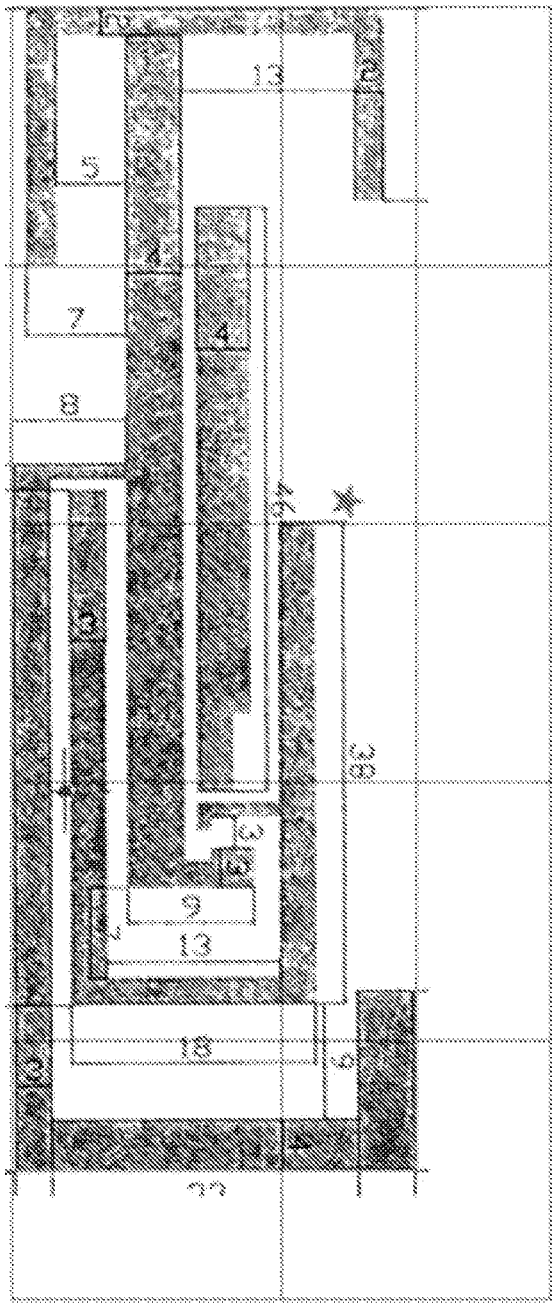
Langley Fig. 13 – G1, Upper Left Feeding Corner



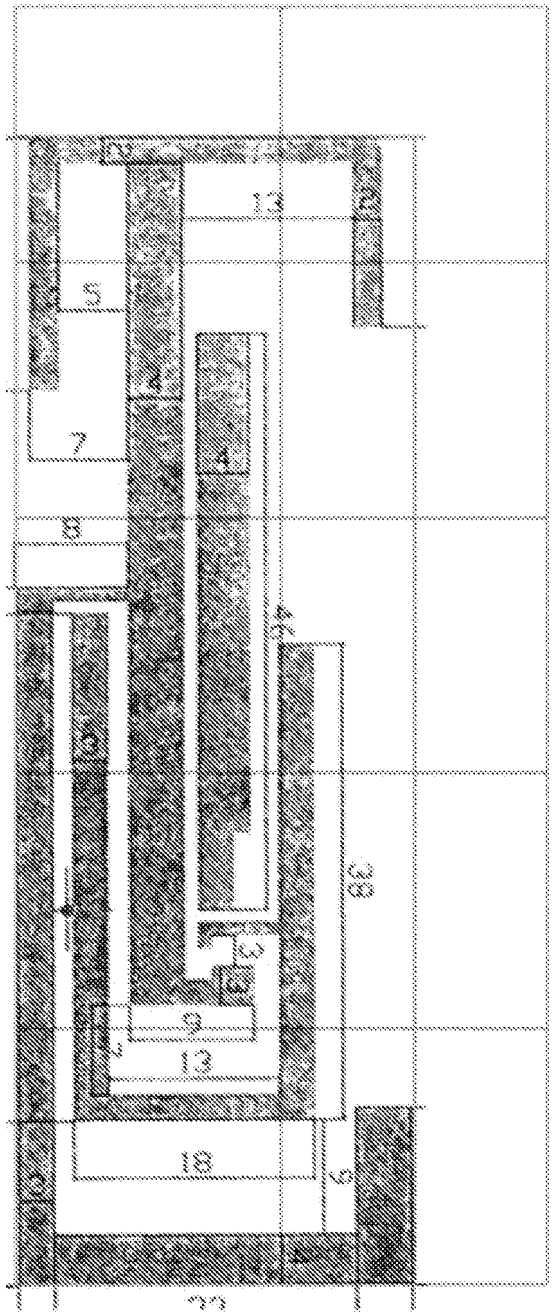
Langley Fig. 13 – G1, Upper Right Feeding Corner



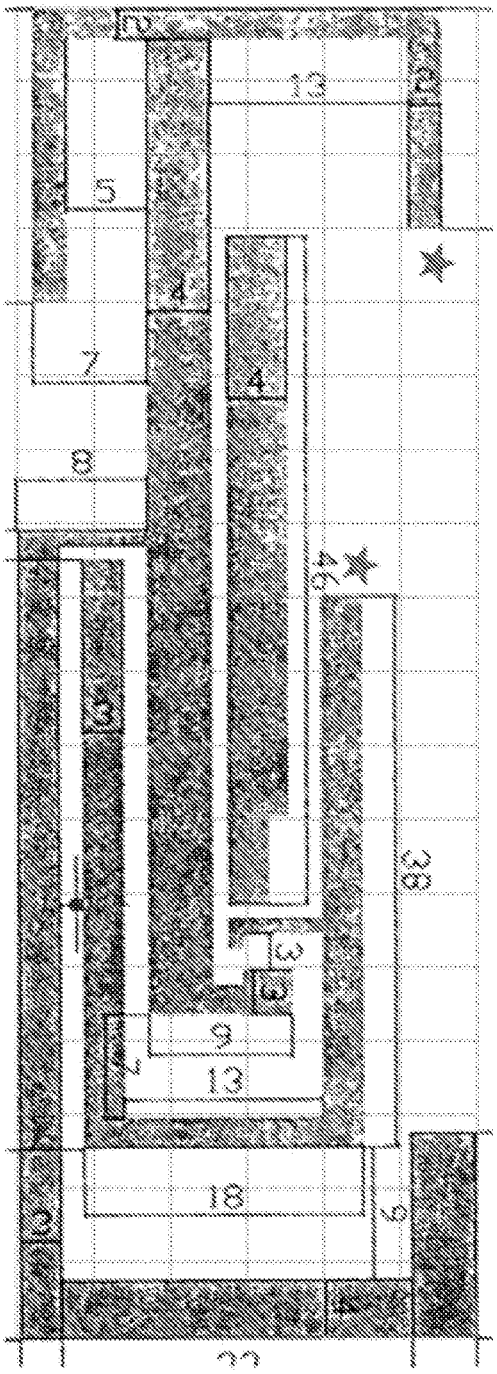
Langley Fig. 13 – G1, Bottom Left Feeding Corner



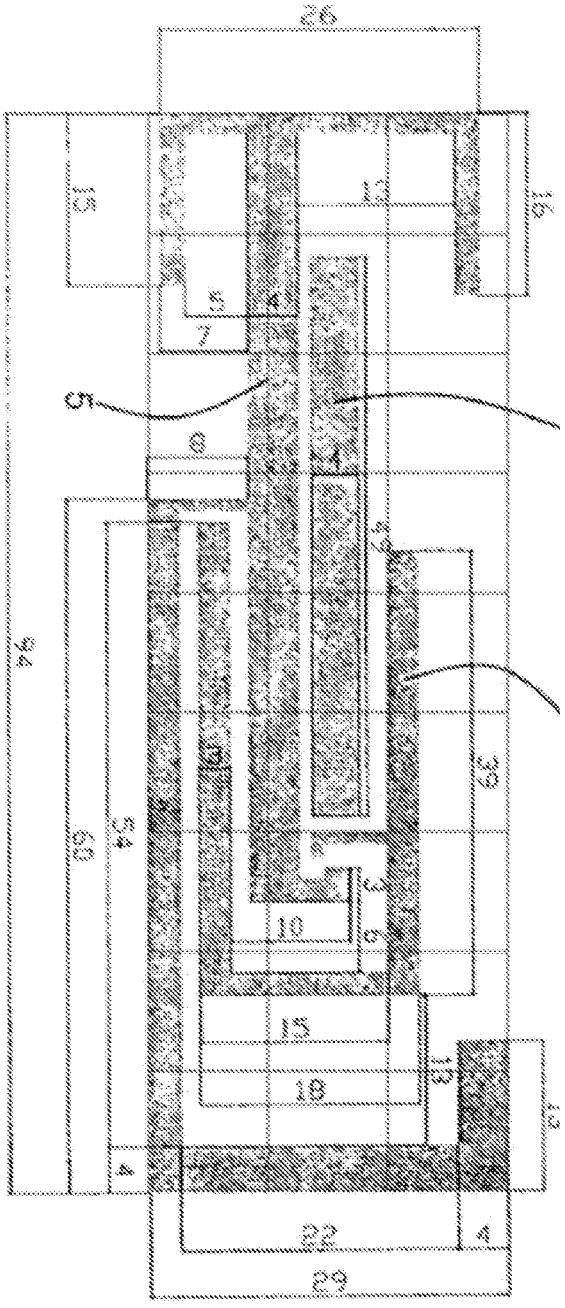
Langley Fig. 13 – G1, Bottom Right Feeding Corner



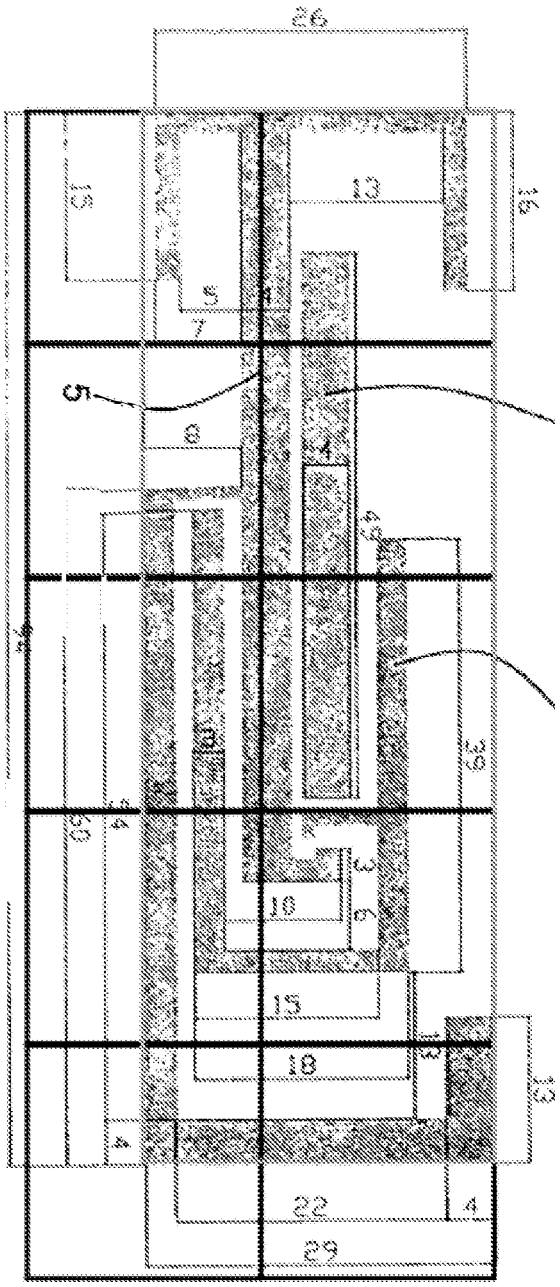
Langley Fig. 13 – G3



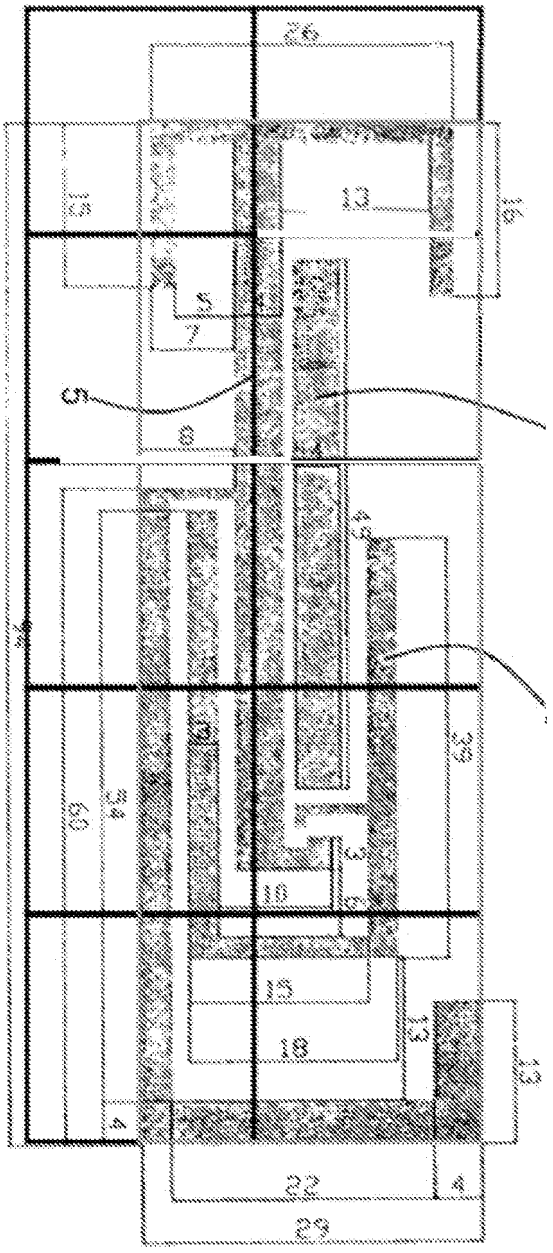
Langley Fig. 2 – G2



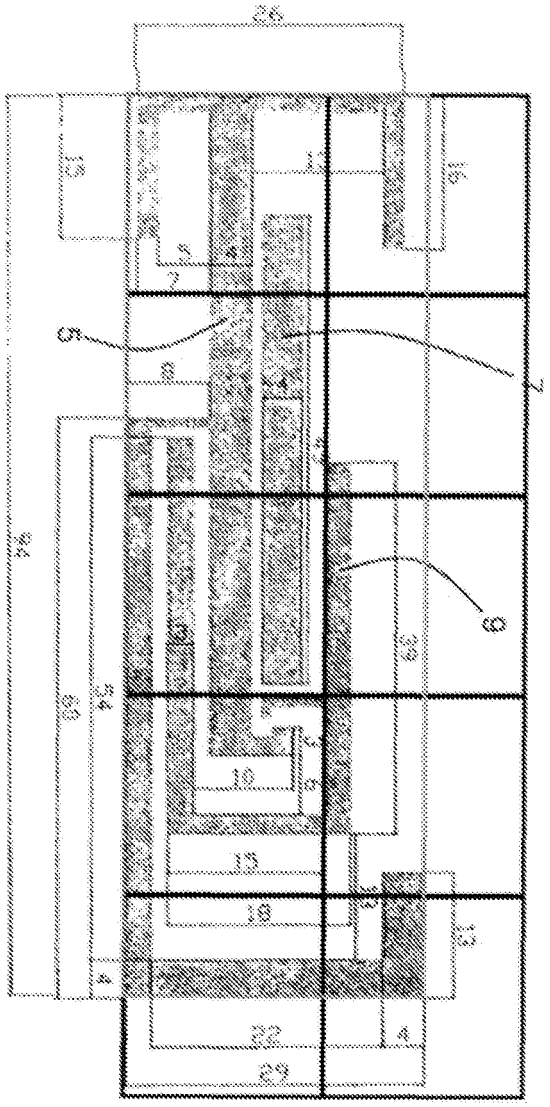
Langley Fig. 2 – G1, Upper Left



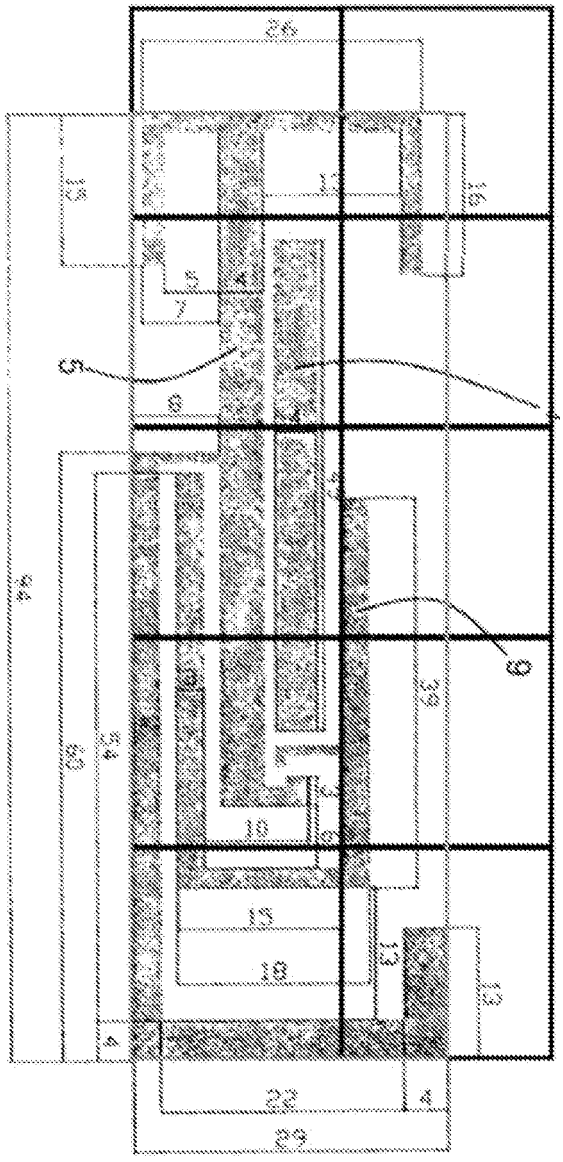
Langley Fig. 2 – G1, Upper Right



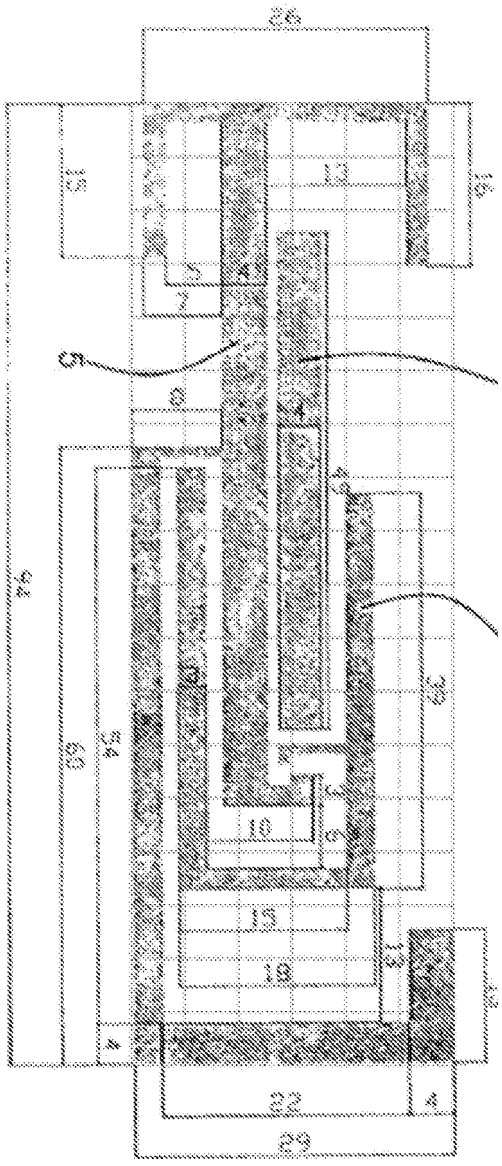
Langley Fig. 2 – G1, Bottom Left



Langley Fig. 2 – G1, Bottom Right



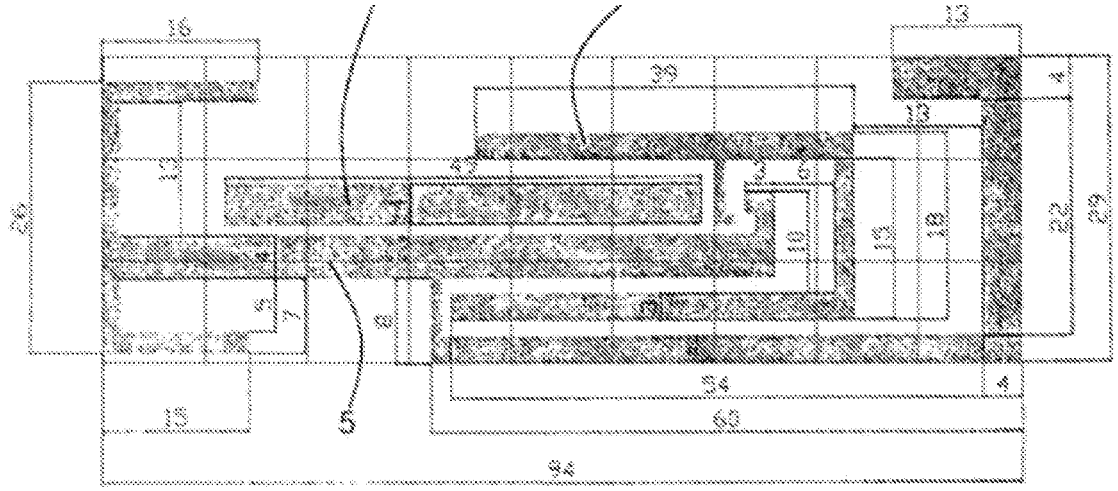
Langley Fig. 2 – G3



CALCULATION FOR LANGLEY FIGURE 2

The F21 value for Langley Figure 2 is 1.38. It is calculated using the N2 and N1 values.

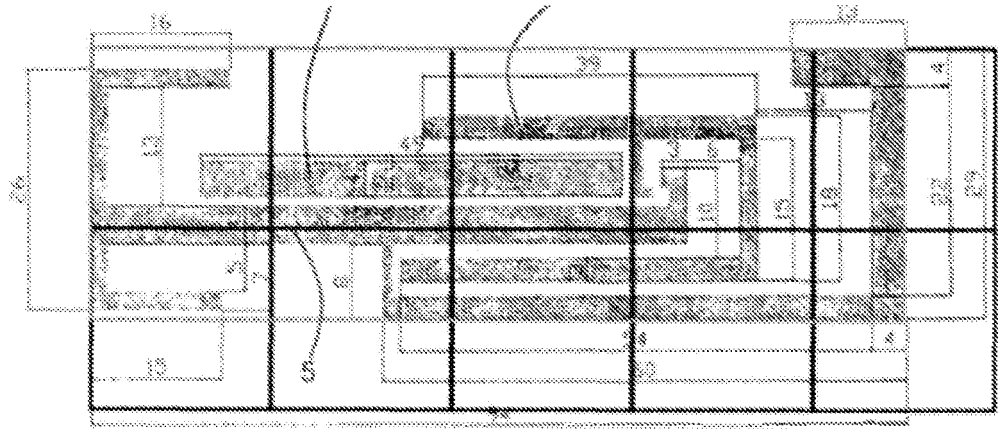
The N2 value is found by counting the number of cells that intercept a part of the antenna contour as seen below:



G2 for Langley Figure 2

The boxes above are the G2 cells. **There are 26 cells that intercept some part of the antenna** contour (then antenna elements are represented by dark shading). **N2 is therefore 26**.

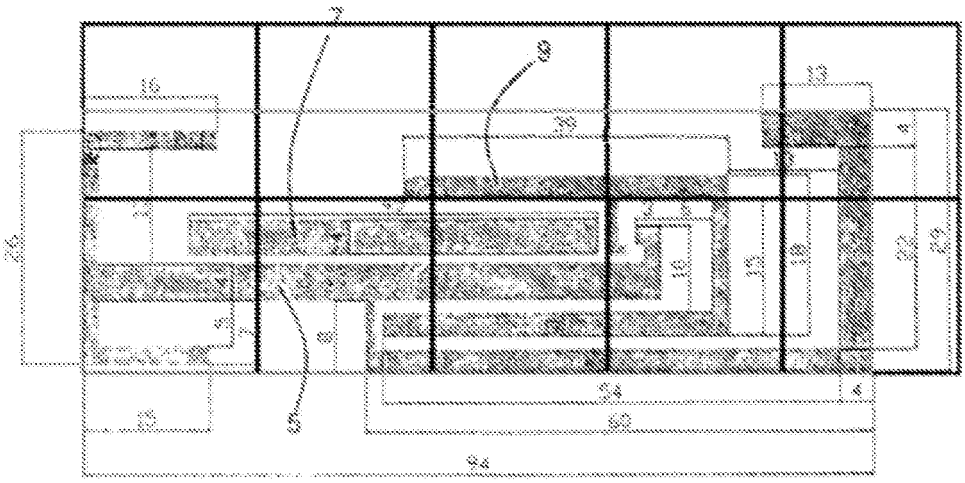
The N1 value is found with the same method as N2. The cells we count, however, are now four times larger than the G2 cells. See below the new cells:



G1 for Langley Figure 2

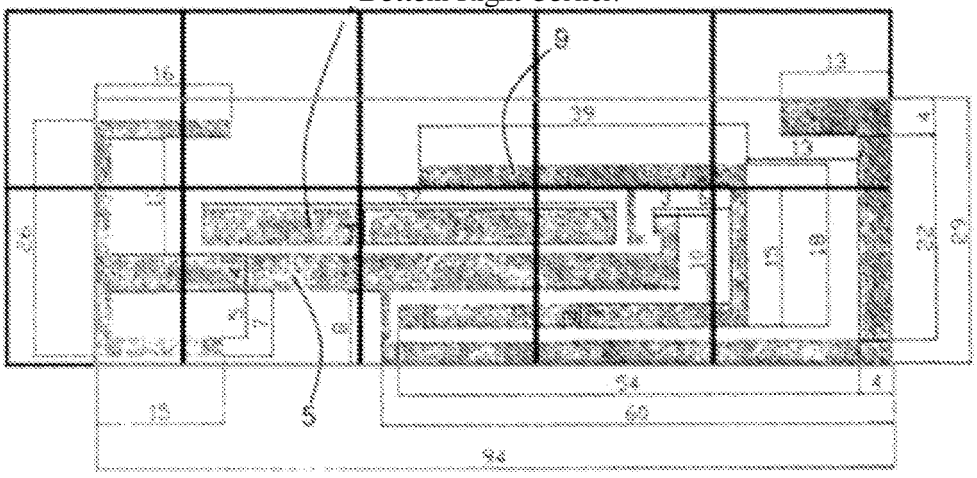
There are 10 cells that touch a part of the antenna contour. N1 is therefore 10.
Note that N1 is 10 no matter if the grid starts at the bottom left, right, or upper right corner of the antenna rectangle:

Bottom Left Corner:

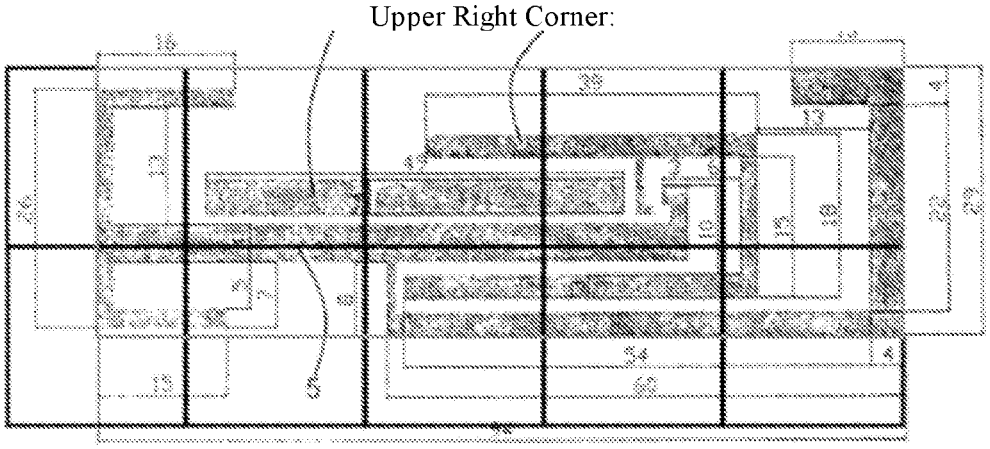


G1 with Alternative Starting Corner for Langley Figure 2

Bottom Right Corner:



G1 with Alternative Starting Corner for Langley Figure 2



G1 with Alternative Starting Corner for Langley Figure 2

Plug in the N2 and N1 values into the following equation:

$$F21 = -\frac{\log(N2) - \log(N1)}{\log(0.5)}$$

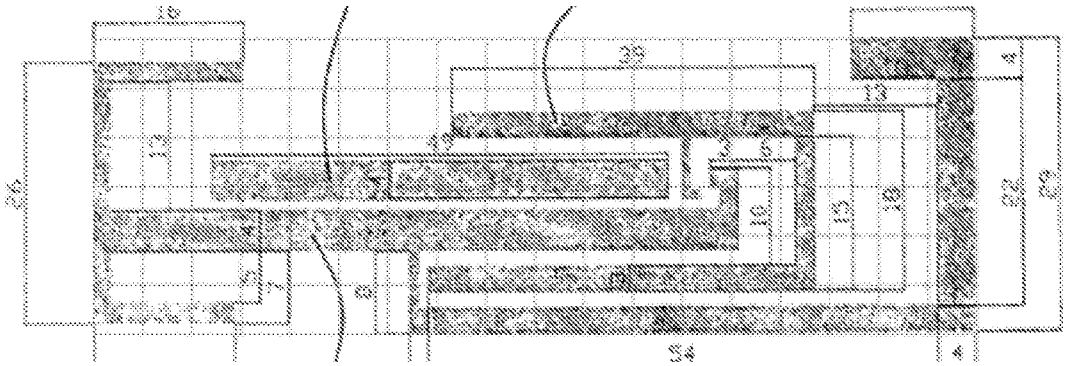
$$F21 = -\frac{\log(26) - \log(10)}{\log(0.5)}$$

$$F21 = 1.378512 = 1.38$$

For Figure 2, based on the above calculation, **the lowest complexity factor F21 by any calculation (including and excluding close call cells, and using all possible feed point corners) is 1.38. This number is greater than the threshold of 1.20 that is required by Claim 11.**

The F32 value for Langley Figure 2 is 1.58. It is calculated using the N2 and N3 values.

The N3 values are found in the same way as N1 and N2, except the cells we count are four times smaller than the original N2 cells. See below:



G3 for Langley Figure 2

There are 78 N3 cells that intercept the antenna contour. **N3 is therefore 78.**

Plug in the N3 and N2 values into the following equation:

$$F32 = -\frac{\log(N3) - \log(N2)}{\log(0.5)}$$

$$F232 = -\frac{\log(78) - \log(26)}{\log(0.5)}$$

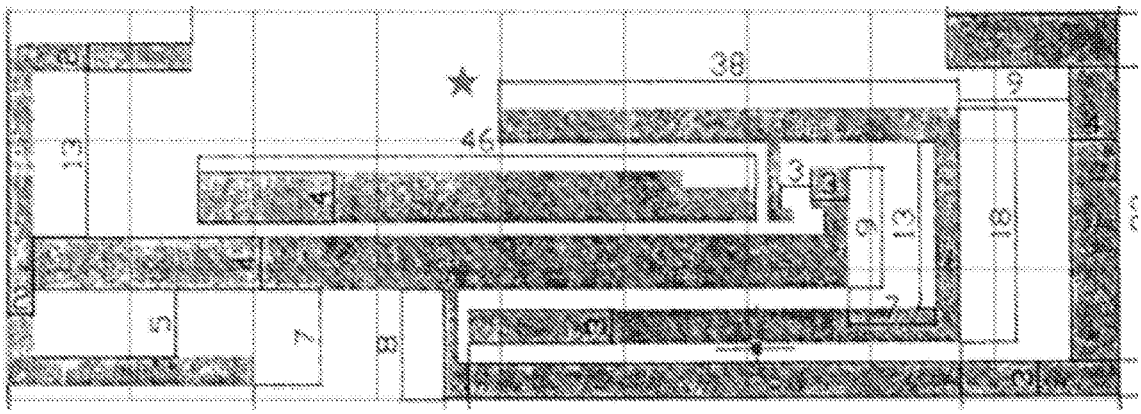
$$F32 = 1.584963 = 1.58$$

Based on the above calculation for Figure 2, **the lowest complexity factor F32 is 1.58. This number is greater than the threshold of 1.35 that is required by Claim 11.**

CALCULATION FOR LANGLEY FIGURE 13

The F32 values for Langley Figure 13 ranges from 1.55 to 1.64. They are calculated using various N2 and N3 values.

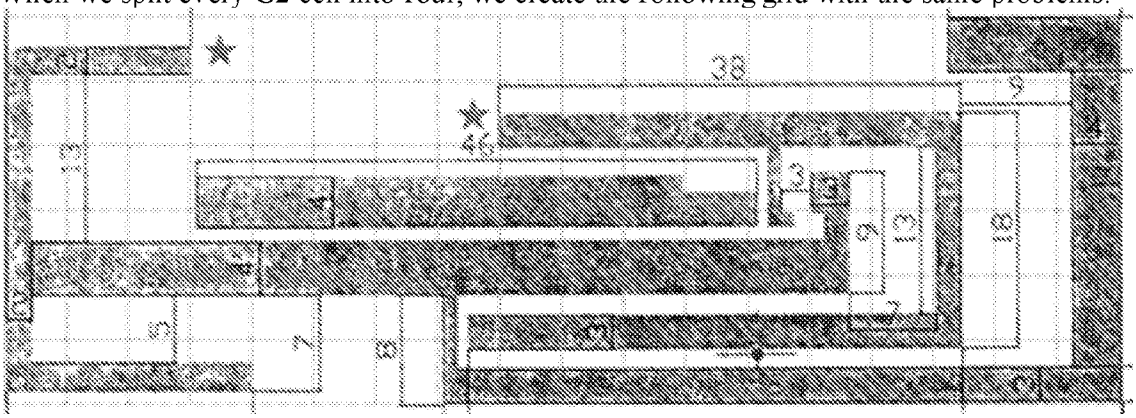
The antenna in Figure 13 is slightly different in shape from the one in Figure 2. This causes some differences in N2 and N3 values. Note that in order to be conservative in calculating the complexity factor value, we separately count cells that could be considered close calls in terms of whether the contour intersects the cell. See below:



G2 for Langley Figure 13

The cell with a star is an example where a cell barely intercepts the antenna contour. To be conservative, we calculate the N value with and without these cells included. **When we count the starred cell, N2 is 26. When we don't count the starred cell, N2 is 25.**

When we split every G2 cell into four, we create the following grid with the same problems:



G3 for Langley Figure 13

There are two starred cells barely intercept the antenna contour. To be conservative, we calculate the N value with and without these cells. **When we count the starred cells, N3 is 78. When we don't count the starred cells, N3 is 76.**

Thus, F32 can be calculated using **N2 = 25 or 26, and N3 = 76 or 78.**

When using N3 = 76 and N2 = 26, we get the following:

$$F32 = -\frac{\log(76) - \log(26)}{\log(0.5)}$$

$$F32 = 1.547488 = 1.55$$

When using N3 = 76 and N2 = 25, we get the following:

$$F32 = -\frac{\log(76) - \log(25)}{\log(0.5)}$$

$$F32 = 1.604071 = 1.60$$

When using N3 = 78 and N2 = 26, we get the following:

$$F32 = -\frac{\log(78) - \log(26)}{\log(0.5)}$$

$$F32 = 1.584963 = 1.58$$

Finally, when using N3 = 78 and N2 = 25, we get the following:

$$F32 = -\frac{\log(78) - \log(25)}{\log(0.5)}$$

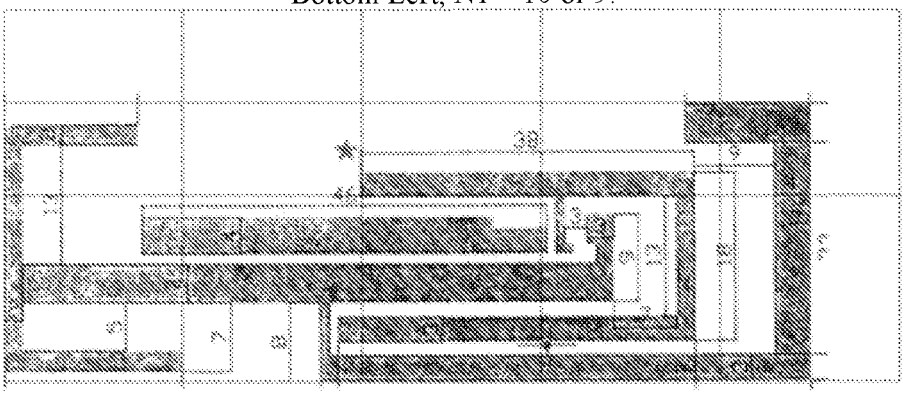
$$F32 = 1.641546 = 1.64$$

For Figure 13, based on the above calculation, **the lowest complexity factor F32 by any method is 1.64. This number is greater than the threshold of 1.35 that is required by Claim 11.**

The same principles apply to F21 values for Langley Figure 13. F21 values for Langley Figure 13 vary between 1.32 to 1.53.

N1 for Figure 13 depends on which corner of the blue rectangle the grid starts. The bottom left corner could be **N1 = 10 or N1 = 9:**

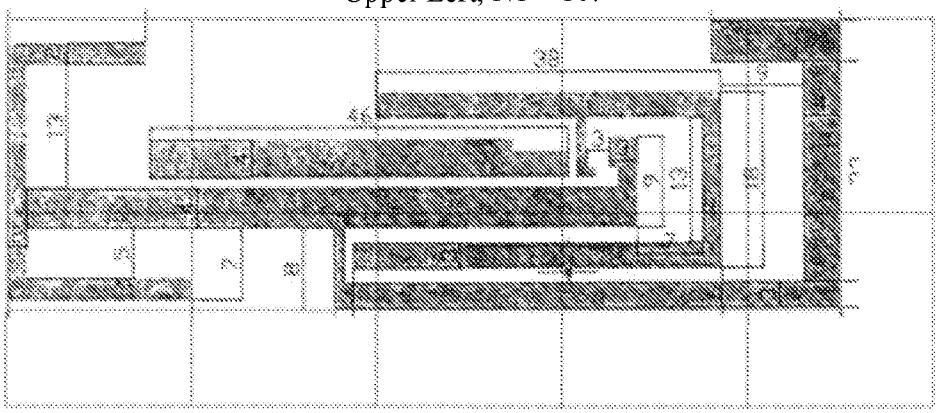
Bottom Left, N1 = 10 or 9:



G1 for Langley Figure 13

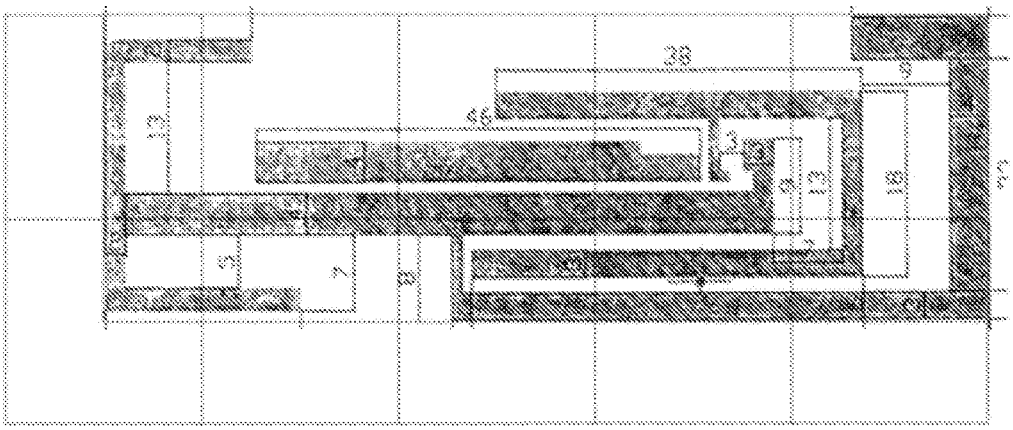
All other grids for Figure 13 have a value of N1 = 10.

Upper Left, N1 = 10:

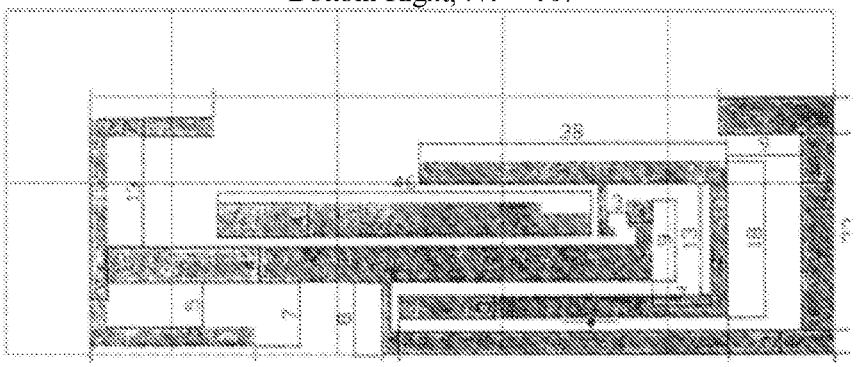


G1 with Alternative Starting Corner for Langley Figure 13

Upper Right, N1 = 10:



G1 with Alternative Starting Corner for Langley Figure 13 Bottom Right, N1 = 10:



G1 with Alternative Starting Corner for Langley Figure 13

F21 can therefore be calculated using values **N1 = 9 or 10, and N2 = 26 or 25.**

When using N2 = 26 and N1 = 10, we get the following:

$$F21 = -\frac{\log(26) - \log(10)}{\log(0.5)}$$

$$F21 = 1.378512 = 1.38$$

When using N2 = 26 and N1 = 9, we get the following:

$$F21 = -\frac{\log(26) - \log(9)}{\log(0.5)}$$

$$F21 = 1.530515 = 1.53$$

When using N2 = 25 and N1 = 10, we get the following:

$$F21 = -\frac{\log(25) - \log(10)}{\log(0.5)}$$

$$F21 = 1.321928 = 1.32$$

Finally, when using N2 = 25 and N1 = 9, we get the following:

$$F21 = -\frac{\log(25) - \log(9)}{\log(0.5)}$$

$$F21 = 1.473931 = 1.47$$

For Figure 13, based on the above calculation, **the lowest complexity factor F21 by any calculation (including and excluding close call cells, and using all possible feed point corners) is 1.32. This is greater than the threshold of 1.20 that is required by Claim 11.**