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Thomson Data Analyzer

——智能信息分析专家助力情报分析

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Clarivate Analytics
(原汤森路透知识产权与科技事业部)
2016年

**Clarivate
Analytics**

Formerly the IP & Science
business of Thomson Reuters



分析专利



分析论文

选题及检索策略：大规模天线阵列系统

检索和分析工具

- Thomson Innovation：按专利授予机构划分的专利集合-全部
- Thomson DATA ANALYZER(TDA)

在TI中的检索策略：

标题/摘要/权利要求：((Massive or large scale) (MIMO or Multi-input Multi-output)) or Large Scale Antenna System

运算符的优先关系

(ADJ, NEAR) -> SAME -> (AND, NOT) > OR

检索结果概览

- 共检索到486条记录 (May,2016),归并同族后为276个DWPI专利同族

检索结果 (所有 DWPI 同族专利)



486 条找到的记录 276 个 DWPI 同族专利 486 条选定的记录

正在显示第 1 - 50 条记录, 共 276 条记录

«« 1 2 3 4 5 »» 第 1 页, 共 6 页

转至该页: Go

显示 50 条记录/页

<input checked="" type="checkbox"/>	<input type="checkbox"/>	项目	公开号	专利权人/申请人	公开日期	现版 IPC	现版 CPC	施引参考文献数 - 专利	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	US20130272263A1	SAMSUNG ELECTRONICS CO LTD	2013-10-17	H04W 72/04	H04W 72/042	18	
			标题: HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS 摘要: Time, frequency and spatial processing parameters for communications between a base station and a mobile station are selected by transmitting synchronization signals in multiple slices of a wireless transmission sector for the base station, and receiving feedback from the mobile station of at least one preferred slice of the multiple slices. In response to selection of one of the slices as an active slice for communications between the base station and the mobile station, reference signals are transmitted in the selected active slice using a corresponding selected precoder and/or codebook. The mobile station estimates and feeds back channel state information (CSI) based on those reference signals, and the CSI is then employed to determine communication parameters for communications between the base station and mobile station that are specific to the mobile station						
<input checked="" type="checkbox"/>		1.1	EP2839589A1	SAMSUNG ELECTRONICS CO LTD	2015-02-25	H04B 7/04	H04W 72/042	0	
			标题: HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS 摘要: Time, frequency and spatial processing parameters for communications between a base station and a mobile station are selected by transmitting synchronization signals in multiple slices of a wireless transmission sector for the base station, and receiving feedback from the mobile station of at least one preferred slice of the multiple slices. In response to selection of one of the slices as an active slice for communications between the base station and the mobile station, reference signals are transmitted in the selected active slice using a corresponding selected precoder and/or codebook. The mobile station estimates and feeds back channel state information (CSI) based on those reference signals, and the CSI is then employed to determine communication parameters for communications between the base station and mobile station that are specific to the mobile station						
<input checked="" type="checkbox"/>		1.2	WO2013157785A1	SAMSUNG ELECTRONICS CO LTD	2013-10-24	H04B 7/04	H04W 72/042	0	
			标题: HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS 摘要: Time, frequency and spatial processing parameters for communications between a base station and a mobile station are selected by transmitting synchronization signals in multiple slices of a wireless transmission sector for the base station, and receiving feedback from the mobile station of at least one preferred slice of the multiple slices. In response to selection of one of the slices as an active slice for communications between the base station and the mobile station, reference signals are transmitted in the selected active slice using a corresponding selected precoder and/or codebook. The mobile station estimates and feeds back channel state information (CSI) based on those reference signals, and the CSI is then employed to determine communication parameters for communications between the base station and mobile station that are specific to the mobile station						
<input checked="" type="checkbox"/>		1.3	KR2013118249A	SAMSUNG ELECTRONICS CO LTD	2013-10-29	H04B 7/04	H04W 72/042	0	4
			标题: APPARATUS FOR HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION (CSI) FEEDBACK IN A MASSIVE MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SYSTEM AND A METHOD THEREOF, CAPABLE OF REDUCING OVERHEAD OF THE CSI FEEDBACK						

大纲

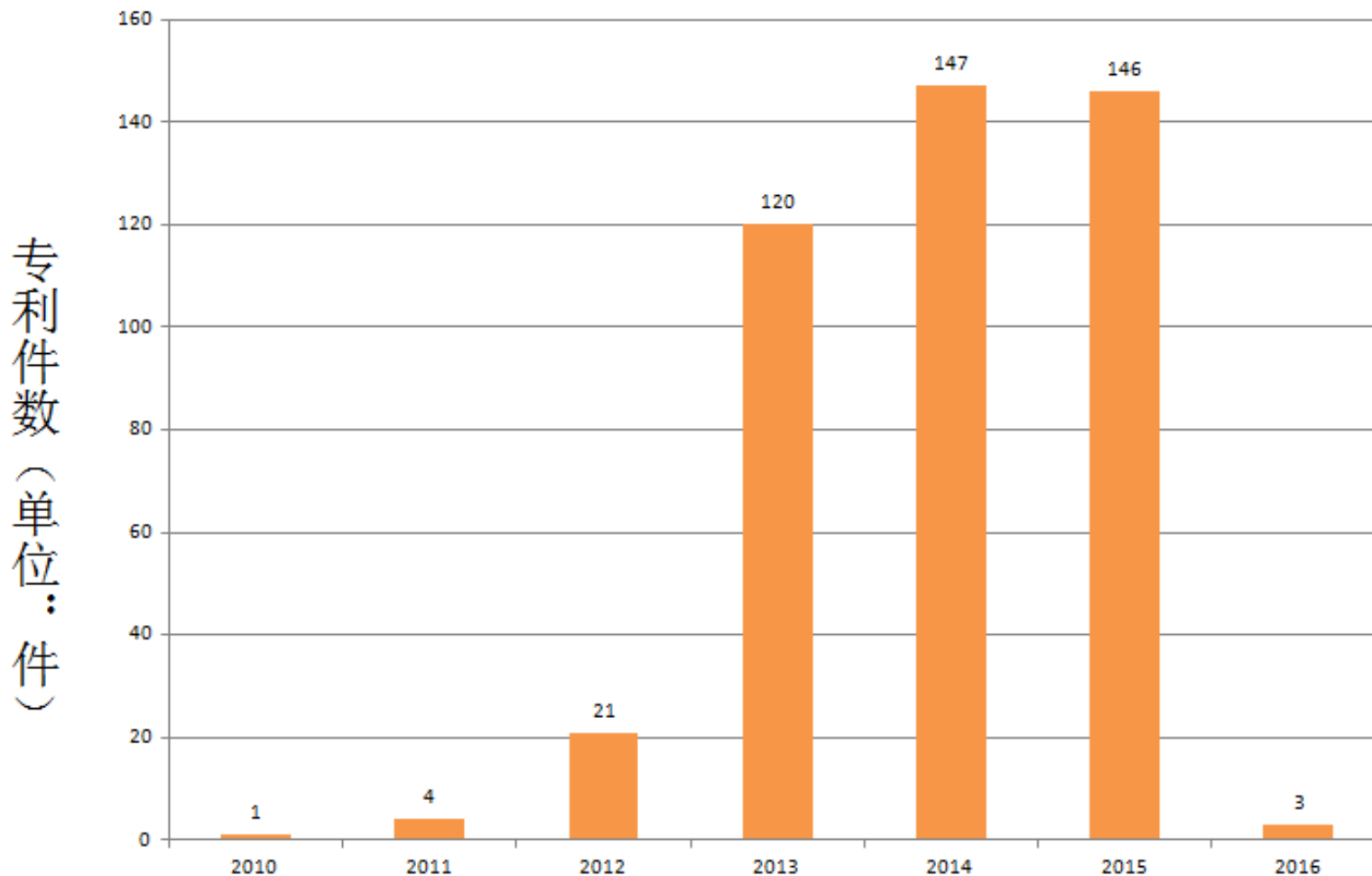
1. 总体态势分析
2. 重点国家分析
3. 重要厂商分析
4. 具体技术分析
5. 核心专利分析

一、总体态势分析

- 1.1 全球的专利申请趋势
- 1.2 发明专利的申请和授权比例
- 1.3 哪些国家/地区是全球的重要市场？
（厂商集中在哪些国家/地区申请专利）
- 1.4 从技术原创性对比各国家/地区
（各国家/地区的专利持有情况）
- 1.5 各国家/地区专利的全球布局
- 1.6 专利主要在企业、个人、科研机构还是政府手中？
- 1.7 最近3年新增加或消失的专利权人？

全球专利申请趋势

数据源：未DWPI家族归并-
用申请号去重
使用字段：application years;

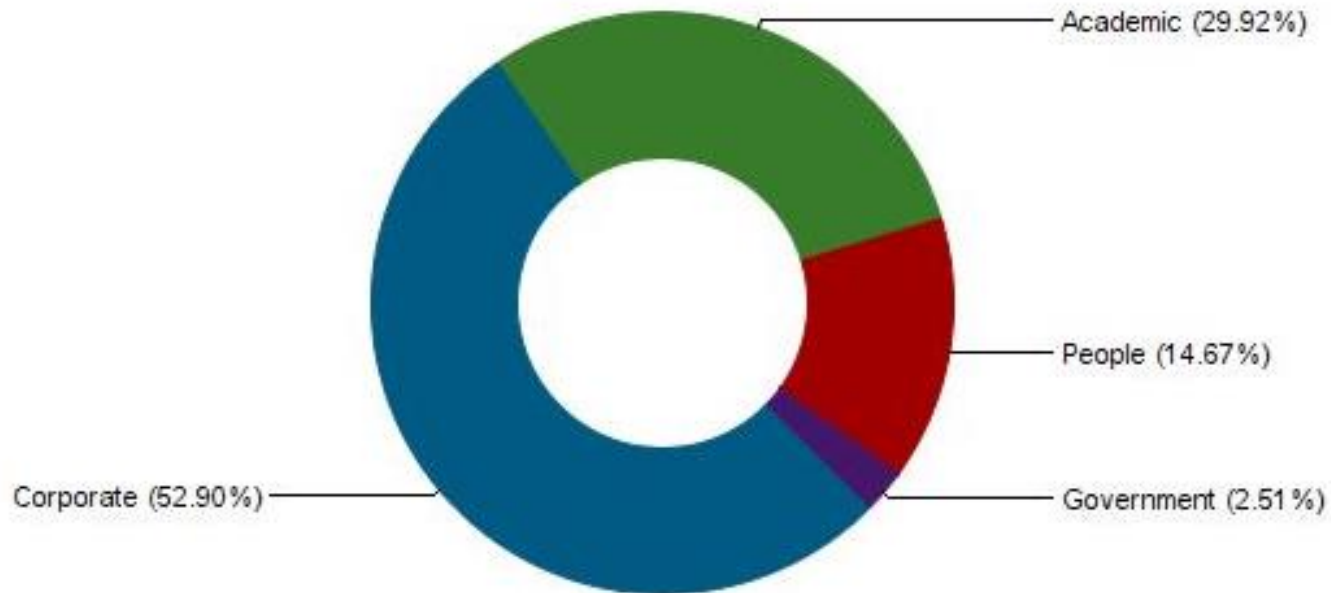


专利的申请vs授权



申请：435件
授权：41件
授权比例是8.6%

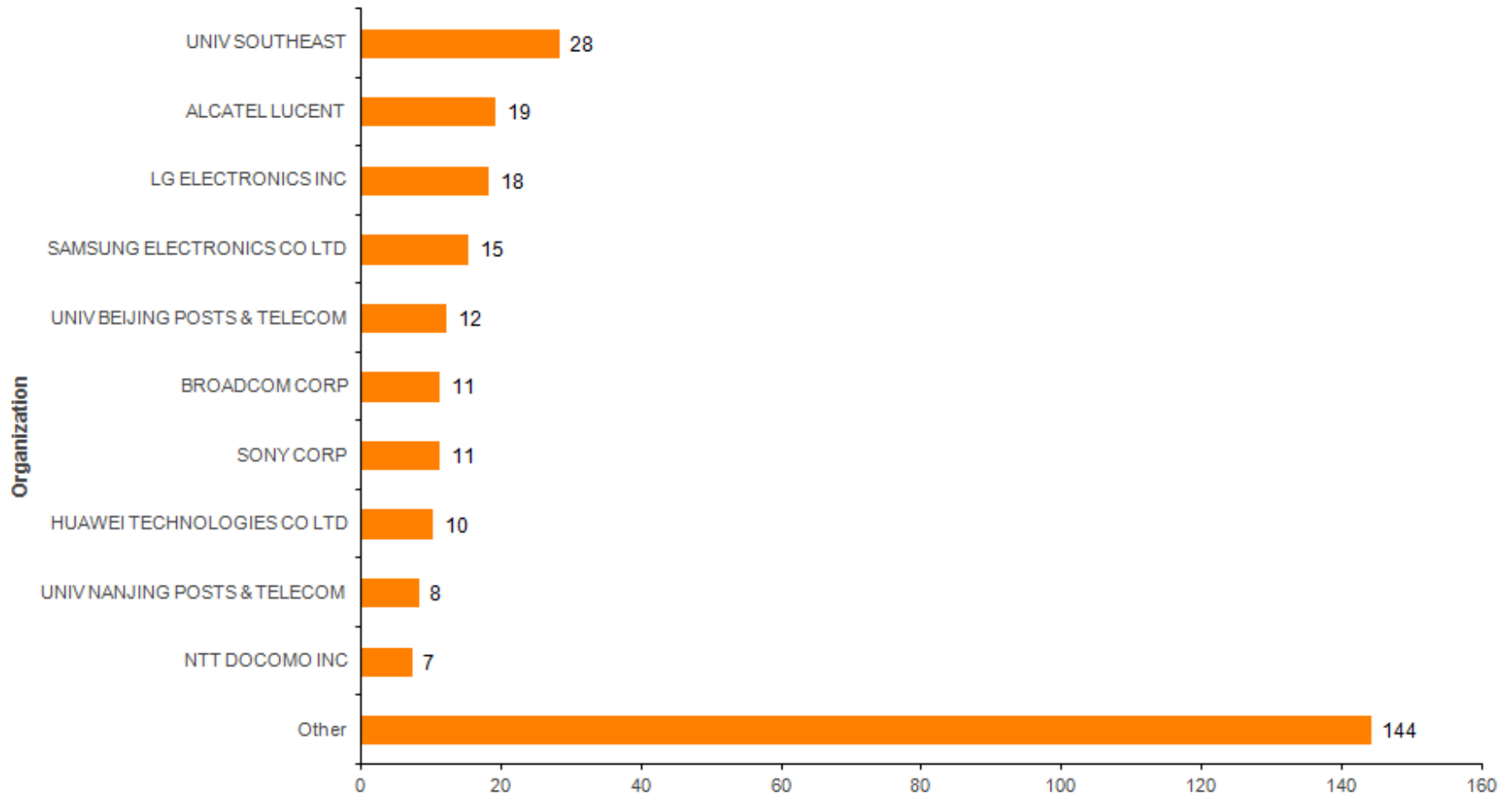
专利申请主体分布



专利权人类型	专利量
Corporate	274
Academic	155
People	76

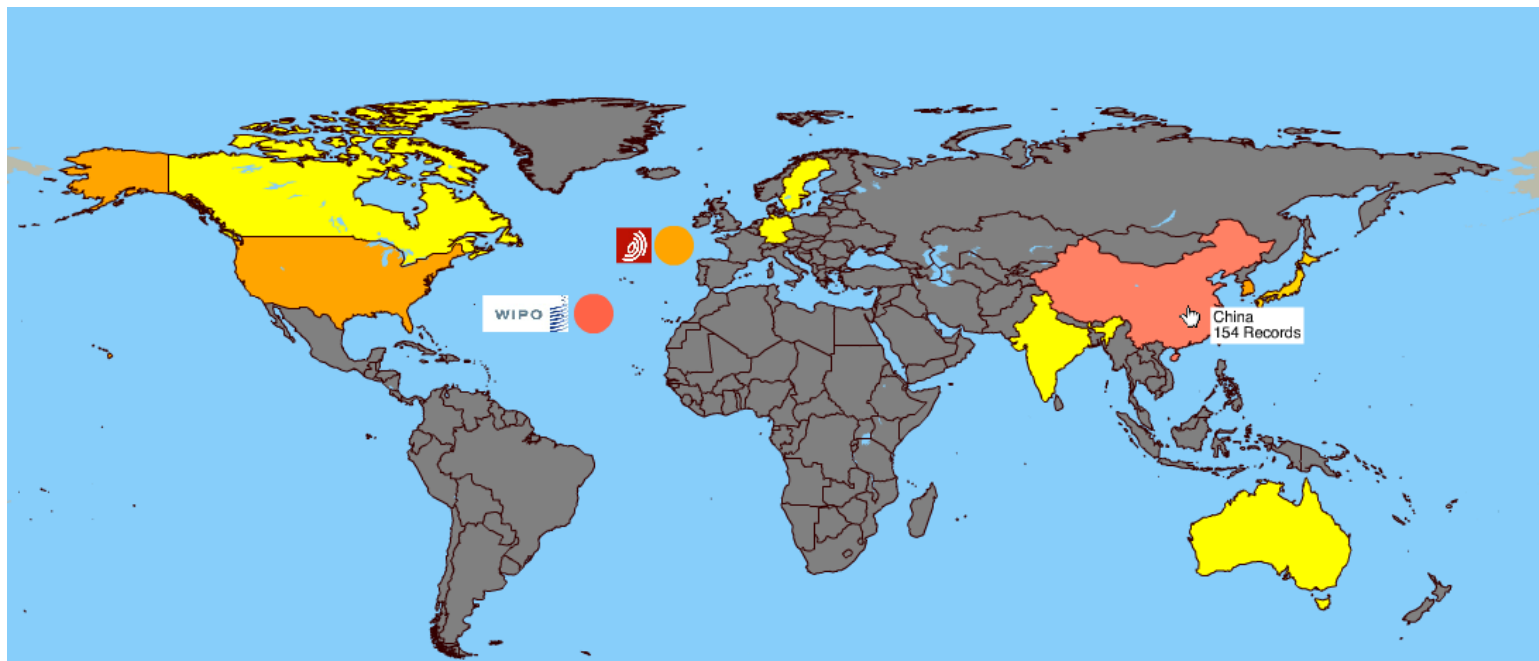
数据源：未DWPI家族归并-
用申请号去重
使用字段： Assignee/Applicant (Cleaned)

主要专利权人 (TOP10)



数据源: DWPI家族归并-
选取自Technology Report

全球集中在哪些国家/地区申请专利

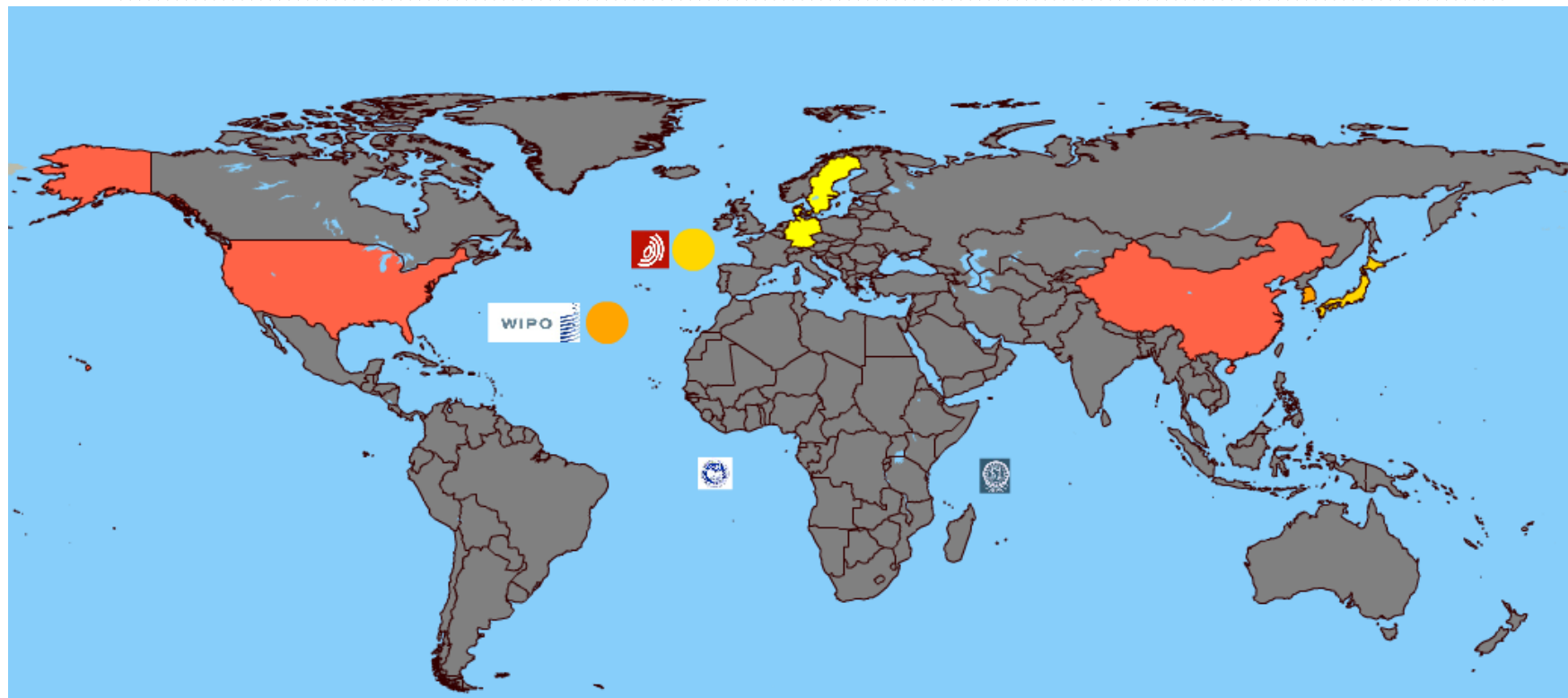


国家地区	专利量	国家地区	专利量
CN	154	TW	11
WO	99	AU	2
US	79	DE	2
KR	44	CA	1
EP	30	HK	1
JP	17	IN	1
		SE	1

中国成为专利申请最多的国家，其次是美国和韩国，可以看到，**中国市场**在 Massive MIMO领域的重要性

数据源：未DWPI家族归并用申请号去重
使用字段：application countries;

各国家/地区技术原创性比较



优先权国家或地区	专利件数	优先权国家或地区	专利件数
US	168	EP	10
CN	148	SE	2
KR	62	DE	1
WO	31	DK	1
JP	19		

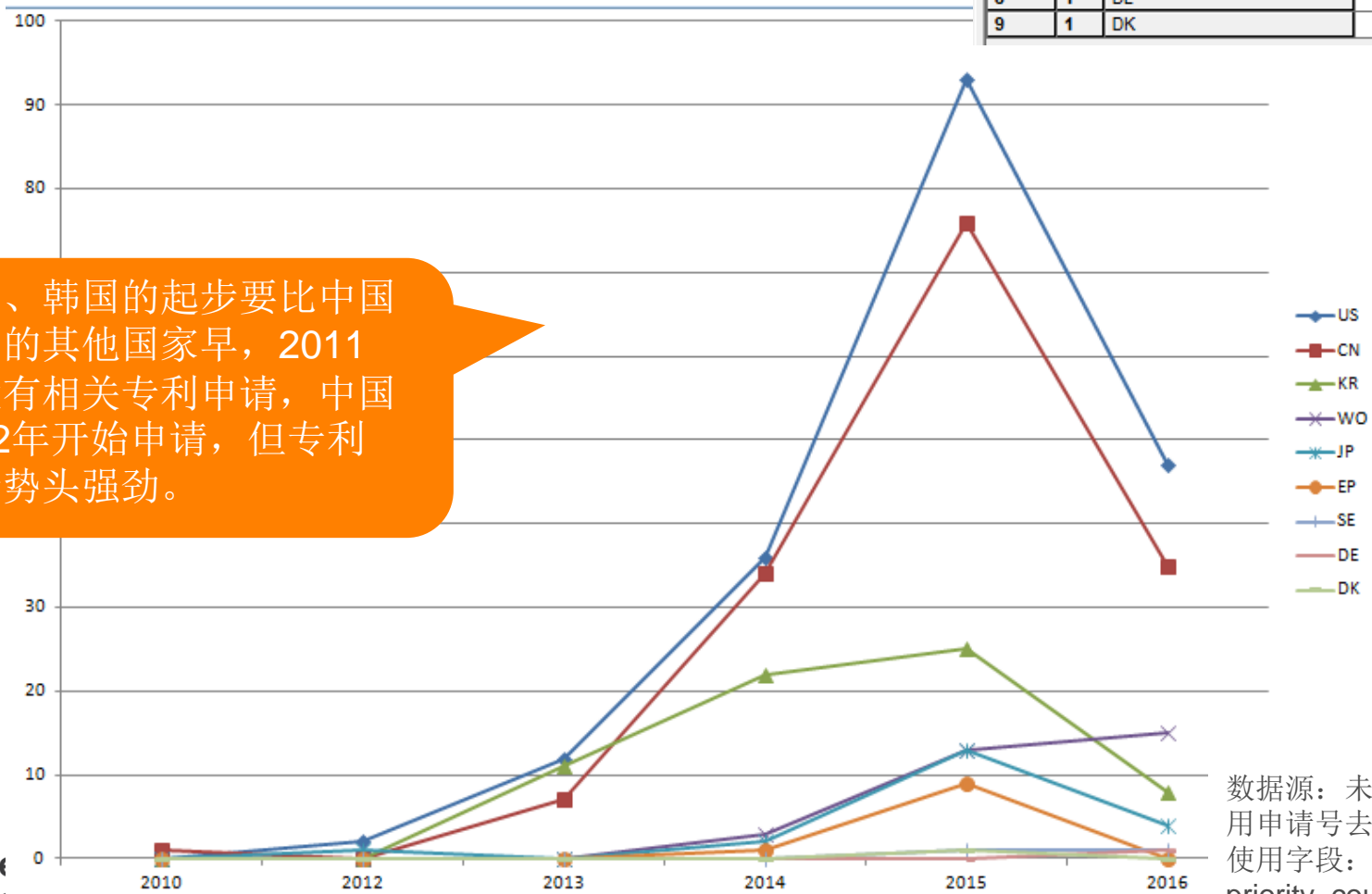
优先权国一般意味着技术原创国，从数据分析看，美国是目前Massive MIMO领域领先的技术原创国

数据源：未DWPI家族归并-
用申请号去重

使用字段：priority countries-earliest

各技术原创国申请专利发展趋势

Reset	Priority Country - Earliest	1	2	3	4	5	6	
	# Records	1	3	30	98	23	11	
Publication Ye	# Records	▼ ▲		▼ ▲		▼ ▲		
		Show Values >= 0 and <= 9						
		2010	2012	2013	2014	2015	2016	
1	168	US	0	2	12	36	93	47
2	148	CN	1	0	7	34	76	35
3	62	KR	0	0	11	22	25	8
4	31	WO	0	0	0	3	13	15
5	19	JP	0	1	0	2	13	4
6	10	EP	0	0	0	1	9	0
7	2	SE	0	0	0	0	1	1
8	1	DE	0	0	0	0	0	1
9	1	DK	0	0	0	0	1	0



美国、韩国的起步要比中国在内的其他国家早，2011年就有相关专利申请，中国2012年开始申请，但专利申请势头强劲。

数据源：未DWPI家族归并用申请号去重
使用字段：priority countries-earliest
Publication years

各国家/地区专利的全球布局

Reset		Priority Country - Earliest	1	2	3	4	5	6	7	8	9	10	11	12	13		
		# Records	248	241	213	131	126	68	42	12	8	5	5	4	2		
Family Member Countries	# Records	▼ ▲ Show Values >= 1 and <= 146 Cooccurrence # of Records ▼ ▲	WO	CN	US	KR	EP	JP	TW	AU	CA	DE	IN	HK	SE		
		1	168	US	125	61	146	60	71	34	25	8	8	4	5	4	
		2	148	CN	28	145	4	4			9						
		3	62	KR	37	13	46	59	27	12							
		4	31	WO	31	17	15	8	15	6	5	4					
		5	19	JP	18	3			4	16							
		6	10	EP	6	2	2		9		3						
		7	2	SE	2												2
		8	1	DE									1				
		9	1	DK	1												

从各个国家专利全球布局可以看到，中国的全局布局明显不及美国和韩国

数据源：未DWPI家族归并
字段：
Priority countries-earliest
Family member country

Organizational Trends in Last 3 Years

最近3年新出现/消失的厂商

Last 3 Years are: 2016 - 2014

Lists of the organizations in the dataset that have been the most active in the last three years (relative to the entire dataset in the last three years), only have activity in the last three years, or have no activity in the last three years.

Top Organizations in Last 3 Years

UNIV SOUTHEAST [23]
 UNIV BEIJING POSTS & TELECOM [11]
 SONY CORP [11]
 ALCATEL LUCENT [8]
 UNIV NANJING POSTS & TELECOM [7]
 UNIV ELECTRONIC SCI & TECHNOLOGY [7]
 LG ELECTRONICS INC [6]
 UNIV CHONGQING POSTS & TELECOM [5]
 UNIV TONGJI [5]
 HUAWEI TECHNOLOGIES CO LTD [5]

最近3年高申请量的专利权人：东南大学、北京邮电大学、索尼、阿尔卡特朗讯等

UNIV XIDIAN [3]
 WONG I C [3]
 WANG Z [2]
 NTT DOCOMO INC [2]
 AGARDH K [2]
 BEIJING INST TECHNOLOGY [2]
 CHEN J [2]
 UNIV BEIJING UNION [2]
 SHANGHAI LANGBO COMMUNICATION TECHNOLOGY [2]
 KWAK Y [2]
 UNIV HOHAI [2]
 UNIV TONGJI [2]
 JI H [2]
 UNIV ZHENGZHOU [2]
 KIM Y [2]
 LEE H [2]
 PLICANIC S V [2]
 QIAN C [2]
 NEC CO LTD [2]

Organizations First Published in Last 3 Years

SONY CORP [11]
 UNIV ELECTRONIC SCI & TECHNOLOGY [7]
 UNIV CHONGQING POSTS & TELECOM [5]
 UNIV SHANDONG [5]
 NOKIA SOLUTIONS & NETWORKS OY [4]
 UNIV HUAZHONG SCI & TECHNOLOGY [4]
 BENGTSSON E [4]
 KUNDARGI N U [4]
 NAT INSTR CO [4]
 NIEMAN K F [4]
 UNIV BEIJING [4]
 UNIV HARBIN [3]

最近3年首次申请专利的，比如索尼、电子科技大学、重庆邮电大学等

UNIV TONGJI [2]
 UNIV ZHENGZHOU [2]
 PLICANIC S V [2]
 QIAN C [2]
 SHARP KK [2]
 UNIV HARBIN ENG [1]
 UNIV HENAN POLYTECHNIC [1]
 ZHU X [1]
 UNIV NANJING SCI & TECHNOLOGY [1]
 UNIV PLA SCI & TECHNOLOGY [1]
 UNIV XIAMEN [1]
 UNIV ZHEJIANG [1]
 ACER INC [1]
 WANG X [1]
 AIRRAYS GMBH [1]
 WUXI BEIYOU PERCEPTIVE TECHNOLOGY IND [1]
 ASHIKHMIN A [1]
 YEN C [1]
 YIN H [1]

Organizations No Longer Published in Last 3 Years

UNIV KOREA NAT TRANSPORTATION IACF [4]
 MOBASHER A [3]
 PAULRAJ A [3]
 ALEX S [3]
 JALLOUL L [3]
 JINDAL N [3]
 MESE M [2]
 KIM Y S [1]
 AHN J Y [1]
 ARIYAVISITAKUL S [1]
 BALACHANDRAN [1]
 BENNETT J [1]
 CHEN [1]
 LI [1]
 T [1]
 T [1]
 H [1]
 U [1]
 MEHREZ [1]
 KIM Y B [1]
 UNIV GYEONGSANG IND ACAD COOP FOUND [1]
 MUN C [1]
 NAM J Y [1]
 UNIV NAGOYA [1]
 UNIV NANJING INFORMATION SCI & TECHNOLOG [1]
 OYMAK S [1]
 PRASAD N [1]
 GUEY J [1]
 CHO J [1]
 SIHLBOM B [1]
 WANG Y [1]
 LEE H J [1]
 LEE J H [1]
 SU Y T [1]
 INT BUSINESS MACHINES CORP [1]
 YUE G [1]
 ZHANG J [1]
 ZHANG Y [1]
 ZHOU H [1]

最近3年没有再申请专利的专利权人：比如国立交通大学、爱立信等

2. 重点国家分析

- 2.1 中国本土的专利权人？
- 2.2 在中国申请专利的外商？
- 2.3 本土专利权人vs外来专利权人之间技术布局的差别？
- 2.4 中国专利权人的海外布局？与其他国家比较？
- 2.5 中国与其他国家的技术布局差别？

以中国作为技术原创国申请专利的主要专利权人

专利权人	专利件数	专利权人	专利件数
UNIV SOUTHEAST	30	UNIV BEIJING TECHNOLOGY	2
UNIV BEIJING POSTS & TELECOM	12	UNIV BEIJING UNION	2
UNIV NANJING POSTS & TELECOM	8	UNIV HOHAI	2
UNIV ELECTRONIC SCI & TECHNOLOGY	7	UNIV TONGJI	2
UNIV QINGHUA	7	UNIV ZHENGZHOU	2
ALCATEL LUCENT	6	CHINA TELECOM CORP LTD	1
SHANGHAI LANGBO COMMUNICATION TECHNOLOGY	6	HARBIN INST TECHNOLOGY	1
UNIV XIAN JIAOTONG	6	HONG KONG APPLIED SCI & TECHNOLOGY RES	1
SAMSUNG ELECTRONICS CO LTD	5	HUAWEI TECHNOLOGIES CO LTD	1
UNIV CHONGQING POSTS & TELECOM	5	INST SEMICONDUCTORS CHINESE ACAD SCI	1
UNIV SHANDONG	5	UNIV CHINA SCI & TECHNOLOGY	1
ZTE CORP	5	UNIV CHINESE PLA INFORMATION ENG	1
UNIV HUAZHONG SCI & TECHNOLOGY	4	UNIV CHONGQING	1
CHINA ACAD TELECOM TECHNOLOGY MII	3	UNIV HARBIN ENG	1
SONY CORP	3	UNIV HENAN POLYTECHNIC	1
TELECOM TECHNOLOGY ACAD	3	UNIV NANJING INFORMATION SCI & TECHNOLOG	1
UNIV BEIHANG	3	UNIV NANJING SCI & TECHNOLOGY	1
UNIV HANGZHOU DIANZI	3	UNIV PLA SCI & TECHNOLOGY	1
UNIV XIDIAN	3	UNIV XIAMEN	1
BEIJING INST TECHNOLOGY	2	UNIV ZHEJIANG	1
	2	WUXI BEIYOU PERCEPTIVE TECHNOLOGY IND	1

无锡贝优光伏
科技有限公司

CAI

数据源: NECCOMPI 家族归并, 申请号合并后使用字段: Priority countries -earliest 中提取 CN 成立 subdataset->Assignees/Applicant (best available) 字段中滤掉 3 件个人申请的专利

无锡贝优光伏科技有限公司

哪些外商在中国布局了相关专利

专利权人/申请人	专利件数
ALCATEL LUCENT	5
SAMSUNG ELECTRONICS CO LTD	5
LG ELECTRONICS INC	4
SONY CORP	3
NEC CO LTD	2
BROADCOM CORP	1
FUJITSU LTD	1
NOKIA SIEMENS NETWORKS OY	1
NOKIA SOLUTIONS & NETWORKS OY	1
NTT DOCOMO INC	1

数据源：未DWPI家族归并，归并申请号后，使用字段：

Application countries中提取CN成立subdataset-> Assignees/Applicant（best available）中提取的外商数据

Reset	DWPI Manual Codes (with Definitions)		1	2
			# Records	131
Assignee/Applicant (Cleaned)	# Records	▼	▲	
		Show Values >= 1 and <= 99		
		Cooccurrence # of Records		
		▼	▲	native individual
1	114	W02-C03A5: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> Diversity systems	99	3
2	38	W01-A06C4: Communication -> Telephone and data transmission systems -> Digital information transmission -> Exchanges; connections between exchanges	30	2
3	29	W02-C03E1A: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> General circuit de	25	
4	24	W01-A08X: Communication -> Telephone and data transmission systems -> Digital information transmission -> DC systems -> Other DC systems	24	
5	22	W01-A01A: Communication -> Telephone and data transmission systems -> Digital information transmission -> Error detection and prevention -> By diversity, r	22	
6	18	W02-C03G1: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> Resource allocatio	12	2
7	15	W01-A03: Communication -> Telephone and data transmission systems -> Digital information transmission -> Multiple use of transmission path	15	
8	13	W02-C03C1B: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> Mobile radio, inclu	9	
9	13	W02-C03C1H: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> Mobile radio, inclu	6	1
10	12	W02-C03A: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> Diversity systems	11	
11	11	T01-J04C: Computing And Control -> Digital computers -> Data processing systems -> For function synthesis/analysis or equation solving -> Matrix or vector	11	
12	9	T01-E03: Computing And Control -> Digital computers -> Data processing systems -> For function synthesis/analysis or equation solving -> Matrix or vector	9	
13	9	W01-A09D: Communication -> Telephone and data transmission systems -> Digital information transmission -> Error detection and prevention -> Using multi-frequency codes	9	
14	8	W02-K07C: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> Orthogonal multiplex systems -> Orthogon	7	1
15	7	T01-J04D: Computing And Control -> Digital computers -> Data processing systems -> For function synthesis/analysis or equation solving -> Function evaluati	7	
16	7	W01-A01: Communication -> Telephone and data transmission systems -> Digital information transmission -> Error detection and prevention	7	
17	7	W01-B05A1A: Communication -> Telephone and data transmission systems -> Selecting -> Connecting via radio or inductive links -> Radio -> For mobile radio	2	1
18	7	W02-C03C1: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> Mobile radio, includ	6	
19	6	T01-C03C: Computing And Control -> Digital computers -> Input/output arrangements -> Data exchange with distant stations -> Radio link	3	1
20	6	W01-A06A3: Communication -> Telephone and data transmission systems -> Digital information transmission -> Exchanges; connections between exchanges	6	
21	6	W02-C03E3: Communication -> Broadcasting, radio and line transmission systems -> Transmission systems (general) -> Radio systems -> General circuit det	6	
22	5	T01-J04: Computing And Control -> Digital computers -> Data processing systems -> For function synthesis/analysis or equation solving	5	
23	5	W01-A03D1: Communication -> Telephone and data transmission systems -> Digital information transmission -> Multiple use of transmission path -> Duplex ->	5	

由于massive MIMO在全球的发展刚刚起步，所以，目前外商在中国就相关技术的布局并没有明显突出的优势

以中国作为优先权国的专利权人的海外布局 (中国本土专利权人的海外布局)

Reset		Assignee/Applicant (Cleaned)	1	2	3	4	5	6	7
		# Records	151	27	17	15	13	8	6
Family Member Countries	# Records	▼ ▲ Show Values >= 1 and <= 27							
		Cooccurrence # of Records	CN	WO	US	EP	KR	JP	TW
1	27	UNIV SOUTHEAST	27	2					
2	12	UNIV BEIJING POSTS & TELECOM	12						
3	8	UNIV NANJING POSTS & TELECOM	8						
4	7	UNIV ELECTRONIC SCI & TECHNOLOGY	7						
5	6	UNIV QINGHUA	6						
6	6	UNIV XIAN JIAOTONG	6						
7	5	HUAWEI TECHNOLOGIES CO LTD	5	3		1	1		
8	5	UNIV CHONGQING POSTS & TELECOM	5						
9	5	UNIV SHANDONG	5						
10	4	SHANGHAI LANGBO COMMUNICATION TE	4	2					
11	4	UNIV HUAZHONG SCI & TECHNOLOGY	4						
12	3	UNIV BEIHANG	3						
13	3	UNIV HANGZHOU DIANZI	3						
14	3	UNIV XIDIAN	3						
15	3	ZTE CORP	3	2					
16	2	BEIJING INST TECHNOLOGY	2						
17	2	UNIV BEIJING TECHNOLOGY	2						
18	2	UNIV BEIJING UNION	2						
19	2	UNIV HOHAI	2						
20	2	UNIV TONGJI	2						
21	2	UNIV ZHENGZHOU	2						

VS

美国各主要厂商的全球布局

数据源：未DWPI家族归并

以美国作为优先权国的专利权人的海外布局

Reset	Assignee/Applicant (Cleaned - No Individuals)	1	2	3	4	5	6	7	8	9	10	11	12
	# Records	146	125	71	61	60	34	25	8	8	5	4	4
Family Member Countries	# Records	US	WO	EP	CN	KR	JP	TW	AU	CA	IN	DE	HK
	▼ ▲												
	Show Values >= 1 and <= 45												
	Cooccurrence # of Records												
1	45 LG ELECTRONICS INC	32	45	18	20	33	13		8	8			
2	37 ALCATEL LUCENT	37	35	21	13	13	13	21					
3	14 BROADCOM CORP	14			4							4	4
4	14 SAMSUNG ELECTRONICS CO LTD	14	14	11	11	14	6						
5	14 SONY CORP	14	8	6	6								
6	6 NAT INSTR CORP	6	6										
7	5 TELEFONAKTIEBOLAGET ERICSSON L M	5	5	5							5		
8	4 ACER INC	4		4	4			4					
9	4 NTT DOCOMO INC	4	2				2						
10	3 HUAWEI TECHNOLOGIES CO LTD	3	2										
11	3 MEDIATEK SINGAPORE PTE LTD	3	3	3									
12	3 NOKIA SIEMENS NETWORKS OY	3		3	3								
13	3 NOKIA SOLUTIONS & NETWORKS OY	3		3	3								
14	2 NEC CO LTD	2	2										
15	1 INT BUSINESS MACHINES CORP	1											
16	1 UNIV MINNESOTA	1											



数据源：未DWPI家族归并

1. Priority countries-earliest 选取US成立子集

2. 用 Assignees/Applicant (Cleaned-No Individuals) 与 family member countries 生成共现矩阵

中国与其他国家的技术布局差别

Reset	DWPI Manual Codes (with Definitions)		1	2	3	4	5	6	7	8	9
	# Records		168	148	62	31	19	10	2	1	1
Priority Country - Earliest	# Records	Show Values >= 1 and <= 124									
		Cooccurrence # of Records	US	CN	KR	WO	JP	EP	SE	DE	DK
1	333	W02-C03A5: Communication -> Broadcasting, radio a	124	116	54	16	12	8	2		1
2	143	W01-A06C4: Communication -> Telephone and data tr	51	32	25	10	19	4	2		
3	80	W02-C03G1: Communication -> Broadcasting, radio a	27	15	20	7	11				
4	79	W02-C03C1H: Communication -> Broadcasting, radio	51	8	6	8	2	4			
5	72	W01-B05A1A: Communication -> Telephone and data	35	7	18	6	2	4			
6	64	W02-C03C1B: Communication -> Broadcasting, radio	34	9	2	4	13	2			
7	64	W02-C03E1A: Communication -> Broadcasting, radio	19	28	15	2					
8	51	W01-A01A: Communication -> Telephone and data tra	17	26	5	1		2			
9	42	T01-C03C: Computing And Control -> Digital computer	24	3	1	7	2	2		2	1
10	37	T01-S03: Computing And Control -> Digital computers	22		1	11		2			1
11	37	W02-K07C: Communication -> Broadcasting, radio an	17	6	5	7	2				
12	32	W01-A08X: Communication -> Telephone and data tra	4	25	1	1					1
13	31	W01-C01D3C: Communication -> Telephone and data t	14	1	6	6	2	2			
14	31	W02-C03C1G: Communication -> Broadcasting, radio	19	1	9		2				
15	30	W02-C03C1: Communication -> Broadcasting, radio a	20	6			4				
16	27	W01-A03: Communication -> Telephone and data tran	5	17	4	1					
17	26	W02-C03A: Communication -> Broadcasting, radio an	7	11		6	2				
18	24	W01-A08B2: Communication -> Telephone and data tr	11	5	5	3					
19	19	W02-C03E3: Communication -> Broadcasting, radio an	10	5	1	3					
20	18	T01-J04C: Computing And Control -> Digital computers	2	11	5						
21	17	W01-C01D3C: Communication -> Telephone and data	3	19							

美国、中国、韩国等比较集中布局在比如

W02-C03A5: Broadcasting, radio and line transmission systems (广播, 无线电和线路传输系统) -> Transmission systems (general) -> Radio systems (无线电系统) -> Diversity systems (分集技术) -> Hybrid diversity schemes (混合分集方案)

W01-A06C4: Telephone and data transmission systems (电话和数据传输系统) -> Digital information transmission (数字信息传输) -> Exchanges; connections between exchanges (including LAN) (交换; 交换间连接 (包括局域网)) -> Characterised by medium -> Radio link (无线电线路)

中国技术布局比较薄弱的比如

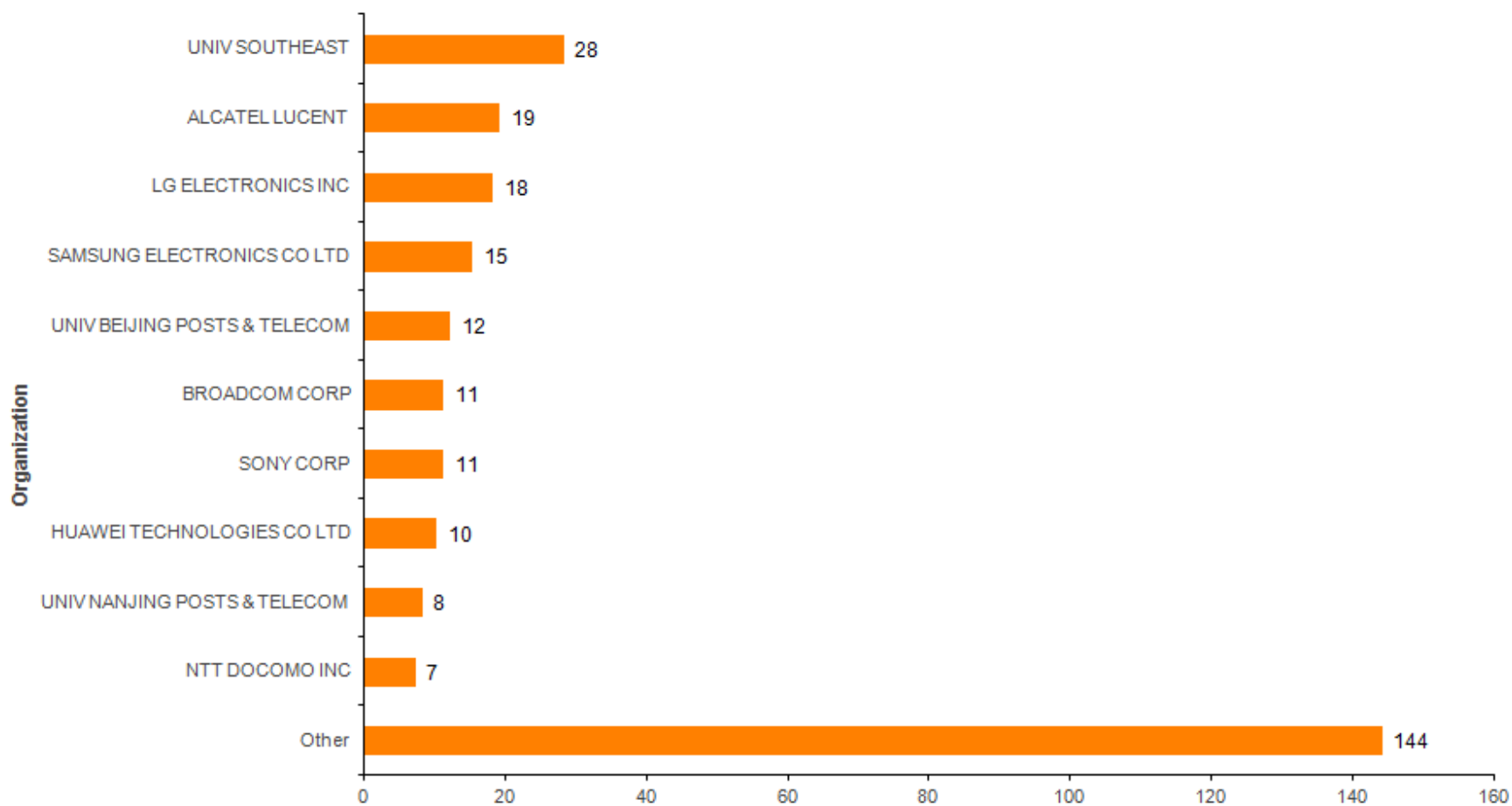
W02-C03G1: Broadcasting, radio and line transmission systems (广播, 无线电和线路传输系统) -> Transmission systems (general) -> Radio systems (无线电系统) -> Resource allocation and cognitive radio systems (资源分配和认知无线电系统) -> Resource allocation (资源分配)

W01-B05A1A: Telephone and data transmission systems (电话和数据传输系统) -> Selecting -> Connecting via radio or inductive links -> Radio -> For mobile radio telephone system(用于移动无线电话系统) -> Cellular (蜂窝移动通信)

3. 重要专利权人分析

- 3.1 全球有哪些重要专利权人？
- 3.2 这些重要专利权人的活跃度？
- 3.3 他们在全球其他国家/地区的布局？
- 3.4 重要专利权人的相似度比较

主要专利权人 (TOP10)



全球主要厂商的活跃度

Reset		Assignee/Applicant (Cleaned)	1	2	3	4	5	6
		# Records	4	21	120	14	14	3
Application Year	# Records	Show Values >= 1 and <= 22						
		Cooccurrence # of Records	2011	2012	2013	2014	2015	2016
1	54	ALCATEL LUCENT	1	8	18	22	5	
2	51	SAMSUNG ELECTRONICS CO LTD	2	7	19	13	10	
3	45	LG ELECTRONICS INC			19	13	13	
4	22	SONY CORP				12	10	
5	19	HUAWEI TECHNOLOGIES CO LTD			10	7	2	
6	17	NTT DOCOMO INC			5	8	4	
7	14	BROADCOM CORP			11	3		
8	7	FUJITSU LTD			5	1	1	
9	6	NAT INSTR CORP					6	
10	6	NOKIA SOLUTIONS & NETWORKS OY				4	2	
11	6	SHANGHAI LANGBO COMMUNICATION TECHNOLOGY			2	2	2	
12	5	TELEFONAKTIEBOLAGET ERICSSON L M		3	1	1		
13	5	ZTE CORP		1	1	3		
14	4	ACER INC					4	
15	4	NEC CO LTD				3	1	
16	3	MEDIATEK SINGAPORE PTE LTD				3		
17	3	NOKIA SIEMENS NETWORKS OY				1	2	
18	2	ICOMERA AB				1	1	
19	2	SHARP KK					2	
20	2	TELEFONICA SA			1	1		
21	1	AIRWAYS GMBH					1	
22	1	CHINA TELECOM CORP LTD				1		
23	1	INT BUSINESS MACHINES CORP	1					
24	1	KATHREIN WERKE KG						1
25	1	WUXI BEIYOU PERCEPTIVE TECHNOLOGY IND				1		

申请量较大的有阿尔卡特朗讯、三星、LG、索尼、华为等。申请年代集中在2013年-2015年。中国本土的企业有华为、上海朗帛通信技术有限公司、中兴、中国电信、无锡贝优光伏科技有限公司

全球主要厂商的技术领域分布

Reset	Assignee/Applicant (Cleaned)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41			
	# Records	123	88	79	60	57	53	34	34	33	31	28	24	23	21	21	20	20	19	19	19	19	18	16	15	15	14	13	13	13	12	12	12	12	12	11	11	11	10	10	10				
CPC - Current	# Records	H04B7/0413	H04B7/0617	H04L5/0048	H04B7/0626	H04B7/0456	H04B7/0452	H04B7/0691	H04L5/0023	H04L25/0204	H04B7/0417	H04B7/0639	H04L5/0057	H04W1/628	H04B7/04	H04W7/2/042	H04L5/0051	H04W24/10	H04B7/024	H04B7/0619	H04B7/063	H04W88/08	H04L5/0035	H04B7/0634	H04W1/632	H04W7/2/04	H04B7/10	H04B7/0478	H04L25/0224	H04L5/00	H04B7/0697	H04L1/0026	H04L25/0202	H04L25/0226	H04L5/0007	H04W7/2/085	H04L1/06	H04L25/0228	H04W88/02	H04B7/065	H04L5/0091				
	▼	Show Values >= 1 and <= 28																																											
	▼	Cooccurrence																																											
1	54	ALCATEL LUCENT	9	12	5	6	5	6	2	3	6	5			3		10		4						9										3						2				
2	51	SAMSUNG ELECTRONICS CO LTD	18	16	28	18	8	3	1	13	11	10	19	5	4	3	14	4	9		4	8	5	5			7			10	6	4	4	9	3	5		10	7	2	5	1	9		
3	45	LG ELECTRONICS INC	27	10	26	16	9	4	10	9	12		11		5	4	10	5	3	8			11	8			8		2	6	4		3	5		5				6	5				
4	22	SONY CORP	11	3	2		3	2	3	2	2				3	2	4							2			2	1			1			2			2								
19	19	HUAWEI TECHNOLOGIES CO LTD	6	10			4	7			3				1												2	2	1		4								2		2				
6	17	NTT DOCOMO INC	8	9		1	3	1			2			9	2					3	2			3	3	2													3			1			
7	14	BROADCOM CORP	10	3	2		3	2	7	2	3						1			1	2						1							3					3			1			
8	7	FUJITSU LTD			1	6				1				6																															
9	6	NAT INSTR CORP	6		6		6	6											6			6																							
10	6	NOKIA SOLUTIONS & NETWORKS OY	3	1		1	3	4	3					1		1	1											1																	
11	6	SHANGHAI LANGBO COMMUNICATION TE																																						2					
12	5	TELEFONAKTIEBOLAGET ERICSSON L M	4		4	4				4	4																																		
5	5	ZTE CORP	2				2														2																								
14	4	ACER INC		4				4																																					
15	4	NEC CO LTD							1																																				
16	3	MEDIATEK SINGAPORE PTE LTD						3			3																																		
17	3	NOKIA SIEMENS NETWORKS OY	3				3	3	3																																				
18	2	ICOMERA AB																																											
19	2	SHARP KK																																											
20	2	TELEFONICA SA																		2																									
21	1	AIRWAYS GMBH		1																																									
22	1	INT BUSINESS MACHINES CORP																																											
23	1	KATHREIN WERKE KG																																											
1	1	WUXI BEIYOU PERCEPTIVE TECHNOLOGY	1			1																																							

对于公司来讲，申请的专利技术布局越多往往代表其业务越广泛。可以看到，一些外商比如阿尔卡特朗讯、三星、LG、索尼、NTT的技术布局相比较中国企业更加广泛和全面。

学术机构的活跃度

Reset		Assignee/Applicant (Cleaned)	1	2	3	4	5	6	7
		# Records	1	4	21	12	14	14	3
Application Year	# Records	Show Values ≥ 1 and ≤ 12							
		Cooccurrence # of Records	2010	2011	2012	2013	2014	2015	2016
1	30	UNIV SOUTHEAST				6	12	12	
2	12	ELECTRONICS & TELECOM RES INST				5	5	2	
3	12	UNIV BEIJING POSTS & TELECOM				1	4	7	
4	12	UNIV KOREA NAT TRANSPORTATION IAC		2	6	2	1	1	
5	9	UNIV YONSEI IND ACADEMIC COOP FOUN				4	3	2	
6	8	UNIV NANJING POSTS & TELECOM				1	1	6	
7	7	UNIV ELECTRONIC SCI & TECHNOLOGY						6	1
8	6	KOREA ADVANCED INST SCI & TECHNOL			1	1	2	2	
9	6	UNIV QINGHUA				2	2	2	
10	6	UNIV XIAN JIAOTONG	1				3	2	
11	5	UNIV CHONBUK NAT IND COOP FOUN				4		1	
12	5	UNIV CHONGQING POSTS & TELECOM					1	4	
13	5	UNIV SHANDONG					2	3	
14	4	UNIV HUAZHONG SCI & TECHNOLOGY					1	3	
15	3	CHINA ACAD TELECOM TECHNOLOGY MII					1	2	
16	3	TELECOM TECHNOLOGY ACAD					1	2	
17	3	UNIV BEIHANG					1	2	
18	3	UNIV HANGZHOU DIANZI						3	
19	3	UNIV XIDIAN					1	2	
20	2	BEIJING INST TECHNOLOGY					1	1	
21	2	UNIV BEIJING TECHNOLOGY				1		1	
22	2	UNIV BEIJING UNION					2		
23	2	UNIV HOHAI						2	
24	2	UNIV TONGJI					1	1	
25	2	UNIV ZHENGZHOU						2	

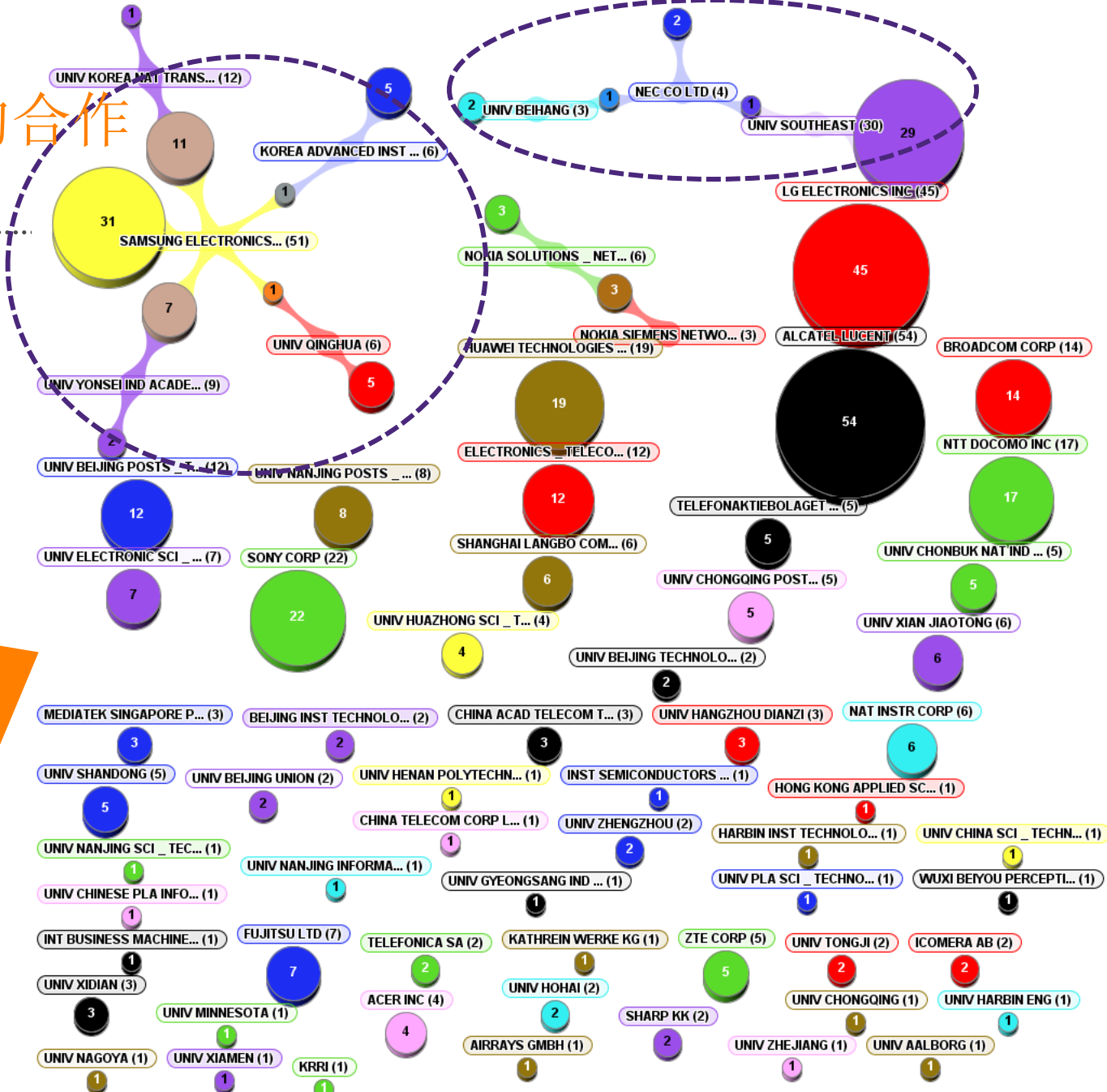
massive MIMO到目前为止，来自大学及科研机构的专利权人约40家，申请主要集中在2013-2015年。申请量最大的是东南大学，共计30件专利，其次是韩国电子通讯研究院、北京邮电大学、韩国国立交通大学，都申请了12件专利。

数据源：未DWPI家族归并-用申请号去重

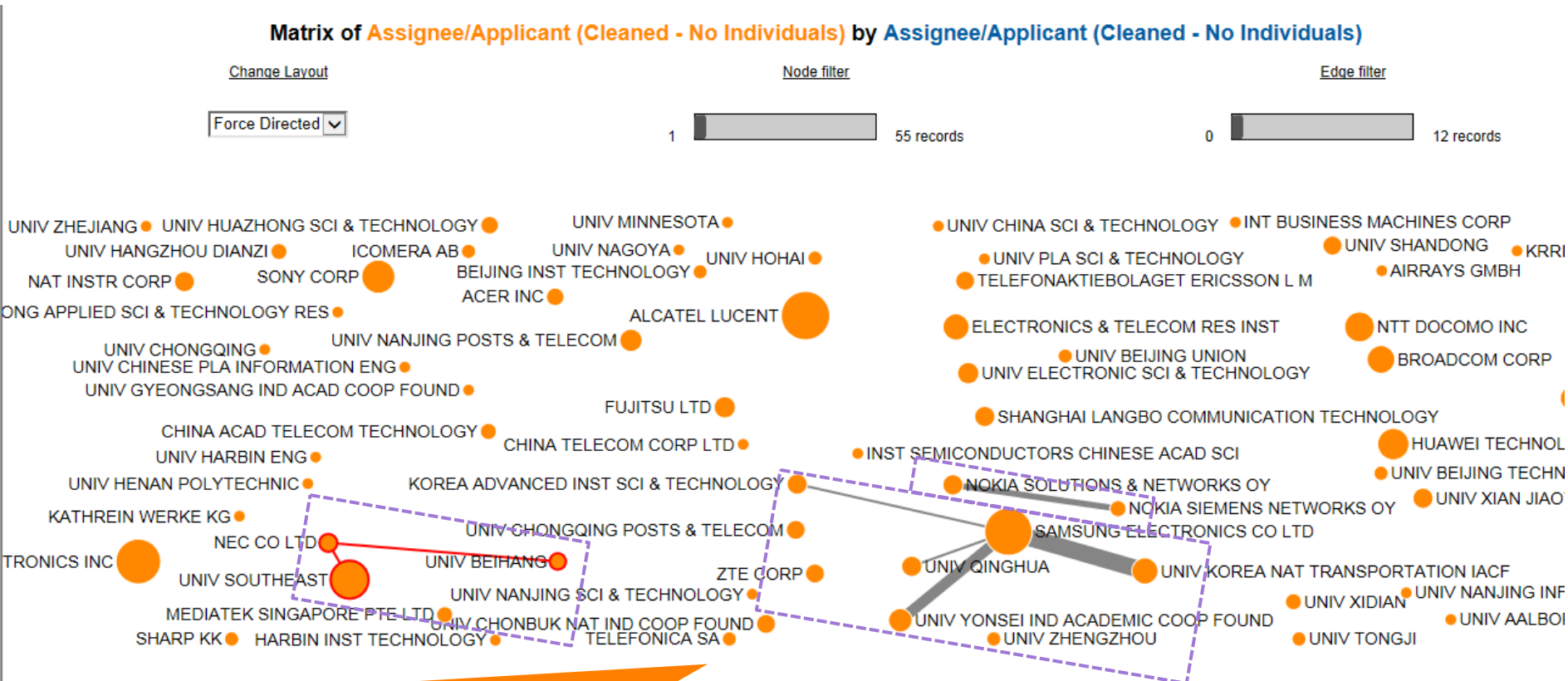
专利权人之间的合作 (Aduna图)

目前，Massive MIMO领域专利权人合作并不普遍。已有的合作比如：

- ✓三星与国内的国立韩国交通大学、延世大学、韩国科学技术院，与美国普渡大学技术商业化基金会、我国的清华大学存在合作；
- ✓东南大学、北航都分别与NEC存在过合作



专利权人之间的合作 (Matrix Viewer图)

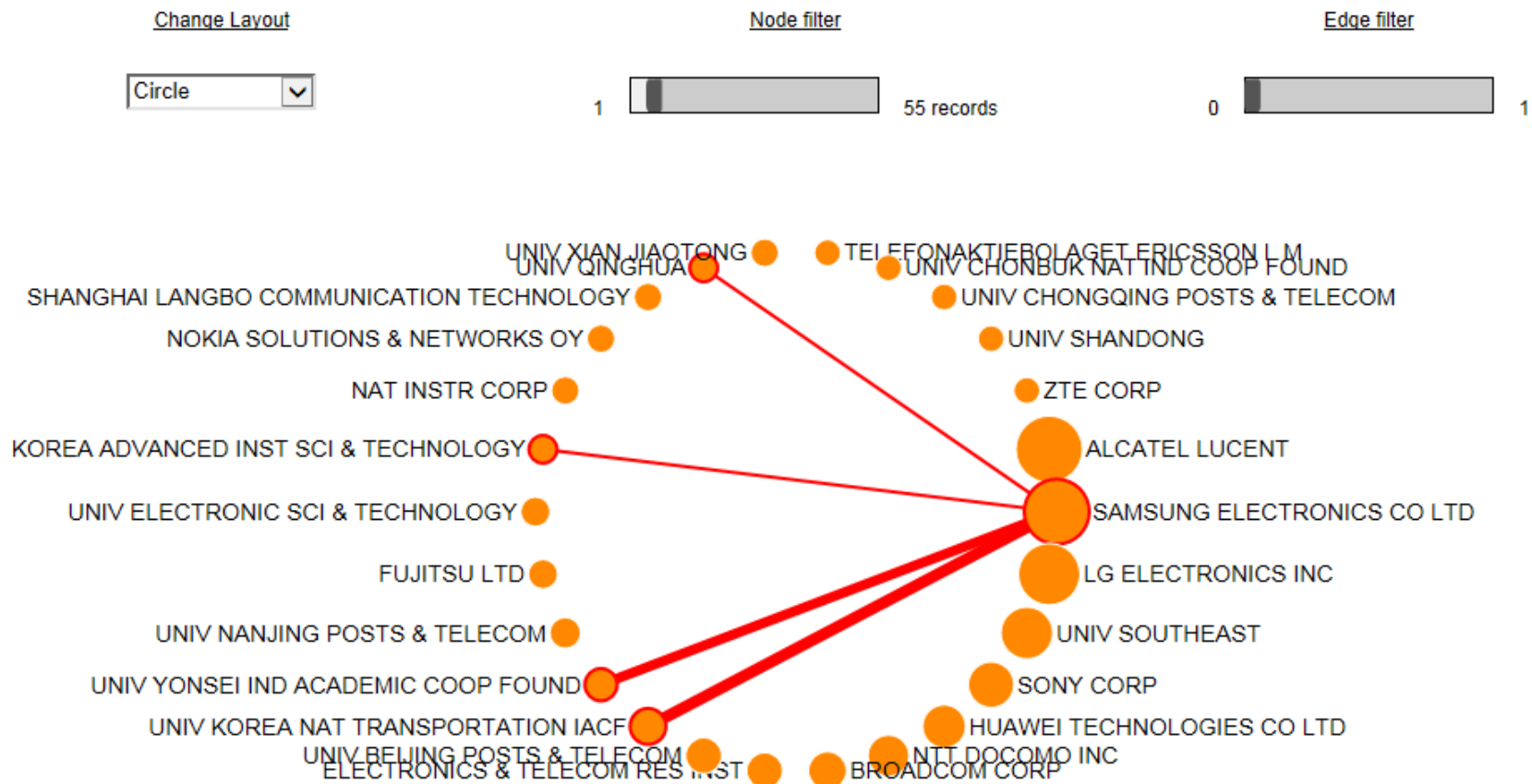


目前，Massive MIMO领域专利权人合作并不普遍。已有的合作比如：

- ✓东南大学、北航都分别与NEC存在过合作
- ✓三星与国内的韩国国立交通大学、延世大学、韩国电子通讯研究院、韩国科学技术院，与美国普渡大学技术商业化基金会、我国的清华大学存在合作；

专利权人之间的合作 (Matrix Viewer图)

Matrix of Assignee/Applicant (Cleaned - No Individuals) by Assignee/Applicant (Cleaned - No Individuals)



专利申请量≥5件的专利权人之间的合作情况，可以看到三星与韩国国立交通大学、延世大学、韩国科学技术院、清华大学的合作较多。

专利权人相似度比较（互相关矩阵）

Reset	Assignee/Applicant (Cleaned - No Ind	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	# Records	51	12	6	12	6	30	45	4	17	22	8	5	1	4	2
	Assignee/Applicant (Cleaned - No Individuals)	SAMSUNG ELECTRONICS CO LTD	ELECTRONICS & TELECOM RES INST	UNIV XIAN JIAOTONG	UNIV KOREA NAT TRANSPORTATION I	KOREA ADVANCED INST SCI & TECHN	UNIV SOUTHEAST	LG ELECTRONICS INC	NEC CO LTD	NTT DOCOMO INC	SONY CORP	UNIV NANJING POSTS & TELECOM	UNIV CHONBUK NAT IND COOP FOUNI	UNIV NANJING SCI & TECHNOLOGY	ACER INC	UNIV TONGJI
	# Records	54	51	45	4	5	6	7	8	9	10	11	12	13	14	15
	ALCATEL LUCENT	0.646	0.539	0.550	0.495	0.632	0.573	0.481	0.552	0.677	0.555	0.445	0.450	0.332	0.332	0.681
	SAMSUNG ELECTRONICS CO LTD	1.000	0.809	0.807	0.796	0.785	0.784	0.764	0.754	0.736	0.725	0.719	0.704	0.703	0.703	0.699
	LG ELECTRONICS INC	0.764	0.762	0.685	0.612	0.682	0.655	1.000	0.642	0.496	0.612	0.582	0.701	0.765	0.765	0.537
	UNIV SOUTHEAST	0.784	0.784	0.885	0.885	0.885	0.885	0.885	0.729	0.719	0.662	0.859	0.772	0.773	0.773	0.804
	SONY CORP	0.725	0.635	0.635	0.635	0.635	0.635	0.635	0.542	0.588	0.688	0.575	0.564	0.604	0.604	0.571
	HUAWEI TECHNOLOGIES CO LTD	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.461	0.461	0.461	0.461	0.461	0.461	0.461	0.440
	NTT DOCOMO INC	0.736	0.636	0.636	0.636	0.636	0.636	0.636	0.540	0.540	0.540	0.540	0.540	0.540	0.540	0.800
	BROADCOM CORP	0.656	0.656	0.656	0.656	0.656	0.656	0.656	0.614	0.614	0.614	0.614	0.614	0.614	0.614	0.505
	ELECTRONICS & TELECOM RES INST	0.809	1.000	0.809	0.809	0.809	0.809	0.809	0.898	0.898	0.898	0.898	0.898	0.898	0.898	0.703
	UNIV BEIJING POSTS & TELECOM	0.642	0.642	0.642	0.642	0.642	0.642	0.642	0.578	0.578	0.578	0.578	0.578	0.578	0.578	0.692
	UNIV KOREA NAT TRANSPORTATION IAC	0.796	0.796	0.796	1.000	0.796	0.796	0.796	0.599	0.599	0.599	0.599	0.599	0.599	0.599	0.646
	UNIV YONSEI IND ACADEMIC COOP FOUN	0.449	0.449	0.449	0.449	0.449	0.449	0.449	0.448	0.448	0.448	0.448	0.448	0.448	0.448	0.350
	UNIV NANJING POSTS & TELECOM	0.719	0.719	0.719	0.719	0.719	0.719	0.719	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.672
	FUJITSU LTD	0.389	0.224	0.330	0.353	0.411	0.309	0.127	0.429	0.463	0.359	0.285	0.107	0.073	0.073	0.353
	UNIV ELECTRONIC SCI & TECHNOLOGY	0.648	0.695	0.756	0.558	0.690	0.767	0.610	0.522	0.466	0.526	0.735	0.765	0.769	0.769	0.592
	KOREA ADVANCED INST SCI & TECHNOL	0.785	0.762	0.869	0.745	1.000	0.851	0.682	0.787	0.762	0.642	0.756	0.664	0.732	0.732	0.847
	NAT INSTR CORP	0.550	0.552	0.510	0.466	0.540	0.518	0.546	0.423	0.470	0.581	0.425	0.452	0.568	0.568	0.525
	NOKIA SOLUTIONS & NETWORKS OY	0.560	0.506	0.455	0.429	0.499	0.479	0.581	0.410	0.474	0.732	0.408	0.456	0.485	0.485	0.499
	SHANGHAI LANGBO COMMUNICATION TE	0.563	0.701	0.730	0.458	0.569	0.702	0.596	0.486	0.412	0.449	0.636	0.658	0.787	0.787	0.658
	UNIV QINGHUA	0.596	0.705	0.694	0.510	0.570	0.741	0.625	0.526	0.438	0.503	0.671	0.656	0.801	0.801	0.489

通过对申请专利的技术领域分布情况（Manual code），可以了解各专利权人的相似度情况。比如在Massive MIMO领域，和三星技术比较相似的专利权人有韩国电子通讯研究院、西安交通大学、韩国国立交通大学、东南大学、LG、NEC、NTT、索尼等

专利权人相似度比较（Matrix Viewer图）

Matrix of Assignee/Applicant (Cleaned - No Individuals) by Assignee/Applicant (Cleaned - No Individuals)

Change Layout

Node filter

Edge filter

Force Directed

1

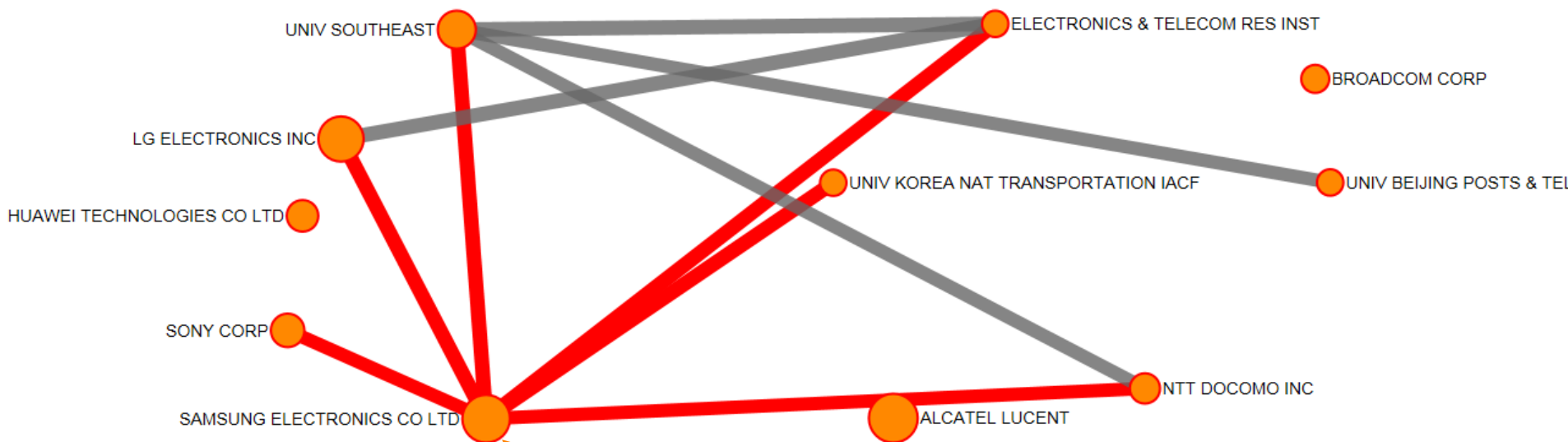


55 records

0



1



可以看到，在几个专利申请量较大的机构之间（申请量 ≥ 10 件），三星与韩国电子通讯研究院、国立韩国交通大学、东南大学、LG、NTT、SONY的相似度较大。

数据源：未DWPI家族归并-用申请号去重
选取字段：利用 Assignee/Applicant (Cleaned - No Individuals) 生成的互相关矩阵，用matrix viewer可视化呈现时，每个节点设置的记录数 ≥ 10 ；并紧密度 ≥ 0.7 的部分。这时，呈现的是专利申请 ≥ 10 件的专利权人之间的相似度（连线只显示相似度 ≥ 0.7 部分）

4. 具体技术分析

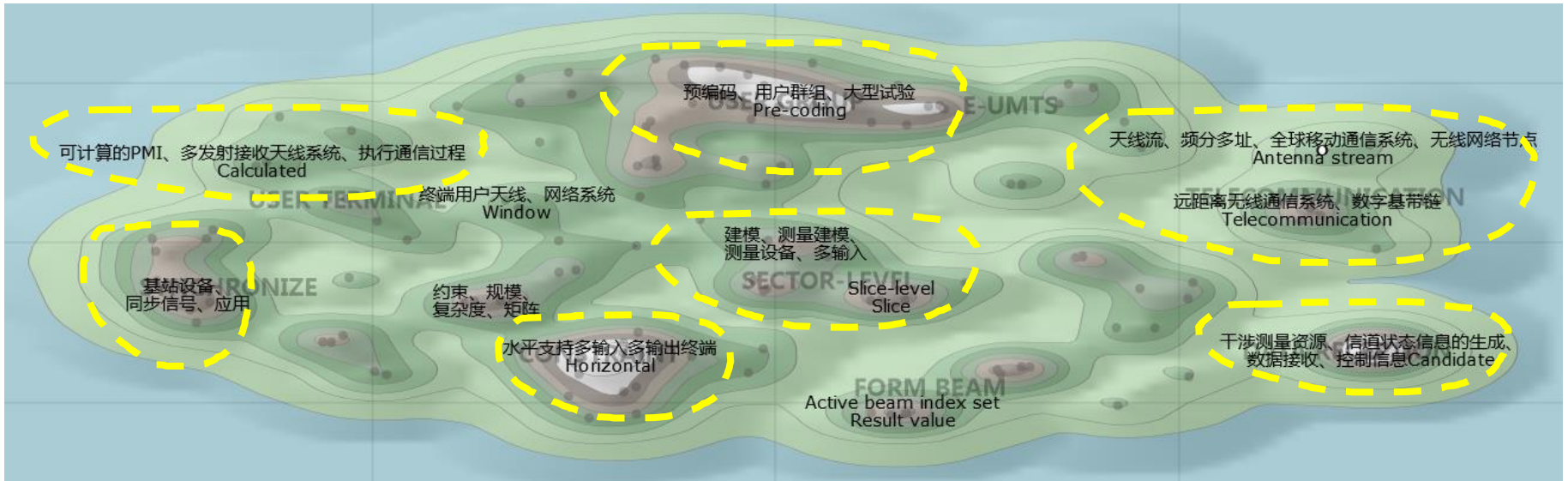
4.1 全球的技术布局

4.2 技术发展随时间的推移

4.3 专利量较大的国家/地区间的技术布局对比

4.4 深入分析领域中某一个技术点

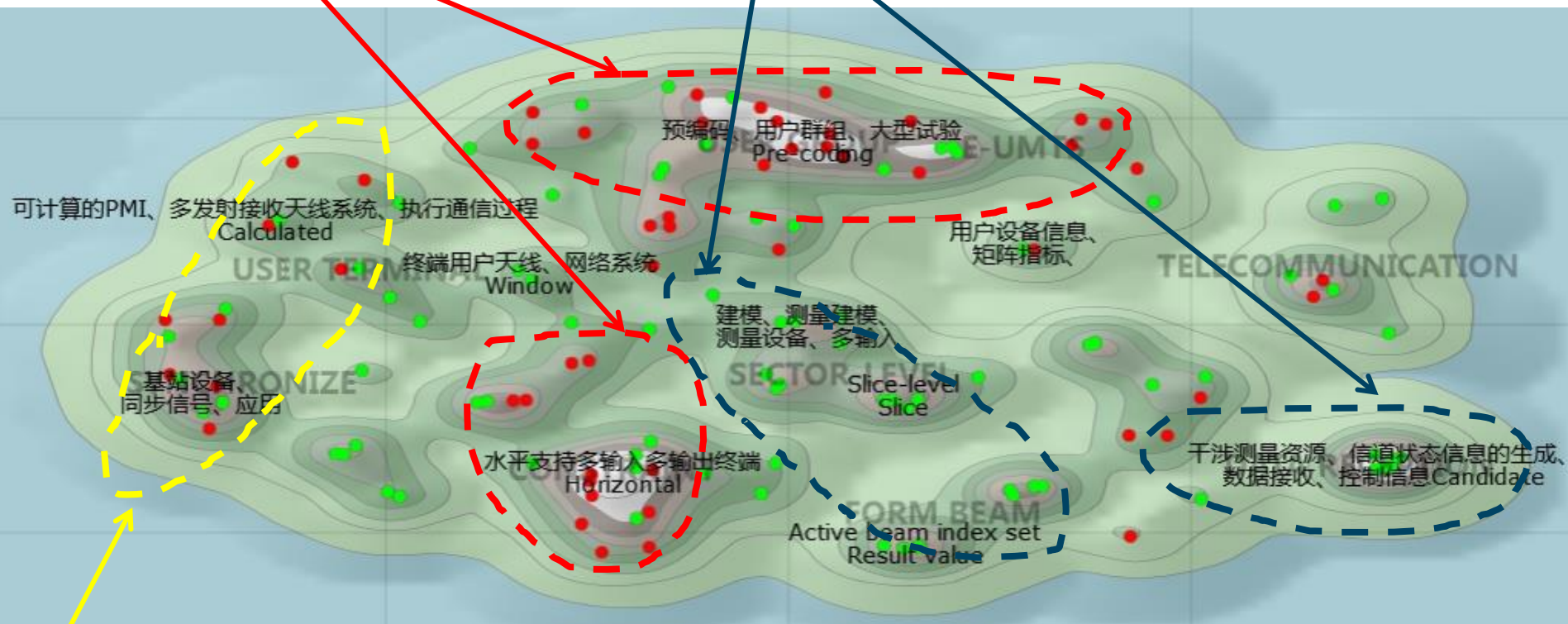
整体技术布局- 基于DWPI标题和DWPI摘要



技术发展随时间的推移

2014年后的热点

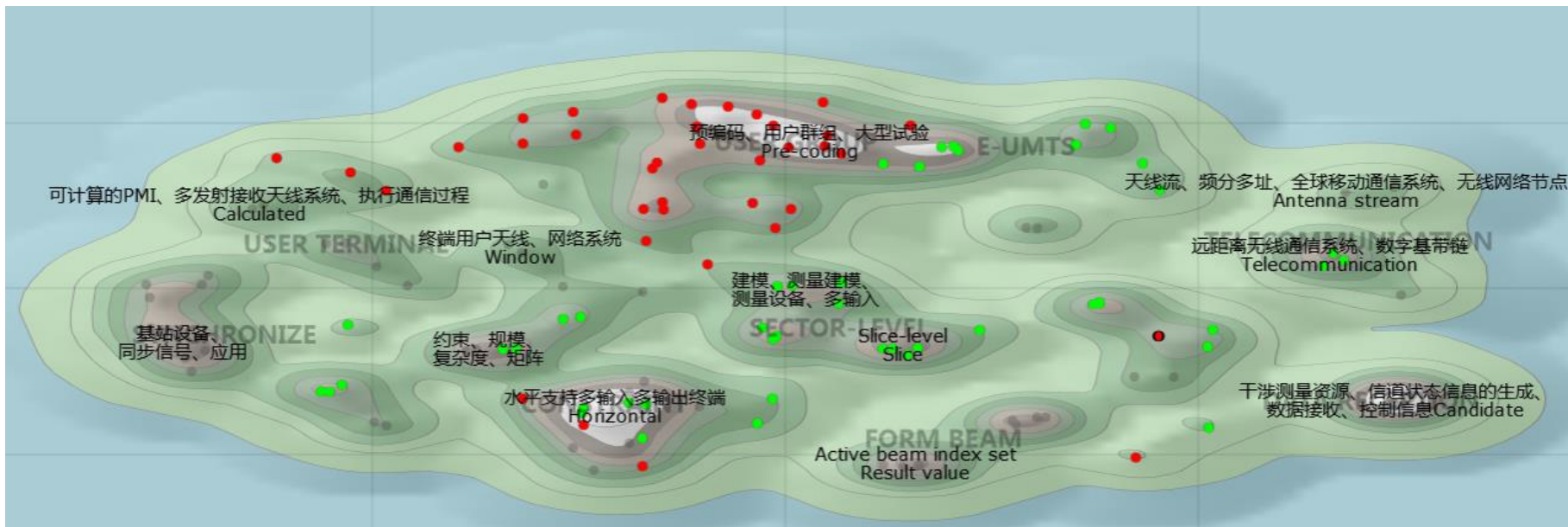
2014年前热点



持续热点

名称	文献数
主题索引	0
2014-2015	52
2010-2013	84

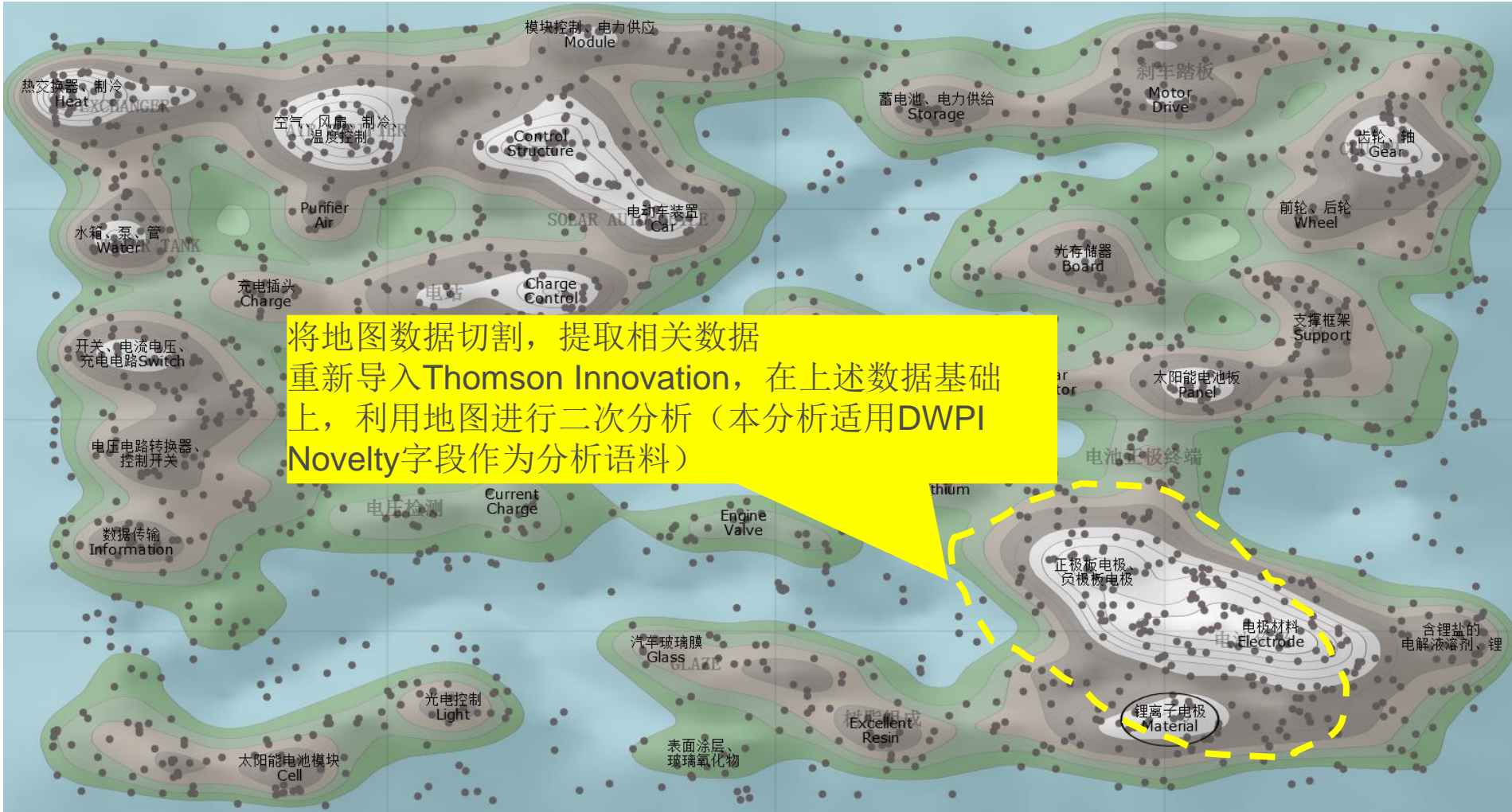
原创国技术侧重比较：中国vs美国



○	名称	文献数
	主题索引	0
	2014-2015	52
	2010-2013	84
●	CN	37
●	US	46

切割重点区域

将地图数据切割，提取相关数据
重新导入Thomson Innovation，在上述数据基础上，利用地图进行二次分析（本分析适用DWPI Novelty字段作为分析语料）



技术发展随时间的推移



Reset		Application Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38				
		# Records	333	143	80	79	72	64	64	51	42	37	37	32	31	31	30	27	26	24	19	18	17	16	15	15	15	14	14	14	14	13	12	12	12	12	11	10	10	10				
DWPI Manual Codes	# Records	Cooccurrence # of Records	W02-C03A5	W01-A06C4	W02-C03G1	W02-C03C1H	W01-B05A1A	W02-C03C1B	W02-C03E1A	W01-A01A	T01-C03C	T01-S03	W02-K07C	W01-A08X	W01-C01D3C	W02-C03C1G	W02-C03C1	W01-A03	W02-C03A	W01-A08B2	W02-C03E3	T01-J04C	W01-C01D3G	W01-A06G5C	W01-A06A3	W01-A09D	W02-C05A	T01-M06A1	T01-N01D	W01-A04A2	W02-C03A1A	T01-E03	T01-N02A3	W02-C03A1B	W02-C03E1	W02-K02	T01-F05B2	W01-A03D1	W01-A03D5					
1	1	2010	1							1																																		
2	4	2011	2	3	1												1								1																		1	
3	21	2012	13	15	5		2	3	3	4		1	4		1	1	5		1	3	1	1	1		3						1													3
4	120	2013	87	45	33	25	36	19	16	16	8	14	7	7	11	10	8	3	4	6	1	4	9	3	1	3	5	4	7	3	2	2	6	8	5	7	1	1	2					
5	147	2014	119	46	19	38	21	26	23	20	16	11	13	15	13	14	10	14	11	10	12	5	6	12	2	6	6	8	6	9	5	4	5	1	4	4	5	6	1					
6	146	2015	110	34	22	16	13	16	22	10	18	11	12	10	6	6	6	10	10	5	5	8	1	1	8	6	4	2	1	2	7	6	1	1	3		5	3	3					
7	3	2016	1																																									

W02-C03A5: Broadcasting, radio and line transmission systems (广播, 无线电和线路传输系统) -> Transmission systems (general) -> Radio systems (无线电系统) -> Diversity systems (分集技术) -> Hybrid diversity schemes (混合分集方案)

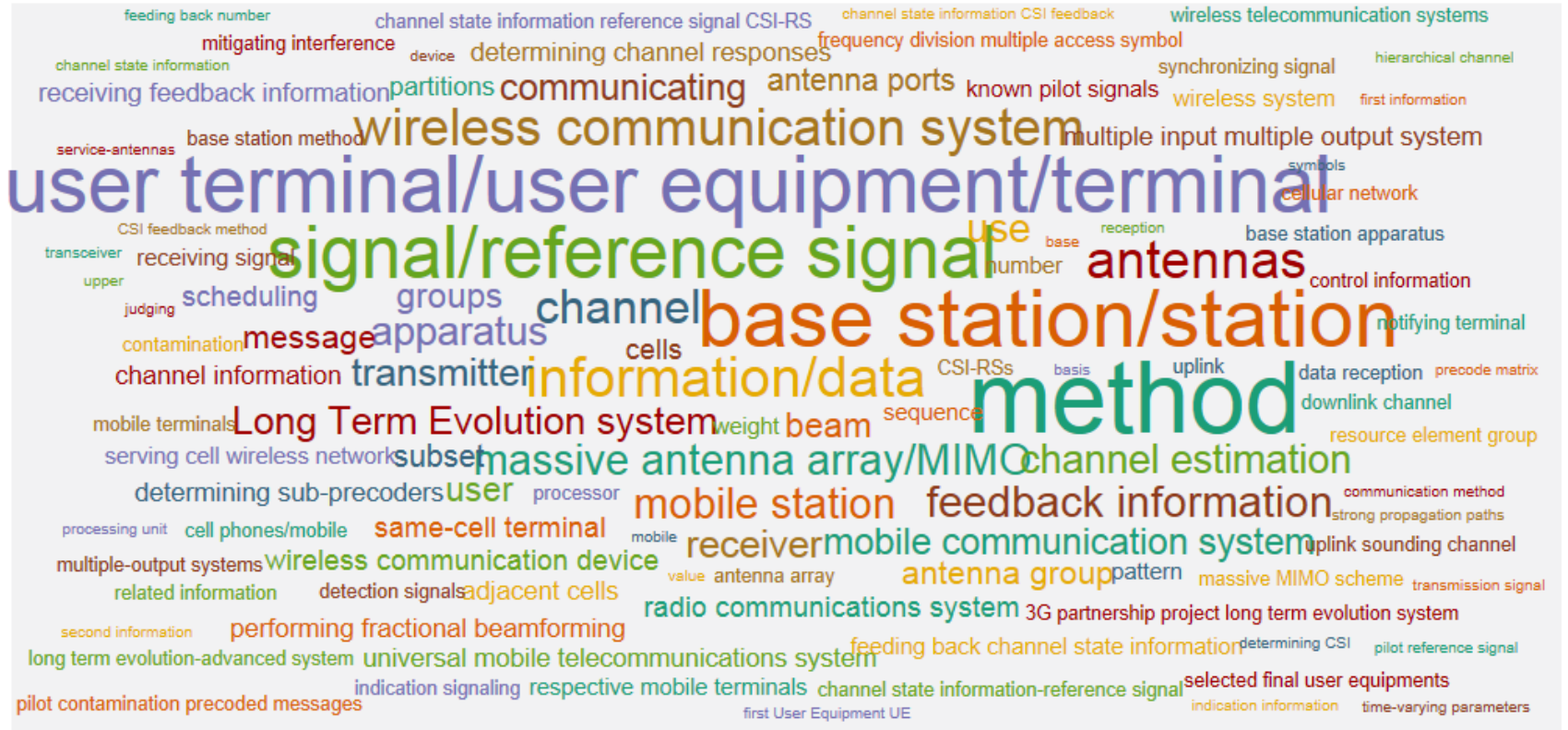
W01-A06C4: Telephone and data transmission systems (电话和数据传输系统) -> Digital information transmission (数字信息传输) -> Exchanges; connections between exchanges (including LAN) (交换; 交换间连接 (包括局域网)) -> Characterised by medium -> Radio link (无线电路)

W02-C03G1: Broadcasting, radio and line transmission systems (广播, 无线电和线路传输系统) -> Transmission systems (general) -> Radio systems (无线电系统) -> Resource allocation and cognitive radio systems (资源分配和认知无线电系统) -> Resource allocation (资源分配)

W01-B05A1A: Telephone and data transmission systems (电话和数据传输系统) -> Selecting -> Connecting via radio or inductive links -> Radio -> For mobile radio telephone system(用于移动无线电话系统) -> Cellular (蜂窝移动通信)

整体技术布局-基于标题中的关键词

Title (Best Available) (NLP) (Phrases) (Cleaned).



标题中的关键词	专利 件数	标题中的 关键词	专利 件数	标题中的关键词	专利 件数	标题中的关键词	专利 件数
method	227	signal/refer ence signal	67	wireless communication system	26	massive antenna array/MIMO	17
base station/station	99	information /data	31	channel	21	mobile station	17
user terminal/user equipment/terminal	89	antennas	28	feedback information	18	apparatus	15
						channel estimation	15

数据源：未DWPI家族归并-用申请号去重
选取字段： Title (Best Available) (NLP) (Phrases) (Cleaned)中取记录数≥5

5. 核心专利分析

- 5.1 衡量核心专利的指标体系
- 5.2 如何查找家族信息？
- 5.3 专利的被引用情况？
- 5.4 如何查找法律状态信息？

汤森路透专利打分 (Patent Scoring)



客观指标:

- **Forward Citation Count**
- Backward Citation Count
- Years to Expiry
- **Age-Weighted Citation**
- Quad Family Protection

半客观指标:

- **Registered as Standards-Essential?**
- Acquired?
- **Advanced Citation Analysis**
- **Subject of Current or Past Litigation**
- Key Term Density

主观指标:

- Claim Scope/Breadth
- Detectability
- Known Prior Art
- Maturity of Technology
- **Commercial Use**
- Incorporated into Standard

Index-Weighting Dashboard

Absolute & Relative Patent Scores delivered into TI

技术分析 – 核心专利

- 参考因素：
 - 发明性专利
 - 专利被引次数（次数，自引，被引）
 - 同族专利（数量，PCT，发达国家申请）
 - 专利分类号数量
 - 专利付费与维持情况
 - 中美欧日四方专利申请数量
 - 法律诉讼多少
 - 关键专利权人或发明人
 - 科学研究关联程度
 - 权利要求和技术内容专家判断

重点技术分析：家族大小

The screenshot displays the Thomson Data Analyzer interface. The main window shows a table with the following data:

	# Records	# Instances	DWPI Count of Family Members
1	1	9	9
2	2	16	8
3	1	7	7
4	4	24	6
5	9	45	5
6	12	48	4
7	20	60	3
8	50	100	2
9	162	162	1

On the right side, there are several panels:

- Assignee/Applicant (Cleaned - No Indiv):** Shows a table with one entry: 1 LG ELECTRONICS INC.
- Application Year:** A bar chart showing data for 2013, 2014, and 2015. The bars for 2013 and 2015 are present, while 2014 is empty.
- Family Member Countries:** A table listing countries: AU, CA, CN, EP, JP, KR, US, WO.
- New Keywords:** A section for entering new keywords.

An orange callout box contains the following text:

将数据导入TDA后，可以看到，最大的DWPI家族是LG集中在2013年和2015年布局在澳大利亚、加拿大、中国、日本、韩国、美国的专利。该家族的专利申请与使用大量天线阵列实现分数波束形成的方法有关。

重点技术分析：家族大小

记录视图: US20130272263A1

添加至工作文件 | 标记记录 | 监控记录 | 下载 | 翻译 | 引证关系图 | 高亮显示 | 打印

完整浏览 跳转至: 著录项目 | 摘要 | 分类/索引 | 法律状态 | **同族专利** | 权利要求 | 说明书 | 引用 | 其他 | 自定义字段

获取同族专利法律状态

美国专利转让 ?

+ 展开 专利转让

同族专利

同族专利 ?

+ 展开 INPADOC 同族专利 (6)

- 折叠 DWPI 同族专利 (5); 国家/地区 (129)

作为检索结果查看

出版物	DWPI 更新	公开日期
US20130272263A1 *	201371	2013-10-17
Local Applications: US2012624841P filed 2012-04-16 US13770590A filed 2013-02-19		
WO2013157785A1 =	201371	2013-10-24
Designated States: (National) AE AG AL AM AO AT AU AZ BA BB BG BH BN BR BW BY BZ CA CH CL CN CO CR CU GM GT HN HR HU ID IL IN IS JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LY MA MD ME MG MK MN MW MX CY RS RU RW SC SD SE SG SK SL SM ST SV SY TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW		
Local Applications: WO2013KR3118A filed 2013-04-15		
KR2013118249A =	201373	2013-10-29

公开号	公开日期	发明人	专利权人/申请人	标题
US20130272263A1	2013-10-17	PI Zhouyue	SAMSUNG ELECTRONICS CO LTD	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS
CN104396151A	2015-03-04	LI Ying	SAMSUNG ELECTRONICS CO LTD	Hierarchical channel sounding and channel state information feedback in massive MIMO systems
EP2839589A1	2015-02-25	PI Zhouyue	SAMSUNG ELECTRONICS CO LTD	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS
EP2839589A4	2015-12-23	PI ZHOUYUE	SAMSUNG ELECTRONICS CO LTD	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS
KR2013118249A	2013-10-29	ZHOUYUE PI	SAMSUNG ELECTRONICS CO LTD	APPARATUS FOR HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION (CSI) FEEDBACK IN A MASSIVE MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SYSTEM AND A METHOD THEREOF
WO2013157785A1	2013-10-24	PI Zhouyue	SAMSUNG ELECTRONICS CO LTD	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS

出版物	DWPI 更新	公开日期	IPC 码	语言
US20130272263A1 *	201371	2013-10-17	H04W007204	English
Local Applications: US2012624841P filed 2012-04-16 US13770590A filed 2013-02-19				
WO2013157785A1 =	201371	2013-10-24	H04B000704	English
Designated States: (National) AE AG AL AM AO AT AU AZ BA BB BG BH BN BR BW BY BZ CA CH CL CN CO CR CU GM GT HN HR HU ID IL IN IS JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LY MA MD ME MG MK MN MW MX CY RS RU RW SC SD SE SG SK SL SM ST SV SY TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW				
Local Applications: WO2013KR3118A filed 2013-04-15				
KR2013118249A =	201373	2013-10-29	H04B000704	Korean
Local Applications: KR201341633A filed 2013-04-16				
EP2839589A1 =	201515	2015-02-25	H04B000704	English
Designated States: (Regional) AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR BA ME				
Local Applications: based on WO2013157785 WO2013KR3118A filed 2013-04-15 EP201377837A filed 2013-04-15				
CN104396151A =	201527	2015-03-04	H04B000704	Chinese
Local Applications: based on WO2013157785 WO2013KR3118A filed 2013-04-15 CN201380031837A filed 2013-04-15				

2 可以在TI中直接查找家族信息

461 条找到的记录, 共 101,796,305 条记录中获取 (显示记录数上限为: 60,000) 422 申请号 0 record(s) selected

正在显示第 1 - 50 条记录, 共 461 条记录 1 2 3 4 5 第 1 页, 共 10 页 转至该页: Go 显示 50 条记录/页

重点技术分析: 施引专利计数

项目	公开号	专利权人/申请人	公开日期	原版 IPC	新版 CPC	施引参考文献数 - 专利
1	US20130272263A1	SAMSUNG ELECTRONICS CO LTD	2013-10-17	H04W 72/04	H04W 72/042	18
	<p>标题: HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS</p> <p>摘要: Time, frequency and spatial processing parameters for communications between a base station and a mobile station are selected by transmitting synchronization signals in multiple slices of a wireless transmission sector for the base station, and receiving feedback from the mobile station of at least one preferred slice of the multiple slices. In response to selection of one of the slices as an active slice for communications between the base station and the mobile station, reference signals are transmitted in the selected active slice using a corresponding selected precoder and/or codebook. The mobile station estimates and feeds back channel state information (CSI) based on those reference signals, and the CSI is then employed to determine communication parameters for communications between the base station and mobile station that are specific to the mobile station</p>					
2	US20130182594A1	SAMSUNG ELECTRONICS CO LTD	2013-07-18	H04W 72/04	H04W 72/042	9
	<p>标题: METHOD AND APPARATUS FOR TRANSMITTING AND RECEIVING REFERENCE SIGNAL</p> <p>摘要: An apparatus and a method for generation of channel state information in a wireless communication system are provided. The method includes transmitting, from an evolved Node B (eNB), a first reference signal to a plurality of User Equipments (UEs), receiving channel state information generated based on the first reference signal from the plurality of UEs, selecting candidate UEs to which wireless resources are to be allocated and transmitting second reference signals to the selected candidate UEs, receiving channel state information generated based on the second reference signals from the candidate UEs, and selecting final UEs, to which wireless resources are to be allocated, from the candidate UEs based on the channel state information generated based on the second reference signals, and transmitting control information for data reception to the selected final UEs</p>					
3	US20130265955A1	SAMSUNG ELECTRONICS CO LTD	2013-10-10	H04W 72/04	H04W 72/04	7
	<p>标题: METHOD AND APPARATUS FOR TRANSMITTING/RECEIVING CHANNELS IN MOBILE COMMUNICATION SYSTEM SUPPORTING MASSIVE MIMO</p> <p>摘要: A channel transmission/reception method and an apparatus for transmitting/receiving channels between a base station and a mobile terminal efficiently in a mobile communication supporting massive Multiple Input Multiple Output (MIMO) transmission are provided. The method includes determining a resource to which Demodulation Reference Signal (DMRS) addressed to a terminal is mapped within a resource block, the DMRS resource being positioned in at least one of a first resource set capable of being allocated for DMRS and a second resource set symmetric with the first resource set on a time axis, and transmitting the DMRS and DMRS allocation information to the terminal</p>					
4	US20130156021A1	ALCATEL LUCENT USA INC	2013-06-20	H04W 92/00	H04W 52/243	7
	<p>标题: Large-Scale Antenna Method And Apparatus Of Wireless Communication With Suppression Of Intercell Interference</p> <p>摘要: Methods are provided for mitigating interference due to pilot contamination in a cellular network in which there is reuse of pilot signals. In embodiments, forward-link signals are precoded, using knowledge of slow-fading coefficients, to mitigate the interference. In embodiments, interference in reverse-link signals destined for a given base station is mitigated by linearly combining reverse-link signals destined for the given base station and for other base stations of the network,</p>					



	# Records	# Instances	Count of Citing
1	1	1	18
2	1	1	9
3	5	5	7
4	1	1	5
5	5	5	3
6	13	13	2
7	26	26	1
8	398	434	0

加入时间综合考虑被引次数

Reset		Count of Citing Patents									
		# Records	1	2	3	4	5	6	7		
Application Year	# Records	<input type="button" value="▼"/> <input type="button" value="▲"/> Show Values ≥ 1 and ≤ 139 Cooccurrence # of Records <input type="button" value="▼"/> <input type="button" value="▲"/>									
			2010	2011	2012	2013	2014	2015	2016		
		1	398	0	1	2	15	10	13	13	3
		2	26	1			3	6	12	5	
		3	13	2		2	2	7	1	1	
		4	5	3			1	2	1	1	
		5	1	5			1				
		6	5	7	1	1	1	2			
		7	1	9					1		
8	1	18					1				



重点技术分析：施引专利计数

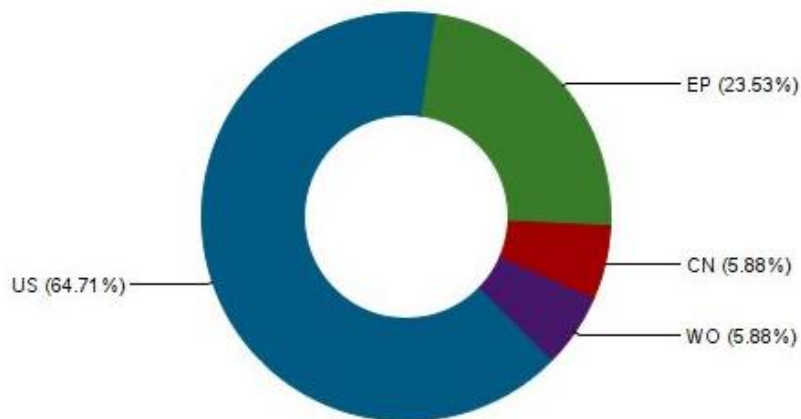
461 条找到的记录, 共 101,796,305 条记录中获取 (显示记录数上限为: 60,000) 422 申请号 0 record(s) selected

项目	公开号	专利权人/申请人	公开日期	现版 IPC	现版 CPC	施引参考文献数 - 专利
1	US20130272263A1	SAMSUNG ELECTRONICS CO LTD	2013-10-17	H04W 72/04	H04W 72/042	18
<p>标题: HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS</p> <p>摘要: Time, frequency and spatial processing parameters for communications between a base station and a mobile station are selected by transmitting synchronization signals in multiple slices of a wireless transmission sector for the base station, and receiving feedback from the mobile station of at least one preferred slice of the multiple slices. In response to selection of one of the slices as an active slice for communications between the base station and the mobile station, reference signals are transmitted in the selected active slice using a corresponding selected precoder and/or codebook. The mobile station estimates and feeds back channel state information (CSI) based on those reference signals, and the CSI is then employed to determine communication parameters for communications between the base station and mobile station that are specific to the mobile station</p>						
2	US20130182594A1	SAMSUNG ELECTRONICS CO LTD	2013-07-18	H04W 72/04	H04W 72/042	9
<p>标题: METHOD AND APPARATUS FOR TRANSMITTING AND RECEIVING REFERENCE SIGNAL</p> <p>摘要: An apparatus and method for transmitting and receiving reference signals in a wireless communication system are provided. The method includes transmitting, by a base station, a first reference signal to a selected user equipment (UE), receiving channel state information generated based on the first reference signal from the UE, determining a second resource to be allocated and transmitting second reference signals to the selected UE based on the second resource, receiving channel state information generated based on the second reference signals from the candidate UEs, and selecting final UEs, to which wireless communication is to be established, based on the channel state information generated based on the second reference signals, and transmitting</p>						
3	US20130156021A1	ALCATEL LUCENT USA INC	2013-06-20	H04W 92/00	H04W 52/243	7
<p>标题: Large-Scale Antenna Method And Apparatus Of Wireless Communication With Suppression Of Intercell Interference</p> <p>摘要: Methods are provided for mitigating interference due to pilot contamination in a cellular network in which there is reuse of pilot signals. In embodiments, forward-link signals are precoded, using knowledge of slow-fading coefficients, to mitigate the interference. In embodiments, interference in reverse-link signals destined for a given base station is mitigated by linearly combining reverse-link signals destined for the given base station and for other base stations of the network,</p>						

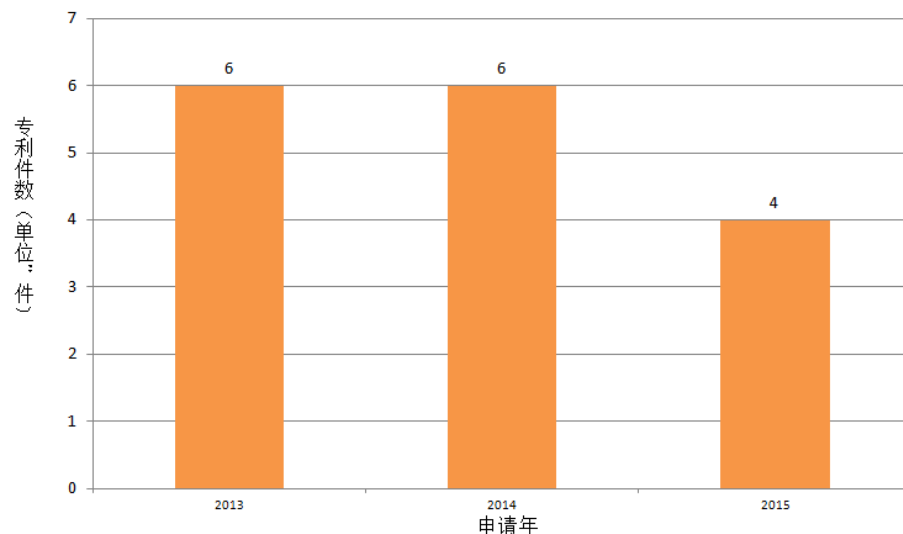
以三星2013年公开的发明专利为例，发明名称：《在大型MIMO系统中的分级信道探测和信道状态信息反馈》

施引专利的国家/地区及年代分布

施引专利的国家或地区分布（优先权国）



施引专利的年代分布



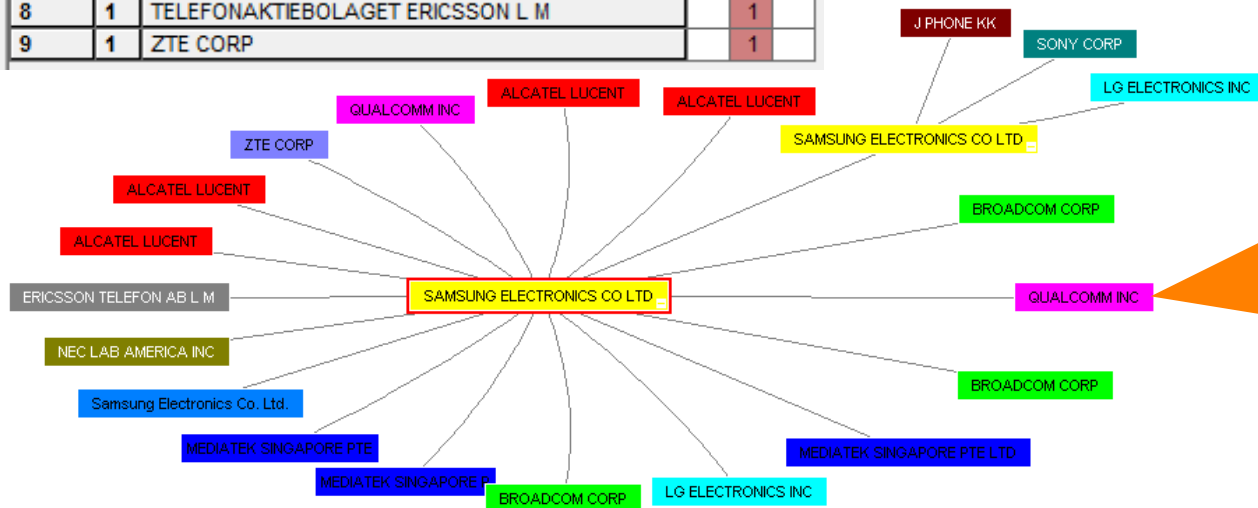
通过施引的专利文献可以看到，三星2013年公开的这件发明专利，在公开当年度就被6件专利引用。这些施引专利从优先权国家来看，主要来自美国，占到全部施引专利的64.71%。

关注该件专利的企业及其关注度情况

关注该件专利的企业

Reset	Assignee/Applicant (Best Available)	1	2	3	
	# Records	6	6	4	
Application Year	▼ ▲				
	Show Values >= 1 and <= 2				
	Cooccurrence # of Records				
	▼ ▲	2013	2014	2015	
1	4	ALCATEL LUCENT	2	2	
2	2	BANK OF AMERICA N.A. AS COLLATERAL AGENT	2		
3	2	MEDIATEK SINGAPORE PTE. LTD.			2
4	2	QUALCOMM INC		1	1
5	2	SAMSUNG ELECTRONICS CO. LTD	2		
6	1	LG ELECTRONICS INC.			1
7	1	NEC LAB AMERICA INC		1	
8	1	TELEFONAKTIEBOLAGET ERICSSON L M		1	
9	1	ZTE CORP		1	

通过施引的专利文献可以看到，三星2013年公开的这件发明专利，在公开当年度就被6件专利引用，除了三星自己有两件专利引用该专利外，其他引用主要来自阿尔卡特朗讯（2件）和美国银行家协会（2件）。而2014年关注三星这件专利的除了阿尔卡特朗讯外，还有高通、NEC、爱立信和中兴。



通过与施引专利生成的2代引证关系图可以看到，三星在这件专利基础上，在2013年又申请的两件专利之后受到了来自LG和SONY的关注。

查看法律状态

US20130272263A1 同族专利法律状态报告

- 找到 6 个结果

跳转	出版物	标题	申请	申请号
状态	US20130272263A1	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS	2013-02-19	US13770590A
状态	EP2839589A4	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS	2013-04-15	EP2013778377A
状态	WO2013157785A1	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS	2013-04-15	WO2013KR3118A
状态	CN104396151A	Hierarchical channel sounding and channel state information feedback in massive MIMO systems	2013-04-15	CN201380031837A
	KR2013118249A	APPARATUS FOR HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION (CSI) FEEDBACK IN A MASSIVE MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SYSTEM AND A METHOD THEREOF, CAPABLE OF REDUCING OVERHEAD OF THE CSI FEEDBACK	2013-04-16	KR201341633A
状态	EP2839589A1	HIERARCHICAL CHANNEL SOUNDING AND CHANNEL STATE INFORMATION FEEDBACK IN MASSIVE MIMO SYSTEMS	2013-04-15	EP2013778377A

显示的代码: [全部](#) [有利](#) [不利](#)

有利行为以绿色显示, 不利行为以红色显示, 中性行为以黑色显示

US20130272263A1:	公报日期	代码	描述 (评论) 列举所有可能的代码 US
	2013-02-19	AS	ASSIGNMENT (ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNORS:PI, ZHOUYUE;LI, YING;JOSIAM, KAUSHIK;SIGNING DATES FROM 20130212 TO 20130213;REEL/FRAME:029832/0762) (新所有者: SAMSUNG ELECTRONICS CO., LTD, KOREA, REPUBLIC OF)

EP2839589A4:	公报日期	代码	描述 (评论) 列举所有可能的代码 EP
	2015-12-23	RA4 +	DATE AND KIND OF SUPPLEMENTARY S
	2015-12-23	RIC1	CLASSIFICATION (CORRECTION)
	2015-12-23	RIC1	CLASSIFICATION (CORRECTION)
	2015-07-22	DAX -	REQUEST FOR EXTENSION OF THE EUROPEAN PATENT (TO ANY COUNTRY) DELETED
	2015-02-25	AK +	DESIGNATED CONTRACTING STATES: (AL;AT;BE;BG;CH;CY;CZ;DE;DK;EE;ES;FI;FR;GB;GR;HR;HU;IE;IS;IT;LI;LT;LU;LV;MC;MK;MT;NL;NO;PL;PT;RO;RS;SE;SI;SK;SM;TR) (EP2839589)
	2015-02-25	17P +	REQUEST FOR EXAMINATION FILED (2014-10-16)
	2015-02-25	AX +	REQUEST FOR EXTENSION OF THE EUROPEAN PATENT TO

2013年2月从个人转让到了三星

WO2013157785A1:	公报日期	代码	描述 (评论) 列举所有可能的代码 WO
	2014-10-16	NENP DE	NON-ENTRY INTO THE NATIONAL PHASE IN: (DE)
	2013-12-11	121	EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS DESIGNATED IN THIS APPLICATION (EP13778377)

重点技术分析：查看法律状态

		Patent Vital Signs																								
#	Records #Instances	Number	Kind Code	Date	DWPI Accession Number	Legal Status (most recent +/-)	Legal Status (Year of most recent)	Years Remaining (Priority Year)	Years Remaining (Publication)	APPLICATIONS	GRANTS	UTILITIES	Grant - probably active with positive	Grant - probably active no +/- LLS	Grant - probably active with negative	Grant - probably expired (20 years)	App - probably active with positive	App - probably active no +/- LLS	App - probably active with negative	App - probably expired (10 years)						
1	1	WO2016075847A1	A1	2016-05-19					10																	
2	1	CN105519060A	A	2016-04-20		+	2016		10																	
3	1	CN105553526A	A	2016-05-04		+	2016		10																	
4	1	CN105553614A	A	2016-05-04		+	2016		10																	
5	1	WO2016075537A1	A1	2016-05-19					10																	
6	1	EP2798748A4	A4	2015-10-14		+	2015		9																	
7	1	EP2819313A4	A4	2015-12-02		+	2015		9																	
8	1	EP2839589A4	A4	2015-12-23		+	2015		9																	
9	1	EP3022850A1	A1	2016-05-25					10																	
10	1	US9351268B2	B2	2016-05-24				18																		
11	1	US9351156B2	B2	2016-05-24				17																		
12	1	KR2016056285A	A	2016-05-19					10																	
13	1	KR2016056286A	A	2016-05-19					10																	
14	1	US20160134438A1	A1	2016-05-12					10																	
15	1	US20160134323A1	A1	2016-05-12					10																	
16	1	CN105554780A	A	2016-05-04	2016-28673H	+	2016		10																	
17	1	WO2016066098A1	A1	2016-05-06	2016-27538M				10																	
18	1	CN105553527A	A	2016-05-04	2016-27538M	+	2016		10																	
19	1	WO2016066231A1	A1	2016-05-06	2016-27536V				10																	
20	1	CN105510872A	A	2016-04-20	2016-27425U	+	2016		10																	
21	1	WO2016065557A1	A1	2016-05-06	2016-273667				10																	
22	1	CN105515627A	A	2016-04-20	2016-25823Q	+	2016		10																	
23	1	WO2016064901A1	A1	2016-04-28	2016-24908A				10																	
24	1	WO2016056805A1	A1	2016-04-14	2016-22664H				10																	

颜色含义

- 绿色: 极大可能是正向的结果. 可以认为是“极其可能是健康”
- 蓝色: 可能是健康, 因为专利还未到期
- 橙色/黄色: 需要进一步核实, 既然存在负面的法律状态信息
- 红色: 极可能到期

通过什么判定专利健康度?

分割并筛选出kind code

查找 INPADOC 法律状态信息

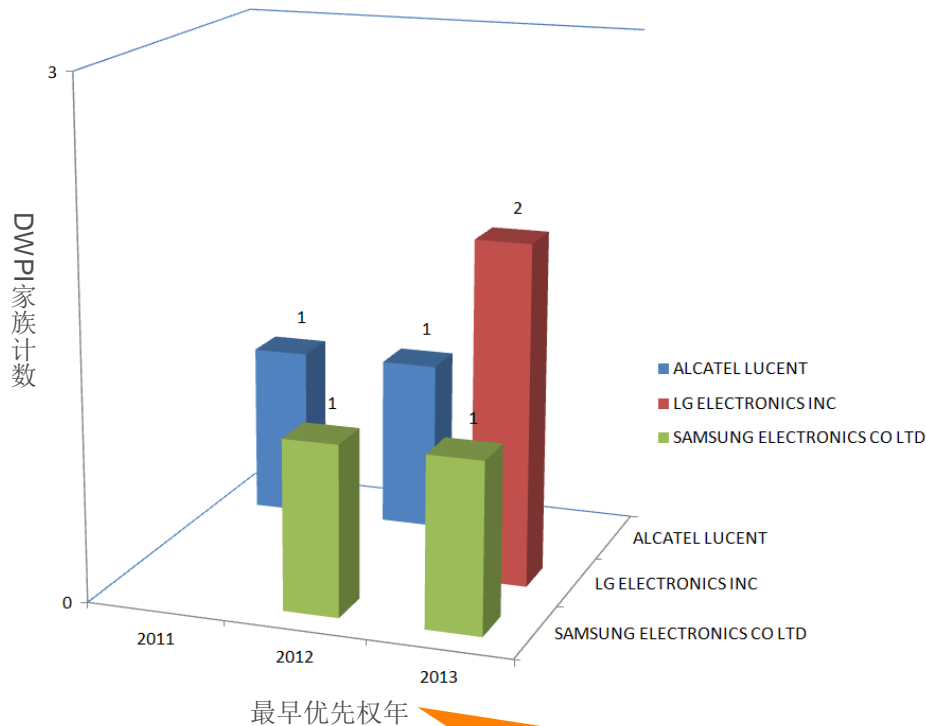
- 正面(+)或负面(-)?
- 法律事件发生的时间点? (授权时间点, 申请日时间点)

准确计算剩余生命周期

- 授权: 优先权年 + 20
- 申请: 公开年 + 10

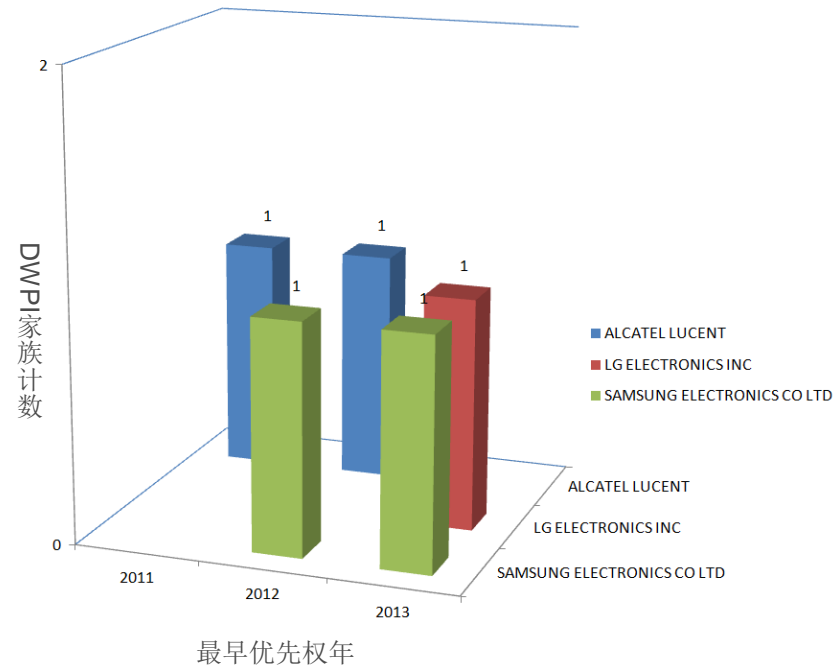
领域中的三方或四方专利

拥有三方专利的企业



从最早优先权年来看，三星2012年和2013年均有1项专利技术在美日欧三个国家或地区布局过专利；LG在2013年布局过2项专利技术；阿尔卡特朗讯在2011年和2012年均布局过1项专利技术

拥有四方专利的企业



从最早优先权年来看，三星2012年和2013年均有1项专利技术在中美日欧四个国家或地区布局过专利；LG在2013年布局过1项专利技术；阿尔卡特朗讯在2011年和2012年均布局过1项专利技术

大纲

1. 总体态势分析
2. 重点国家分析
3. 重要厂商分析
4. 具体技术分析
5. 核心专利分析



分析专利



分析论文

Massive MIMO领域基于科技论文的分析

宏观层面：论文与专利的发文趋势对比、高发文国家、高发文机构等
微观层面：以东南大学为例，分析其与教育科研机构/企业的合作关系

在SCI和CPCI-S中检索Massive MIMO

The screenshot shows the Web of Science search results page. The search criteria are: `ts=("Massive MIMO" or "Massive Multi-input Multi-output" or "large scale mimo" or "large scale Multi-input Multi-output" or "Large Scale Antenna System")`. The results are sorted by citation frequency (descending). The first result is "Massive MIMO in the UL/DL of Cellular Networks: How Many Antennas Do We Need?" by Hoydis, Jakob; ten Brink, Stephan; Debbah, Merouane, published in IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, volume 31, issue 2, pages 160-171, February 2013. The second result is "Massive MIMO for Next Generation Wireless Systems" by Boccardi, Federico; Heath, Robert W., Jr.; Lozano, Angel; et al., published in IEEE COMMUNICATIONS MAGAZINE, volume 52, issue 2, pages 74-80, February 2014.

检索结果: 757
(来自 Web of Science 核心合集)

您的检索: `ts=("Massive MIMO" or "Massive Multi-input Multi-output" or "large scale mimo" or "large scale Multi-input Multi-output" or "Large Scale Antenna System")` ...更多内容

创建跟踪服务

精炼检索结果

在如下结果集内检索

Web of Science 类别

- ENGINEERING ELECTRONIC (49)
- TELECOMMUNICATIONS (39)
- COMPUTER SCIENCE INFORMATION SYSTEMS (39)
- TRANSPORTATION TECHNOLOGY (5)
- COMPUTER SCIENCE METHODS (39)

更多选项/分类...

排序方式: 被引频次 (降序)

第 1 页, 共 76 页

选择页面 | 保存为其他文件格式 | 添加到标记结果列表

1. **Massive MIMO in the UL/DL of Cellular Networks: How Many Antennas Do We Need?**
作者: Hoydis, Jakob; ten Brink, Stephan; Debbah, Merouane
IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS 卷: 31 期: 2 页: 160-171 出版年: FEB 2013

被引频次: 268
(来自 Web of Science 的核心合集)

高被引论文

使用次数

2. **Massive MIMO for Next Generation Wireless Systems**
作者: Boccardi, Federico; Heath, Robert W., Jr.; Lozano, Angel; 等.
IEEE COMMUNICATIONS MAGAZINE 卷: 52 期: 2 页: 74-80 出版年: FEB 2014

被引频次: 242
(来自 Web of Science 的核心合集)

高被引论文

使用次数

被引频次: 178
(来自 Web of Science 的核心合集)

热点论文

高被引论文

使用次数

被引频次: 151
(来自 Web of Science 的核心合集)

高被引论文

使用次数

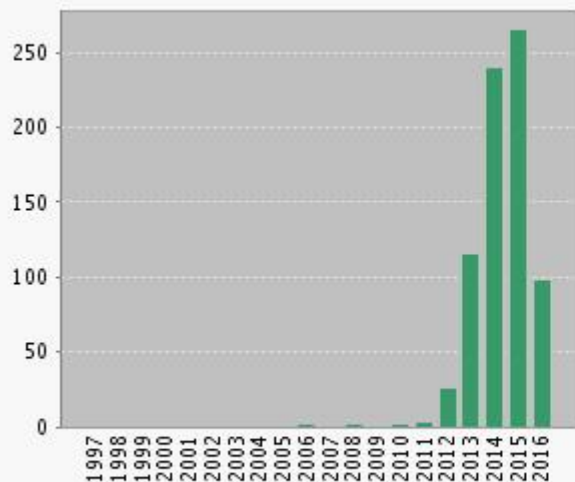
- 来源库: SCI+CPCI-S
- 主题检索: “Massive MIMO” or “Massive Multi-input Multi-output” or “large scale mimo” or “large scale Multi-input Multi-output” or “Large Scale Antenna System”
- 检索结果: 757, 其中, ESI高被引文章25篇, ESI热点文章1篇。

Massive MIMO是比较新并且受到较大关注的课题

字段: 文献类型	记录数	占 757 的 %
ARTICLE	396	52.312 %
PROCEEDINGS PAPER	351	46.367 %
EDITORIAL MATERIAL	7	0.925 %
REVIEW	3	0.396 %
CORRECTION	1	0.132 %

从文献类型、发表文章的时间都可以印证Massive MIMO是较新出现的一项研究，而且成果发表之后，迅速被关注。

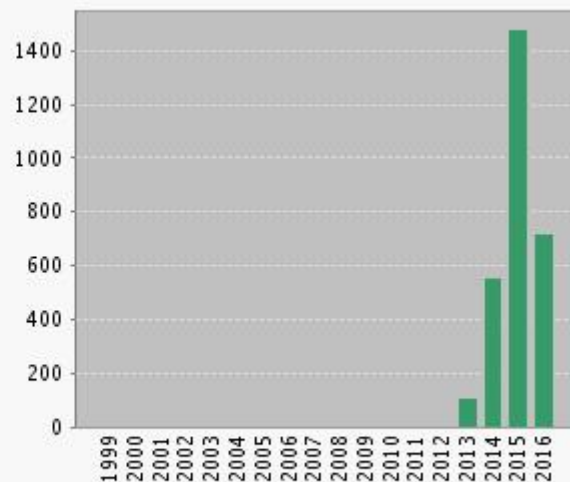
每年出版的文献数



显示最近 20 年。

[查看所有年份的图表。](#)

每年的引文数

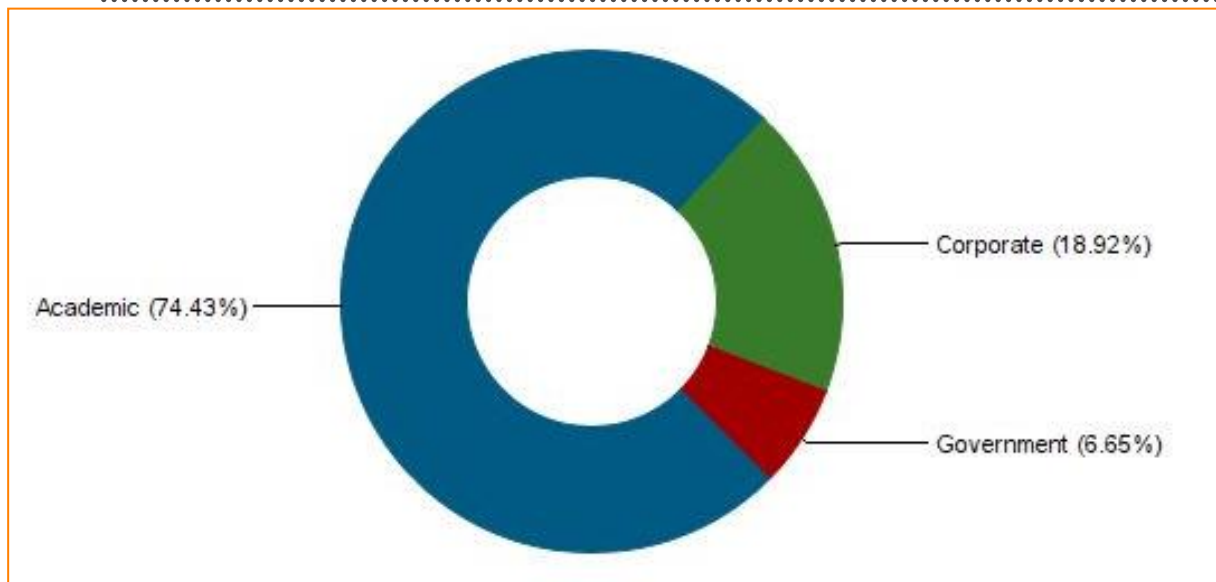


显示最近 20 年。

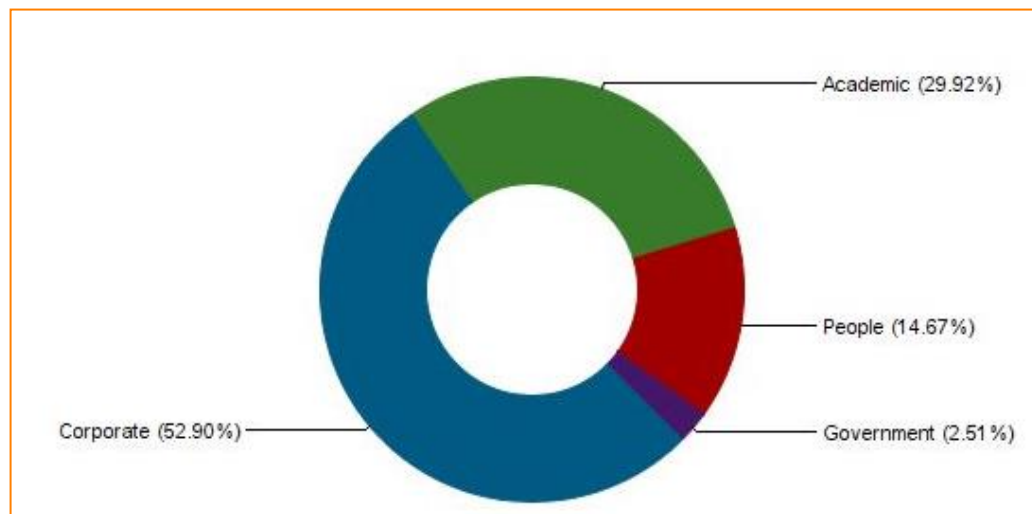
Massive MIMO领域专利与科技论文发展趋势对比



科技论文的发文主体



专利的申请主体



高发文国家/地区（发文量≥5篇）及其活跃度

Reset		Countries	1	2	3	4	5	6	7	8	9	10	11	12
		# Records	1	1	1	2	2	2	3	26	11	24	26	98
Publication Year	# Records	▼ ▲												
		Show Values >= 1 and <= 126												
		Cooccurrence	1992	2001	2005	2006	2008	2010	2011	2012	2013	2014	2015	2016
1	302	China						1	2	5	32	86	12	50
2	165	USA	1					1	3	7	32	60	40	21
3	93	UK									6	25	49	13
4	76	Sweden								2	9	26	32	7
5	67	South Korea								4	9	20	26	8
6	48	France					1			1	9	19	12	6
7	42	Canada			1					1	6	13	12	9
8	41	Germany					1			1	7	17	12	3
9	28	Taiwan				2				3	3	5	8	7
10	24	Japan						1		2	7	4	7	3
11	23	Singapore								1	1	5	15	1
12	17	India									2	8	5	2
13	13	Australia									1	3	7	2
14	13	Finland									2	5	4	2
15	13	Saudi Arabia									2	6	4	1
16	11	Spain		1						1		4	5	
17	9	Italy									1	2	4	2
18	7	Pakistan									1	2	4	
19	6	Greece										3	3	
20	6	New Zealand										2	4	
21	5	Ireland										2	2	1
22	5	Norway										2	2	1

中国、美国、英国、瑞典、韩国是科技论文量最大的前5个国家。其中，中国近3年的发文量明显增多并超过位列第二位的美国

高发文教育/科研机构（发文量≥10篇）

Reset	Author Affiliations (Organization Only)	1	2	3	4	5	6	7
	# Records	1	2	26	11	24	26	98
Publication Year	▼ ▲ Show Values >= 1 and <= 27							
	Cooccurrence # of Records	1992	2010	2012	2013	2014	2015	2016
1	69 Southeast Univ		1		9	19	27	13
2	50 Tsinghua Univ				6	12	25	7
3	30 Beijing Univ Posts & Telecommun				3	10	12	5
4	26 Linkoping Univ			1	4	7	8	6
5	25 UCL				3	7	12	3
6	22 Chalmers				1	9	12	
7	20 Hong Kong Univ Sci & Technol			1	1	7	8	3
8	18 CentraleSupélec				3	7	6	2
9	18 Purdue Univ				5	7	4	2
10	18 Queens Univ Belfast					6	11	1
11	15 Korea Adv Inst Sci & Technol			1	4	6	3	1
12	14 Nanjing Univ Posts & Telecommun				1	6	7	
13	13 Lund Univ			1	3	4	5	
14	13 Univ Edinburgh				3	7	3	
15	12 KTH Royal Inst Technol				1	6	5	
16	12 Univ So Calif			1	1	7	2	1
17	12 Zhejiang Univ				3	3	5	1
18	11 Nanjing Univ Aeronaut & Astronaut				1	3	6	1
19	11 Yonsei Univ			1	1	2	6	1
20	10 Beijing Jiaotong Univ					2	5	3
21	10 China Mobile Res Inst				1	5	3	1
22	10 Singapore Univ Technol & Design					2	8	
23	10 Univ Calif Irvine	1			1	6	1	1
24	10 Univ Elect Sci & Technol China			1	2	1	4	2
25	10 Univ Southampton					2	6	2

Linkoping Univ (瑞典林雪平大学)
UCL (伦敦大学学院)
Chalmers (瑞典查尔姆斯理工大学)
Hong Kong Univ Sci & Technol (香港科技大学)
Purdue Univ (美国普渡大学)
Queens Univ Belfast (英国贝尔法斯特女王大学)
Korea Adv Inst Sci & Technol (韩国科学技术院)

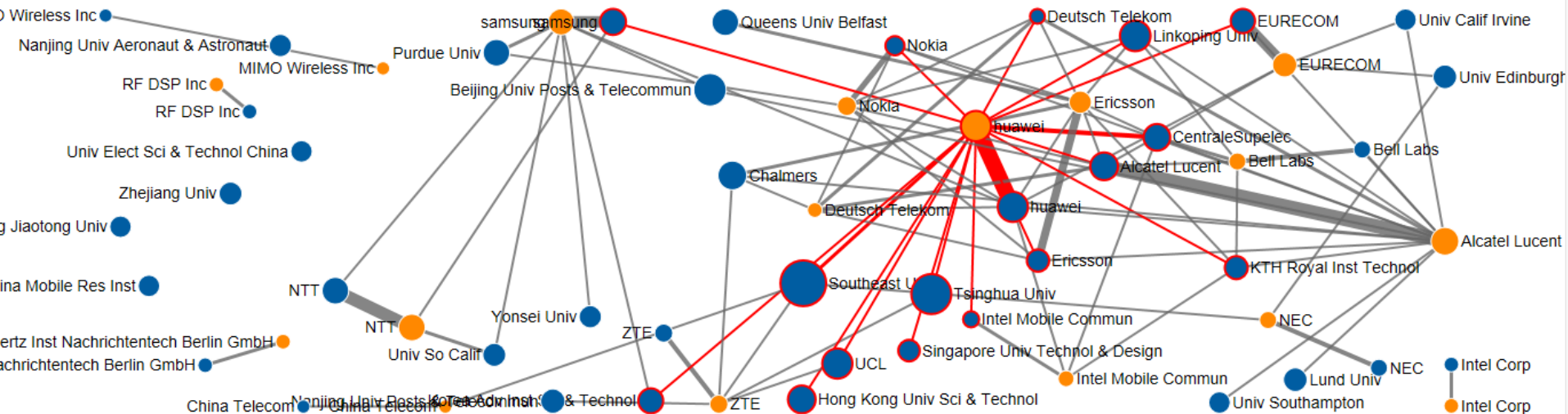
在教育/科研机构中，东南大学发文量最高，且2013年至今一直非常活跃。此外，其他机构还有清华大学、北京邮电大学、瑞典林雪平大学、伦敦大学学院等。

高发文企业（发文量≥2篇）

Reset		Author Affiliations (Organization Only)	1	2	3	4	5	6
		# Records	3	26	116	24	26	98
Publication Year	# Records	▼ ▲						
		Show Values >= 1 and <= 12						
		Cooccurrence						
		▼ ▲	2011	2012	2013	2014	2015	2016
1	25	huawei				8	12	5
2	20	Alcatel Lucent			5	8	6	1
3	18	NTT		3	3	6	4	2
4	17	samsung		3	3	4	7	
5	14	EURECOM			3	9	1	1
6	11	Ericsson				4	7	
7	7	Nokia				2	3	2
8	6	ZTE			2	1	3	
9	5	Bell Labs			2	1	2	
10	5	NEC	1			2		2
11	4	Intel Mobile Commun			2	1	1	
12	3	Deutsch Telekom				1	2	
13	3	Heinrich Hertz Inst Nachrichtentech Berlin			1	2		
14	3	Intel Corp			1	1	1	
15	3	RF DSP Inc					3	
16	2	China Telecom					2	
17	2	MIMO Wireless Inc			2			

在企业中，华为的发文量位居首位，2014年至今共发表25篇文章。此外，发文量较大且较活跃的企业有阿尔卡特朗讯、NTT、三星、EURECOM（法国在信息和通信技术(ICT)领域领先的工程师学校及研究中心）、爱立信等。

企业与教育/科研机构的合作情况



基于massive MIMO领域中的科技论文来看，几乎所有的高发文企业（发文量 ≥ 2 篇）都存在与其他机构的合作。比如华为与（法国）高等电力学院、东南大学、阿尔卡特朗讯、爱立信、（瑞典）林雪平大学、德国电信股份公司、清华大学、伦敦大学学院、EURECOM（法国在信息和通信技术(ICT)领域领先的工程师学校及研究中心）等50多家机构存在合作。

中美高发文机构及其活跃度分析（包括合作机构）

中国高发文机构（发文量≥5篇，包括合作机构）

美国高发文机构（发文量≥5篇，包括合作机构）

Reset	Author Affiliations (Organization Only)	1	2	3	4	5	6	7
	# Records	1	2	5	32	86	12	50
	Show Values >= 1 and <= 26							
	Cooccurrence # of Records							
Publication Year	# Records	2010	2011	2012	2013	2014	2015	2016
1	68	Southeast Univ	1		9	19	26	13
2	50	Tsinghua Univ			6	12	25	7
3	30	Beijing Univ Posts & Telecommun			3	10	12	5
4	19	Hong Kong Univ Sci & Technol		1	1	7	7	3
5	14	Nanjing Univ Posts & Telecommun			1	6	7	
6	12	UCL			2	4	4	2
7	12	Zhejiang Univ			3	3	5	1
8	11	Nanjing Univ Aeronaut & Astronaut			1	3	6	1
9	10	Beijing Jiaotong Univ				2	5	3
10	10	Univ Elect Sci & Technol China		1	2	1	4	2
11	8	China Mobile Res Inst				4	3	1
12	8	Queens Univ Belfast				1	6	1
13	8	Singapore Univ Technol & Design				2	6	
14	7	Chalmers			1	1	5	
15	7	Columbia Univ	1	1		2	1	2
16	7	Huazhong Univ Sci & Technol			2	2	2	1
17	7	Shanghai Jiao Tong Univ				2	4	1
18	7	Univ Southampton				1	4	2
19	6	Natl Sun Yat Sen Univ			1	1	2	2
20	6	Peking Univ			2	1	3	
21	6	Shandong Univ				2	2	2
22	5	Beihang Univ			1	1	3	
23	5	Heriot Watt Univ				3	1	1
24	5	Huawei Technol Co Ltd				3	2	
25	5	PLA Univ Sci & Technol				1	4	

Reset	Author Affiliations (Organization Only)	1	2	3	4	5	6	7	8
	# Records	1	1	3	7	32	60	40	21
	Show Values >= 1 and <= 7								
	Cooccurrence # of Records								
Publication Year	# Records	1992	2010	2011	2012	2013	2014	2015	2016
1	18	Purdue Univ				5	7	4	2
2	12	Univ So Calif			1	1	7	2	1
3	11	Southeast Univ		1			1	4	5
4	10	Univ Calif Irvine	1			1	6	1	1
5	9	Alcatel Lucent				3	5	1	
6	8	Rice Univ			1	3	3	1	
7	8	Univ Texas Austin				1	3	3	1
8	7	Columbia Univ		1	1		2	1	2
9	7	Stanford Univ				2	1	3	1
10	6	Univ Kansas			1	2	1	2	
11	5	Samsung Elect Co Ltd			1		1	3	
12	5	Univ Calif Riverside					1	4	
13	5	Univ Wisconsin				2	3		

从科技文献看中美研究差异

Reset		Keywords (author's) (Cleaned)	1	2
		# Records	302	165
		Show Values ≥ 1 and ≤ 145		
		Cooccurrence # of Records		
			5	5
1	343	massive MIMO/large-scale MIMO/massive	145	78
2	63	channel estimation	28	15
3	51	pilot contamination	24	13
4	30	energy efficiency	12	6
5	25	precoding	9	6
6	24	beamforming	5	13
7	19	MIMO	5	9
8	16	5G	8	1
9	16	Compressive sensing	7	
10	15	spectral efficiency	5	4
11	12	small cells	3	4
12	11	linear precoding	3	1
13	11	MIMO systems	1	1
14	11	multiuser MIMO	1	1
15	11	Zero-forcing	1	4
16	10	Antenna selection	4	1
17	10	Multi-User MIMO	2	3
18	10	power allocation	4	
	9	MMSE		5

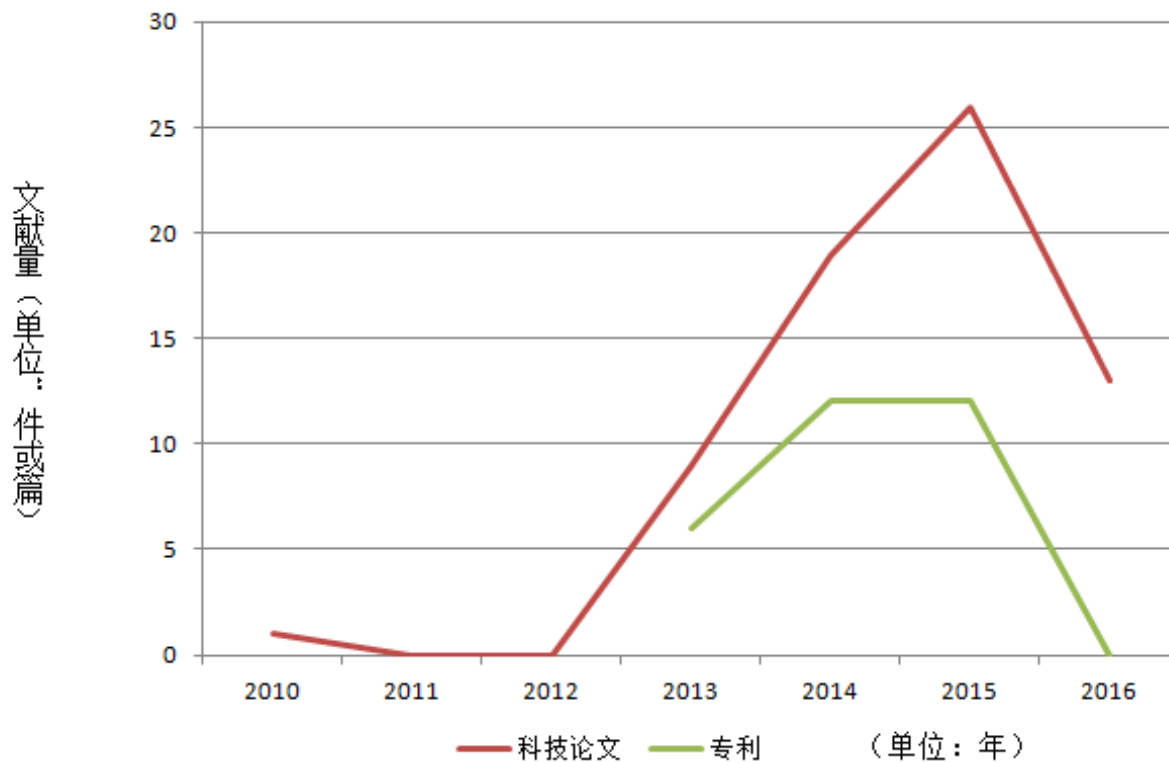
从文章数量来看，中国在 massive MIMO、信道估测、导频污染、能效和5G等发文量较大；而美国在波束形成（beamforming）领域发文量明显超过中国

Massive MIMO领域基于科技论文的分析

宏观层面：论文与专利的发文趋势对比、高发文国家、高发文机构等

微观层面：以东南大学为例，分析其与教育科研机构/企业的合作关系

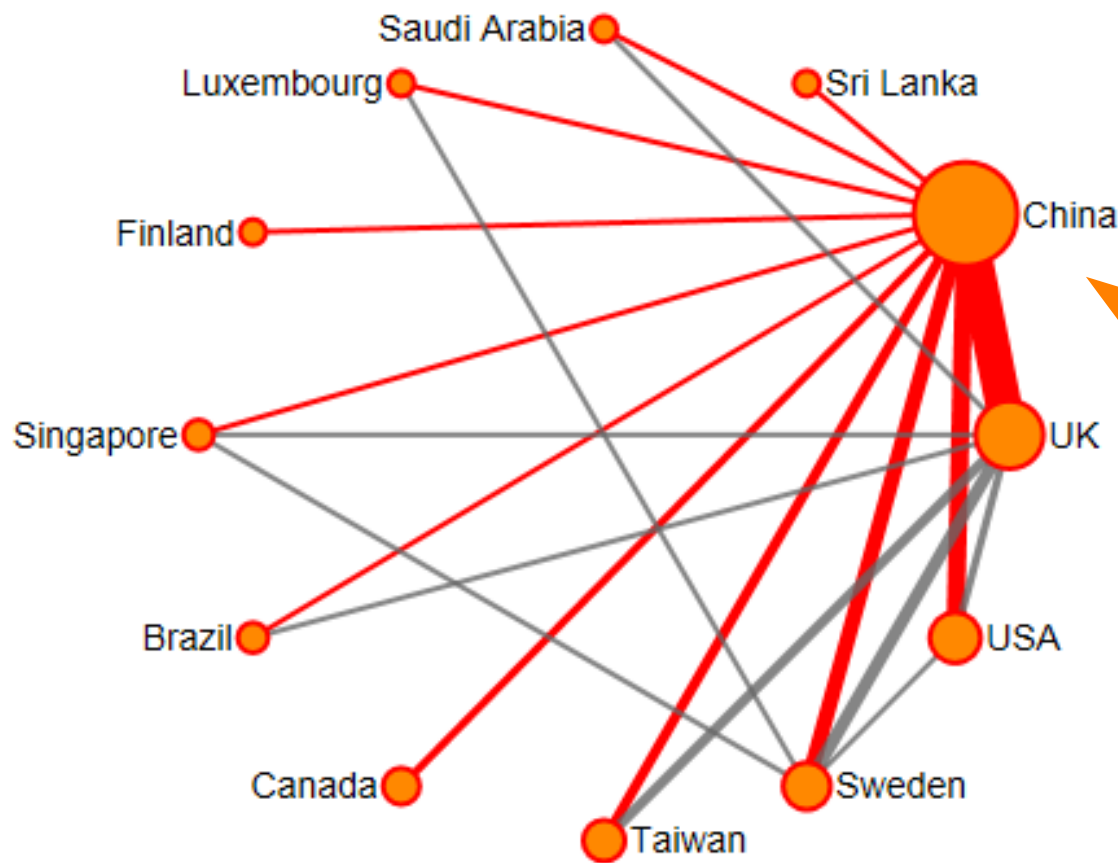
东南大学科技论文和专利文献的年代分布



东南大学对massive MIMO领域的研究，最早于2010年发表在科技论文上，之后在2013年才有第一件专利提交申请。

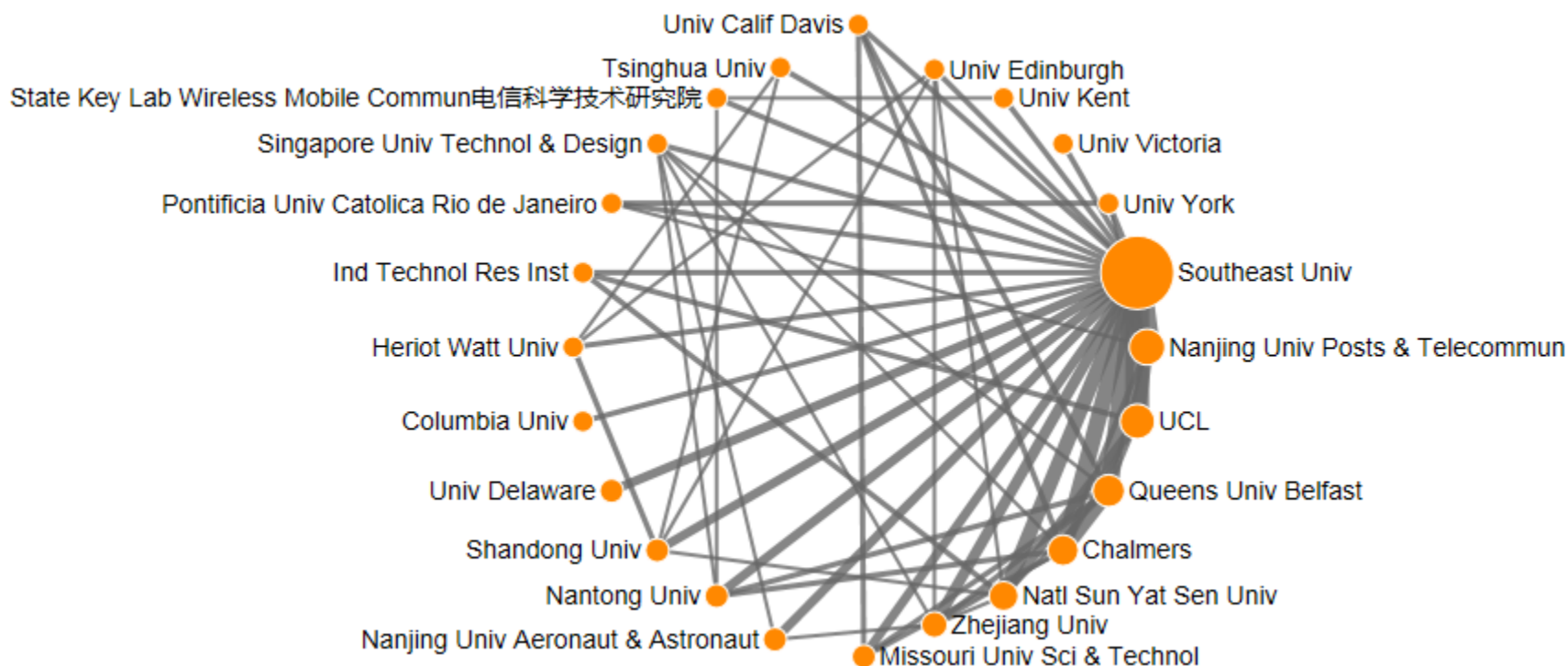
专利用的申请年
科技论文用的出版年

从国家层面看东南大学的科研合作



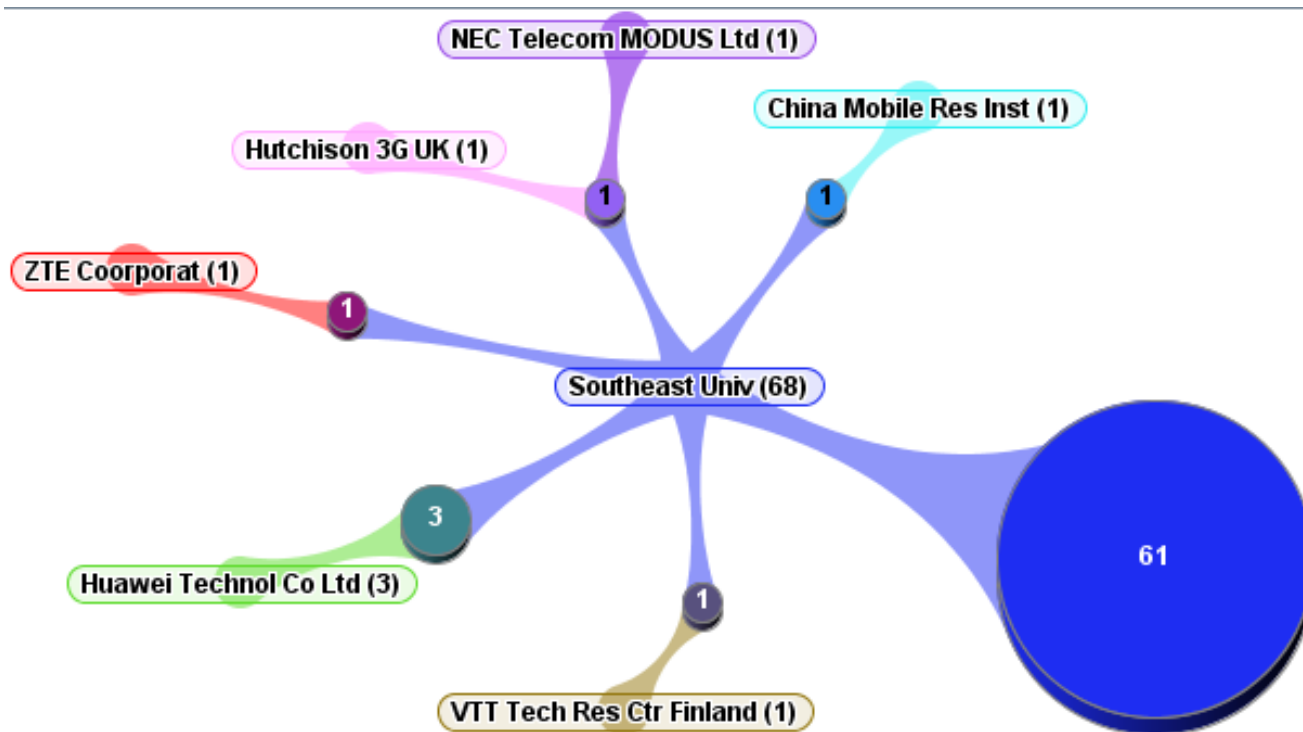
和东南大学合作最多的是英国，共同合作发表24篇文章。其他国家或地区还有美国（11篇）、瑞典（9篇）、中国台湾地区（6篇）、加拿大（4篇）等。

从大学/科研院所层面看东南大学的科研合作



东南大学发表的68篇文章中，有52篇存在跨机构之间的合作，其中与大学或科研院所的合作共计51篇，与企业的合作共计7篇。与大学政府的合作主要来自南京邮电大学（11篇）、英国伦敦大学学院（10篇）、英国贝尔法斯特女王大学（8篇）、瑞典查尔姆斯理工大学（7篇）、国立中山大学（6篇）等。

从企业层面看东南大学的科研合作



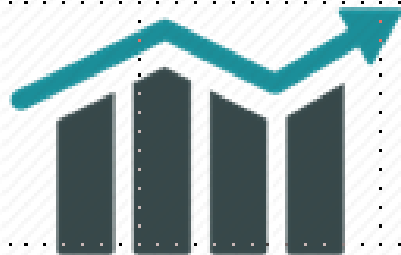
东南大学合作的企业共有6家：华为（3篇）、中国移动研究院（1篇）、英国第四大电信商Hutchison 3G UK（1篇）、NEC(1篇)、芬兰国家技术研究中心有限公司（1篇）和中兴（1篇）



分析专利



分析论文



发文量及发文趋势

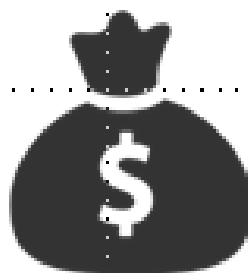


国家

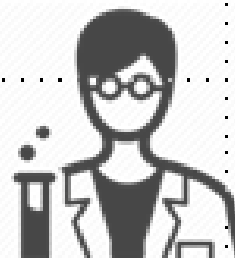


机构

Research
Areas



基金资助情况

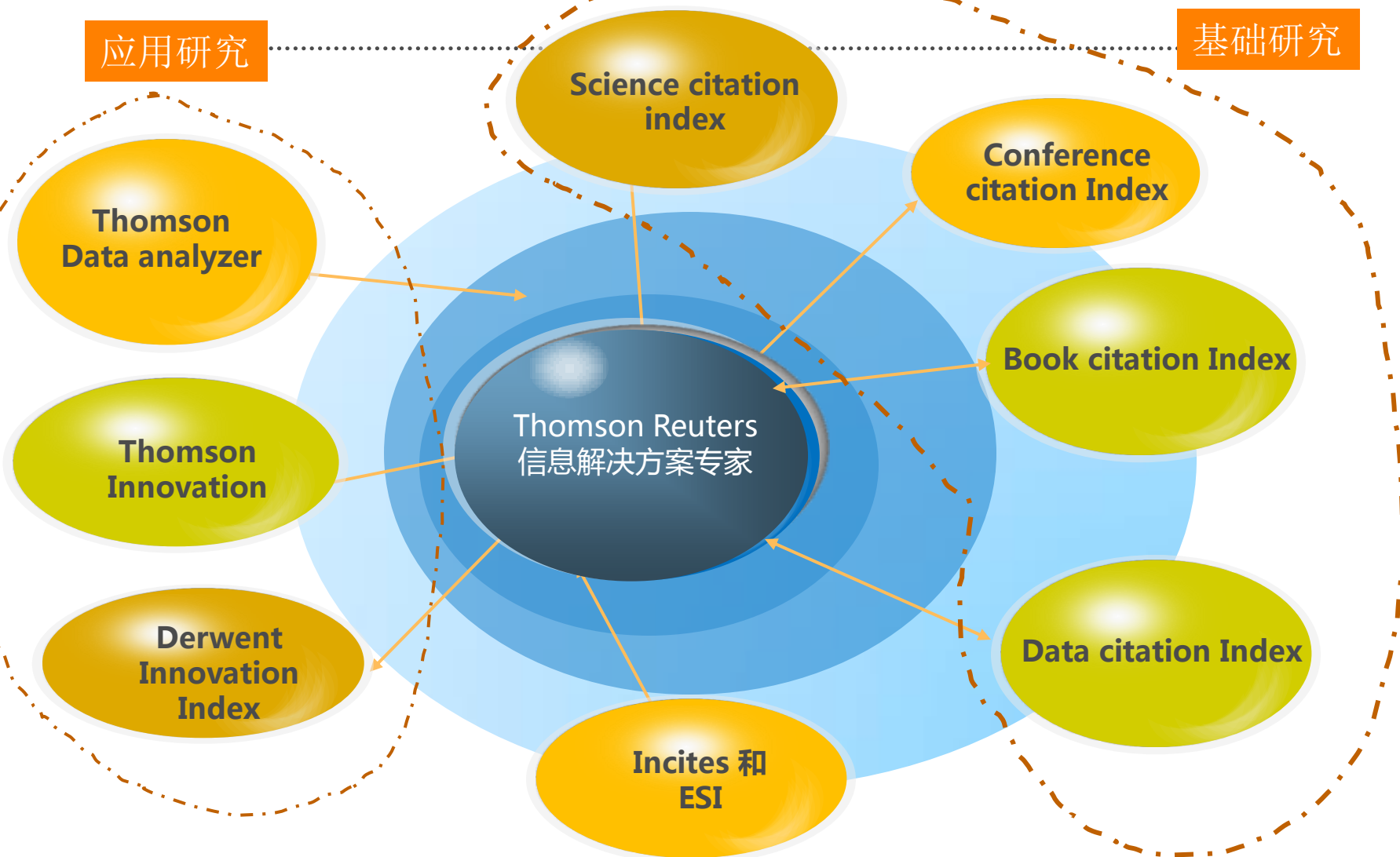



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