



New connection on: : 10-09-2020 : 21:47:56 - Last disconnection on: : 10-09-2020 : 15:12:51

V 4.0.0.44803(LP,U,linux) (Rev:43856 2017-04-27 09:03:29 +0200#(D201820)) (RPM D201820)

Welcome to EPOQUE Rebuild under the Production Environment

[EPODOC: SS 31] beamforming and (wireless w transceiver) and performance and similar+ and (direction+ w beam+)

Results in EPODOC 0

[SS 32] beamforming and (wireless w transceiver)

Results in EPODOC 21

[SS 33] ..li



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PN - [US10567134](#) B1 20200218
PR - US201715462903 20170319; US201762460066P 20170216
AP - US201715462903 20170319
DT - *; Rep
CT - || STSE (B1)
[US7555053](#) B2 20090630 [] (TRACHEWSKY JASON A [US], et al);
[US8421676](#) B2 20130416 [] (MOSHFEGHI MEHRAN [US]);
[US8428168](#) B1 20130423 [] (ZHANG HONGYUAN [US], et al);
[US2009278742](#) A1 20091112 [] (MEHTA NEELESH B [IN], et al);
[US2012314649](#) A1 20121213 [] (FORENZA ANTONIO [US], et al);
[US2014093005](#) A1 20140403 [] (XIA PENGFEI [US], et al);
[US2015085944](#) A1 20150326 [] (MOBASHER AMIN [US], et al);
[US2016277132](#) A1 20160922 [] (PRATT THOMAS G [US], et al);
[US2016380729](#) A1 20161229 [] (PORAT RON [US], et al);
[US2018167252](#) A1 20180614 [] (WANG RENQIU [US], et al);
[US2018213382](#) A1 20180726 [] (TABET TARIK [US], et al);
[US2019089504](#) A1 20190321 [] (HWANG SEUNGGYE [KR], et al)
CCI - [H04B7/0602](#) ; [H04B7/0617](#) ; [H04L5/0023](#)
CCA - [H04B7/0452](#) ; [H04W84/12](#)
CI - H04B7/0417 (US)
- H04B7/0486 (US)
- H04B7/0602 (EP)
- H04B7/0617 (EP, US)
- H04B7/0695 (US)
- H04L5/0023 (EP, US)
- H04L5/0051 (US)
- H04W72/085 (US)
CA - H04B7/0452 (EP)
- H04W84/12 (EP, US)
PA - QUANTENNA COMMUNICATIONS INC [US]

- TI - WiFi antenna selection with **beamforming**
- AB - A **wireless transceiver** for wireless communications on a selected orthogonal frequency division multiplexed (OFDM) communication channel of a wireless local area network (WLAN). The transceiver includes: a number of antennas, a plurality of components, and a beamform antenna selection circuit. The plurality of components are coupled to one another to form receive chains and transmit chains lesser in number than the number of antennas, and switchably coupled to the antennas for multiple-input multiple-output (MIMO) wireless communications on the OFDM tones of the selected communication channel. The beamform antenna selection circuit couples to the plurality of components and to the antennas to select a highest ranked subset of the antennas to couple to the transmit chains by sounding a targeted transceiver on the WLAN with the number of antennas and by switchably coupling the transmit chains to the highest ranked subset of the antennas for beamformed transmission of subsequent data communication packets to the targeted transceiver.

2/21 © EPODOC / EPO

- PN - [US2018294829](#) A1 20181011
- PNFP - US10484032 B2 20191119
- PR - US201816006383 20180612; US201313829536 20130314
- AP - US201816006383 20180612
- DT - **
- CT - || STSE (A1)
[US2007201540](#) A1 20070830 [A] (BERKMAN WILLIAM H [US]);
[US2011006898](#) A1 20110113 [A] (KRUEST JAMES ROBERT [US], et al);
[US2010056078](#) A1 20100304 [A] (FELDMAN LOWELL PHILLIP [US], et al);
[US2013148341](#) A1 20130613 [A] (WILLIAMS NICOLAS PAUL [GB])
 - || STSE (B2)
[US2007201540](#) A1 20070830 [] (BERKMAN WILLIAM H [US]);
[US2010056078](#) A1 20100304 [] (FELDMAN LOWELL PHILLIP [US], et al);
[US2011006898](#) A1 20110113 [] (KRUEST JAMES ROBERT [US], et al);
[US2013148341](#) A1 20130613 [] (WILLIAMS NICOLAS PAUL [GB])
- CCI - [F21K9/232](#) ; [F21V23/045](#) ; [H04B1/38](#) ; [H04W88/08](#)
- CCA - [F21V3/061](#) ; [F21V3/062](#) ; [F21V29/74](#) ; [F21Y2107/00](#) ; [F21Y2115/10](#)
- CI - F21K9/232 (EP, US)
 - F21V23/045 (EP, US)
 - H04B1/38 (EP, US)
 - H04B1/3827 (US)
 - H04W88/08 (EP, US)
- CA - F21V3/061 (EP, US)
 - F21V3/062 (EP, US)
 - F21V29/74 (EP, US)
 - F21Y2107/00 (EP, US)
 - F21Y2115/10 (EP, US)
- PA - (A1 B2)
 BBY SOLUTIONS INC [US]
- TI - (A1)
 INTEGRATED NETWORKING EQUIPMENT AND DIVERSITY ANTENNA IN LIGHT BULB
 - (B2)
 Integrated networking equipment and diversity antenna in light bulb
- AB - (A1 B2)
 A light bulb or other lamp device incorporating improved antenna configurations and integrated networking equipment is described herein. In one example, a LED light bulb is arranged to include a **wireless transceiver** and related wireless network processing circuitry, and is coupled to multiple antennas configured to receive and transmit signals using spatial diversity, **beamforming**, multiple-input and multiple-output (MIMO), or other multi-antenna techniques. The heat sink in the light bulb may be purposed to provide one or more of the

multiple antennas, such as use of respective heat sink structures to serve as a diversity antenna. The wireless network processing circuitry may be used for control of the light bulb or for operability with wireless and non-wireless networks. For example, the network processing circuitry may operate as a wireless network access point, repeater, relay, bridge, or like function.

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PN - [US2018213545](#) A1 20180726

PNFP - US10708930 B2 20200707

PR - US201815926065 20180320; US201615160640 20160520; US201414231219 20140331

AP - US201815926065 20180320

DT - **

CT - || STSE (B2)
[US5604735](#) A 19970218 [] (LEVINSON FRANK H [US], et al);
[US7023833](#) B1 20060404 [] (AIELLO ROBERTO [US], et al);
[US7539175](#) B2 20090526 [] (WHITE PATRICK E [US], et al);
[US8848676](#) B1 20140930 [] (WHEELER TODD STEVEN [US], et al);
[US9239578](#) B2 20160119 [] (ZIARNO JAMES J [US]);
[US2002068590](#) A1 20020606 [] (SUZUKI TOSHIRO [JP], et al);
[US2002149534](#) A1 20021017 [] (BOBIER JOSEPH A [US]);
[US2003052828](#) A1 20030320 [] (SCHERZER SHIMON B [US], et al);
[US2006114158](#) A1 20060601 [] (CHIANG BING A [US], et al);
[US2006268816](#) A1 20061130 [] (ADACHI TOMOKO [JP], et al);
[US2008225991](#) A1 20080918 [] (PROCTOR JAMES A [US], et al);
[US2011064033](#) A1 20110317 [] (GONG MICHELLE X [US], et al);
[US2012171972](#) A1 20120705 [] (HUANG HOWARD C [US], et al)

CCI - [H04L49/101](#) ; [H04L49/254](#)

CI - H04B7/086 (US)
H04L47/50 (US)
H04L49/101 (EP, US)
H04L49/254 (EP, US)
H04W16/28 (US)
H04W72/1205 (US)

PA - (A1 B2)
IBM [US]

TI - (A1)
WIRELESS CROSS-CONNECT SWITCH
(B2)
Wireless cross-connect switch

AB - (A1 B2)
Wireless packet switches and enclosures include multiple port controllers, each in communication with a respective **wireless transceiver** located on an outer surface of a spherical shell. Each port controller is configured to analyze data streams to and from the respective **wireless transceiver**. Each **wireless transceiver** is configured to establish **beamforming** connections with a client device in a **beamforming** direction pointed away from the spherical shell. A cross-connect switch is in communication with all of the port controllers, configured to provide connections between respective port controllers. An arbiter is in communication with all of the port controllers and with the cross-connect switch and is configured to control the cross-connect switch, such that the cross-connect switch connects data streams of the port controllers in accordance with packet destination information and scheduling information from the port controllers.

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PN - [CN105634630](#) A 20160601

PR - US201562104205P 20150116; US201462082227P 20141120; US201514923445 20151027

AP - CN201510808954 20151120

DT - I

CT - || STSE (A)
[WO2006116028](#) A2 00000000 [A]
 [A] 1-22
 * 全文 *;
[CN101120520](#) A 00000000 [A]
 [A] 1-22
 * 全文 *;
[CN101641872](#) A 00000000 [A]
 [A] 1-22
 * 全文 *;
[CN103297360](#) A 00000000 [X]
 [X] 1-22
 * 说明书第15-78段, 附图1-6 *

CCI - [H04B7/0617](#) ; [H04B17/14](#)

CCA - [H04L25/0202](#)

CI - H04B7/0413 (US)
 - H04B7/0617 (EP, US)
 - H04B17/14 (EP, US)

CA - H04L25/0202 (EP, US)

PA - MEDIATEK INC

TI - Scheme for performing **beamforming** calibration by measuring joint signal path mismatch

AB - A method operative on a **wireless transceiver** device for performing **beamforming** calibration includes: measuring at least one joint signal response of at least one circuit loopback between a transmitter of the **wireless transceiver** device and a receiver of the **wireless transceiver** device to determine the measurement result; and calibrating joint signal path mismatch according to the measurement result for s multiple antenna **beamforming** system operating on the **wireless transceiver** device.

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PN - [US2016149652](#) A1 20160526

PNFP - US9590745 B2 20170307

PR - US201514923445
 20151027; US201462082227P
 20141120; US201562104205P 20150116

AP - US201514923445 20151027

DT - *; Rep

CT - || R141 (A1)
[US2008274712](#) A1 00000000 [];
[US2012051287](#) A1 00000000 [];
[US2013109448](#) A1 00000000 []
 - || STSE (B2)
[US2008274712](#) A1 00000000 [];
[US2012051287](#) A1 00000000 [];
[US2013109448](#) A1 00000000 []

CCI - [H04B7/0617](#) ; [H04B17/14](#)

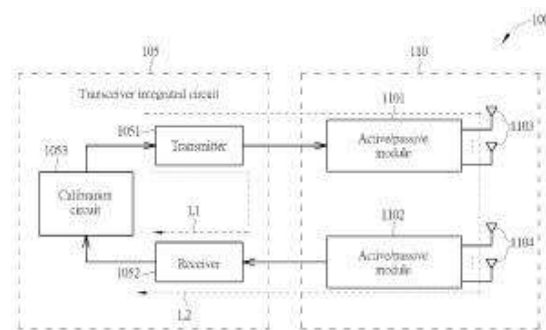
CCA - [H04L25/0202](#)

CI - H04B7/0413 (US)
 - H04B7/0617 (EP, US)
 - H04B17/14 (EP, US)

CA - H04L25/0202 (EP, US)

PA - (A1 B2)
 MEDIATEK INC [TW]

TI - (A1)



SCHEME FOR PERFORMING **BEAMFORMING**
CALIBRATION BY MEASURING JOINT SIGNAL
Path MISMATCH

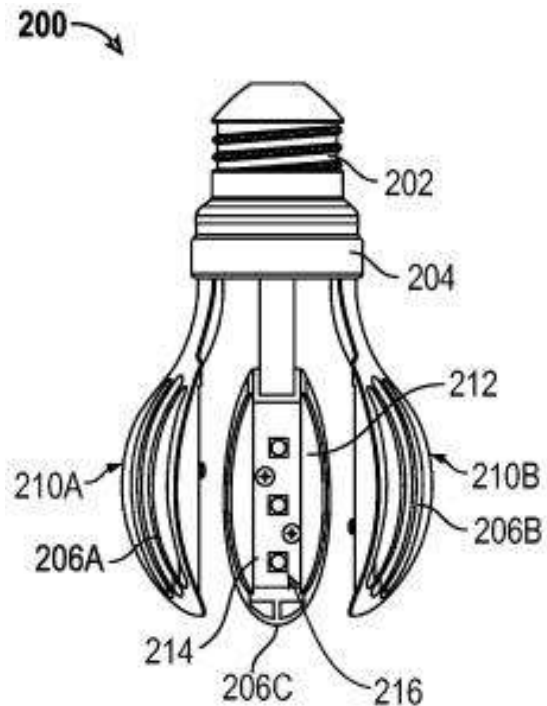
- (B2)
Scheme for performing **beamforming**
calibration by measuring joint signal path
mismatch

AB - (A1 B2)
A method operative on a **wireless transceiver** device for performing **beamforming** calibration includes: measuring at least one joint signal response of at least one circuit loopback between a transmitter of the **wireless transceiver** device and a receiver of the **wireless transceiver** device to determine the measurement result; and calibrating joint signal path mismatch according to the measurement result for s multiple antenna **beamforming** system operating on the **wireless transceiver** device.

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- PN - [US2014273892](#) A1 20140918
- PNFP - US10020833 B2 20180710
- PR - US201313829536 20130314
- AP - US201313829536 20130314
- DT - *; Rep
- CT - || R141 (A1)
[US2011095687](#) A1 20110428 [] (JONSSON KARL [US]);
[US8328582](#) B1 20121211 [] (CARLEY ADAM L [US], et al);
[US2013148341](#) A1 20130613 [] (WILLIAMS NICOLAS PAUL [GB]);
[US6373447](#) B1 20020416 [] (ROSTOKER MICHAEL D [US], et al);
[US2008170371](#) A1 20080717 [] (LAI YAW-HUEY [TW]);
[US2007201540](#) A1 20070830 [] (BERKMAN WILLIAM H [US])
- || STSE (B2)
[US6373447](#) B1 20020416 [] (ROSTOKER MICHAEL D [US], et al);
[US8328582](#) B1 20121211 [] (CARLEY ADAM L [US], et al);
[US2007201540](#) A1 20070830 [] (BERKMAN WILLIAM H [US]);
[US2008170371](#) A1 20080717 [] (LAI YAW-HUEY [TW]);
[US2011095687](#) A1 20110428 [] (JONSSON KARL [US]);
[US2013148341](#) A1 20130613 [] (WILLIAMS NICOLAS PAUL [GB])

CTNP - || R141 (A1)
[] - Motorola, AP-7131 Spec2011 [http:](http://)



[//www.motorolasolutions.com/web/Business/Products/Wireless%20LAN%20Devices/WLAN%20Access%20Points/AP-7131/_Documents/_staticfiles/AP-7131_Spec-Sheet_0910-web.pdf](http://www.motorolasolutions.com/web/Business/Products/Wireless%20LAN%20Devices/WLAN%20Access%20Points/AP-7131/_Documents/_staticfiles/AP-7131_Spec-Sheet_0910-web.pdf)

- || STSE (B2)
- [] - Motorola, AP-7131 Spec, 2011 http://www.motorolasolutions.com/web/Business/Products/Wireless%20LAN%20Devices/WLAN%20Access%20Points/AP-7131/_Documents/_staticfiles/AP-7131_Spec-Sheet_0910-web.pdf.
- CCI - [F21K9/232](#) ; [F21V23/045](#) ; [H04B1/38](#) ; [H04W88/08](#)
- CCA - [F21V3/061](#) ; [F21V3/062](#) ; [F21V29/74](#) ; [F21Y2107/00](#) ; [F21Y2115/10](#)
- CI - F21K9/232 (EP, US)
- F21V23/045 (EP, US)
- H04B1/38 (EP, US)
- H04B1/3827 (US)
- H04W88/08 (EP, US)
- CA - F21V3/061 (EP, US)
- F21V3/062 (EP, US)
- F21V29/74 (EP, US)
- F21Y2107/00 (EP, US)
- F21Y2115/10 (EP, US)
- PA - (A1)
- NOURBAKSH FARHAD [US]
- (B2)
- BBY SOLUTIONS INC [US]
- TI - (A1)
- INTEGRATED NETWORKING EQUIPMENT AND DIVERSITY ANTENNA IN LIGHT BULB
- (B2)
- Integrated networking equipment and diversity antenna in light bulb
- AB - (A1 B2)
- A light bulb or other lamp device incorporating improved antenna configurations and integrated networking equipment is described herein. In one example, a LED light bulb is arranged to include a **wireless transceiver** and related wireless network processing circuitry, and is coupled to multiple antennas configured to receive and transmit signals using spatial diversity, **beamforming**, multiple-input and multiple-output (MIMO), or other multi-antenna techniques. The heat sink in the light bulb may be purposed to provide one or more of the multiple antennas, such as use of respective heat sink structures to serve as a diversity antenna. The wireless network processing circuitry may be used for control of the light bulb or for operability with wireless and non-wireless networks. For example, the network processing circuitry may operate as a wireless network access point, repeater, relay,

bridge, or like function.

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- PN - [US2014160957](#) A1 20140612
- PR - US201213730771
20121228; US201261735939P 20121211
- AP - US201213730771 20121228
- DT - *; Rep
- CT - || R141 (A1)
[US2005185728](#) A1 00000000 [];
[US2007165737](#) A1 00000000 [];
[US2008080449](#) A1 00000000 [];
[US2008089396](#) A1 00000000 [];
[US2012051287](#) A1 00000000 [];
[US8229017](#) B1 00000000 [];
[US8498363](#) B2 00000000 [];
[US8781020](#) B1 00000000 []

CCI - [H04L25/0224](#)

CCA - [H04L5/0048](#) ; [H04W24/06](#)

CI - H04L25/0224 (EP)

- H04W24/02 (US)

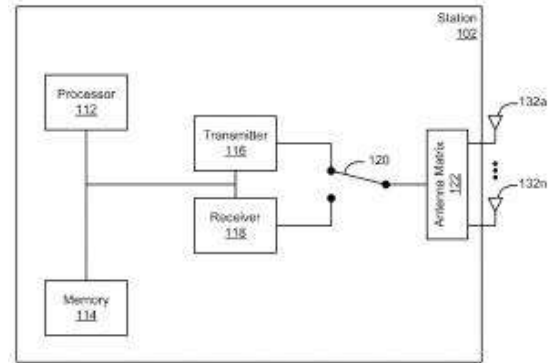
CA - H04L5/0048 (EP)

- H04W24/06 (EP)

PA - BROADCOM CORP [US]

TI - CHANNELSTATEINFORMATION
CALIBRATION

AB - A dedicated calibration device may be utilized by a **wireless transceiver** device, such as a base station, to compute compensation matrices. The **wireless transceiver** device and the dedicated calibration device can exchange training sequence signals. Based on the exchanged training sequence signals, the **wireless transceiver** device and the dedicated calibration device can estimate overall baseband to baseband channel responses taking into account the amplitude and phase responses of the respective transmit and receive radio chains, and the **wireless transceiver** device can determine the compensation matrices. Furthermore, the **wireless transceiver** device can estimate a baseband-to-baseband uplink channel response relative to actual user equipment, approximate a downlink channel response using only one of the determined compensation matrices, and perform **beamforming** to the actual user equipment using the approximated downlink channel response.



8/21 © EPODOC / EPO

- PN - [US2013230005](#) A1 20130905
- PR - US201313867299 20130422; US201113023539 20110208; US20100302214P 20100208
- AP - US201313867299 20130422

DT - **

CT - || R141 (A1)
[US2010075594](#) A1 20100325 [] (KIM SUNG-MAN [KR], et al);
[US2010150013](#) A1 20100617 [] (HARA YOSHITAKA [JP], et al)

CCI - [H01Q3/2647](#) ; [H04B7/0682](#) ; [H04B7/0691](#) ; [H04B17/12](#) ; [H04B17/309](#)

CI - H01Q3/2647 (EP, KR)
 - H04B1/58 (KR)
 - H04B7/0413 (KR)
 - H04B7/0617 (KR)
 - H04B7/0682 (EP, KR)
 - H04B7/0691 (EP, KR)
 - H04B17/11 (KR)
 - H04B17/12 (EP, KR)
 - H04B17/29 (KR)
 - H04B17/309 (EP, KR)
 - H04W72/02 (KR, US)

PA - BROADCOM CORP [US]

TI - Method and System for Uplink **Beamforming** Calibration in a Multi-Antenna Wireless Communication System

AB - A **wireless transceiver**, comprising a transmitter, a receiver and a plurality of antennas, determines transmit phase relationship between at least two of antennas based on radio frequency (RF) signals received via the at least two antennas from one or more antennas of a base station. RF signals are transmitted via the at least two antennas utilizing the determined transmit phase relationship. The receiver is calibrated based on receiver performance determined from the received RF signals for subsequent reception of RF signals. The transmit phase relationship is dynamically adjusted based on the transmit RF measurements and the determined receiver performance. Transmit channel qualities are determined for each transmit antenna based on the transmit RF measurements and the dynamically adjusted transmit phase relationship. Transmit antennas are dynamically selected based on the adjusted transmit phase relationship, the characterized transmit channel qualities and the determined receiver performance for subsequent transmission to the base station.

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PN - [KR20130047639](#) A 20130508

PNFP - KR101466185B B1 20141127

PR - US201113329296 20111218; US201161552835P 20111028

AP - KR20120120236 20121029

DT - I

CCI - [H04B7/0408](#) ; [H04B7/0617](#) ; [H04L25/03949](#)

CI - H04B7/0408 (EP, KR)
 - H04B7/0617 (EP, KR)
 - H04L25/0202 (KR)
 - H04L25/03949 (EP)

PA - (A)
 BROADCOM CORP [US]

TI - (A B1)
 REVERSE CHANNEL ESTIMATION FOR RF TRANSCEIVER WITH **BEAMFORMING** ANTENNA

AB - (A)
 PURPOSE: A reverse direction channel estimation device for a **wireless transceiver** including a beam forming antenna is provided to receive second transmission from a first remote station by generating first transmission in the first remote station based on a plurality of first steering weighted values for a plurality of antennas. CONSTITUTION: A plurality of RF(Radio Frequency) transceivers generates the first transmission of a first remote station based on a plurality of first steering weighted values for a plurality of antennas. A plurality of the RF transceivers receives

the second transmission from the first remote station. The first transmission and the second transmission are generated by a first communication channel. A configuration controller(104) generates a plurality of the first steering weighted values based on the reverse direction channel estimation of the first communication channel. [Reference numerals] (100) Array antenna; (104) Configuration controller; (106) Control signals; (108) Feedback signals; (110) **Wireless transceiver**; (111) RF transceiving unit; (112) RF transceiver; (152) Inward RF signal; (160) Inward data; (162) Outward data; (170) Outward RF signal

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PN - [KR20130047635](#) A 20130508
 PNFP - KR101511649B B1 20150413
 PR - US201113329302 20111218; US201161552835P 20111028
 AP - KR20120120108 20121029
 DT - I
 CCI - [H04B7/0617](#) ; [H04B7/0623](#) ; [H04B7/0695](#)
 CI - H04B7/0617 (EP, KR, US)
 - H04B7/0623 (EP, KR, US)
 - H04B7/0695 (EP, KR, US)
 PA - (A)
 BROADCOM CORP [US]
 TI - (A B1)
 RF TRANSCEIVER WITH **BEAMFORMING**ANTENNA AND METHODS FOR USE THEREWITH
 AB - (A)
 PURPOSE: An RF(Radio Frequency) transceiver including a beam-forming antenna and a using method thereof are provided to generate a control signal for selecting a first candidate emission pattern for a beam forming antenna. CONSTITUTION: A configuration controller(104) generates a control signal for selecting a first candidate emission pattern for a plurality of antennas based on a plurality of first steering weighted values. An RF transceiver broadcasts first beacon transmission as a first candidate emission pattern for generating a feedback signals for allowing a first remote station to respond the first beacon transmission. [Reference numerals] (100) Array antenna; (104) Configuration controller; (106) Control signals; (108) Feedback signals; (110) **Wireless transceiver**; (111) RF transceiving unit; (112) RF transceiver; (152) Inward RF signal; (160) Inward data; (162) Outward data; (170) Outward RF signal

11/21 © EPODOC / EPO

PN - [CN102835039](#) A 20121219
 PNFP - CN102835039B B 20151216
 PR - WO2011US24112 20110208; US20100302214P 20100208
 AP - CN20118018118 20110208
 DT - I
 CT - || STSE (A)
[US2007222677](#) A1 20070927 [A] (STRONG PETER N [GB]);
[WO2009078529](#) A1 20090625 [YX] (KOREA ELECTRONICS TELECOMM [KR], et al);
[US7280515](#) B2 20071009 [A] (RANTA PEKKA [FI]);
[EP1198151](#) A2 20020417 [A] (NOKIA CORP [FI]);
[US5412414](#) A 19950502 [A] (AST HARRY C [US], et al);
[CN101610233](#) A 20091223 [Y] (FUJITSU LTD [JP])
 CCI - [H01Q3/2647](#) ; [H04B7/0682](#) ; [H04B7/0691](#) ; [H04B17/12](#) ; [H04B17/309](#)
 CI - H01Q3/2647 (EP, KR)
 - H04B1/58 (KR)
 - H04B7/0413 (KR)
 - H04B7/0617 (KR)
 - H04B7/0682 (EP, KR)
 - H04B7/0691 (EP, KR)

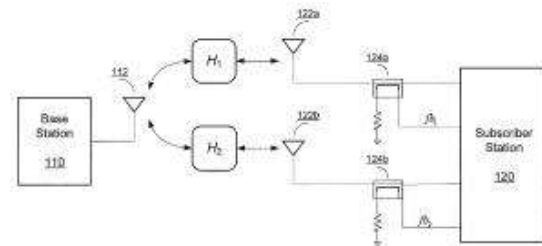
	- H04B17/11 (KR) - H04B17/12 (EP, KR) - H04B17/29 (KR) - H04B17/309 (EP, KR) - H04W72/02 (KR, US)
PA	- (A)
	BROADCOM CORP
TI	- (A)
	Method and system for uplink beamforming calibration in a multi-antenna wireless communication system
AB	- (A)
	A wireless transceiver , comprising a transmitter, a receiver and a plurality of antennas, determines transmit phase relationship between at least two of antennas based on radio frequency (RF) signals received via the at least two antennas from one or more antennas of a base station. RF signals are transmitted via the at least two antennas utilizing the determined transmit phase relationship. The receiver is calibrated based on receiver performance determined from the received RF signals for subsequent reception of RF signals. The transmit phase relationship is dynamically adjusted based on the transmit RF measurements and the determined receiver performance. Transmit channel qualities are determined for each transmit antenna based on the transmit RF measurements and the dynamically adjusted transmit phase relationship. Transmit antennas are dynamically selected based on the adjusted transmit phase relationship, the characterized transmit channel qualities and the determined receiver performance for subsequent transmission to the base station.

12/21 © EPODOC / EPO

PN	- WO2011097652 A1 20110811	.
PR	- US20100302214P 20100208	
AP	- WO2011US24112 20110208	
DT	- **	
CT	- [US] ISR (A1)	
	WO2009078529 A1 20090625 [X] (KOREA ELECTRONICS TELECOMM [KR], et al);	
	US2007222677 A1 20070927 [Y] (STRONG PETER N [GB]);	
	US5412414 A 19950502 [Y] (AST HARRY C [US], et al);	
	US5581548 A 19961203 [Y] (UGLAND JON K [SE], et al);	
	US2008153433 A1 20080626 [A] (PALLONEN JORMA [FI], et al)	
CCI	- H01Q3/2647 ; H04B7/0682 ; H04B7/0691 ; H04B17/12 ; H04B17/309	
CI	- H01Q3/2647 (EP, KR) - H04B1/58 (KR) - H04B7/0413 (KR) - H04B7/0617 (KR) - H04B7/0682 (EP, KR) - H04B7/0691 (EP, KR) - H04B17/11 (KR) - H04B17/12 (EP, KR) - H04B17/29 (KR) - H04B17/309 (EP, KR) - H04W72/02 (KR, US)	
PA	- BROADCOM CORP [US]; LORENZ ROBERT G [US]	
TI	- METHOD AND SYSTEM FOR UPLINK BEAMFORMING CALIBRATION IN A MULTI-ANTENNA WIRELESS COMMUNICATION SYSTEM	
AB	- A wireless transceiver, comprising a transmitter, a receiver and a plurality of antennas, determines transmit phase relationship between at least two of antennas based on radio frequency (RF) signals received via the at least two antennas from one or more antennas of a base station. RF signals are transmitted via the at least two antennas utilizing the determined transmit phase relationship. The receiver is calibrated based on receiver performance	

determined from the received RF signals for subsequent reception of RF signals. The transmit phase relationship is dynamically adjusted based on the transmit RF measurements and the determined receiver performance. Transmit channel qualities are determined for each transmit antenna based on the transmit RF measurements and the dynamically adjusted transmit phase relationship. Transmit antennas are dynamically selected based on the adjusted transmit phase relationship, the characterized transmit channel qualities and the determined receiver performance for subsequent transmission to the base station.

- 13/21** © EPODOC / EPO
- PN - [US2011195670](#) A1 20110811
- PNFP - US8428529 B2 20130423
- PR - US201113023539
20110208; US20100302214P 20100208
- AP - US201113023539 20110208
- DT - *; Rep
- CT - || R141 (A1)
[US7280515](#) B2 20071009 [] (RANTA PEKKA [FI]);
[US7154442](#) B2 20061226 [] (VAN WONTERGHEM JARI [CA], et al);
[US7324794](#) B2 20080129 [] (CHARI SUJAI [US], et al);
[US2004017326](#) A1 20040129 [] (MERRILL JEFFREY C [US]);
[US2009005120](#) A1 20090101 [] (YLITALO JUHA [FI]);
[US5412414](#) A 19950502 [] (AST HARRY C [US], et al);
[US5530449](#) A 19960625 [] (WACHS MARVIN R [US], et al);
[US2008153433](#) A1 20080626 [] (PALLONEN JORMA [FI], et al);
[US2007173277](#) A1 20070726 [] (YUN LOUID C [US]);
[US7245257](#) B1 20070717 [] (BRUCE GREGORY S [US], et al);
[US7248216](#) B2 20070724 [] (AKIYAMA CHIYOSHI [JP], et al);
[US2011176635](#) A1 20110721 [] (HOCHWALD BERTRAND M [US], et al);
[US2010214017](#) A1 20100826 [] (COUCHMAN ALAN DAVID [GB], et al);
[US2011201283](#) A1 20110818 [] (LORENZ ROBERT GUSTAV [US], et al);
[US4612548](#) A 19860916 [] (BELTRAN FERNANDO [US]);
[US2003179138](#) A1 20030925 [] (CHEN MICHAEL [TW]);
[US2007222677](#) A1 20070927 [] (STRONG PETER N [GB]);
[US7286855](#) B2 20071023 [] (RALEIGH GREGORY GENE [US], et al);
[US6320540](#) B1 20011120 [] (MEREDITH SHELDON K [US]);
[US2004228422](#) A1 20041118 [] (SILVEIRA MARTINUS W DA [CA], et al);
[US7450065](#) B1 20081111 [] (BRUCE GREGORY S [US], et al);



	US7616704 B2 20091110 [] (LI QINGHUA [US], et al); US8055216 B2 20111108 [] (DENT PAUL WILKINSON [US]); US5581548 A 19961203 [] (UGLAND JON K [SE], et al); US7308705 B2 20071211 [] (GORDY STEPHEN C [US], et al)
	- STSE (B2) US7154442 B2 20061226 [] (VAN WONTERGHEM JARI [CA], et al); US7280515 B2 20071009 [] (RANTA PEKKA [FI]); US7324794 B2 20080129 [] (CHARI SUJAI [US], et al)
CCI	- H01Q3/2647 ; H04B7/0682 ; H04B7/0691 ; H04B17/12 ; H04B17/309
CI	- H01Q3/2647 (EP, KR) - H04B1/58 (KR) - H04B7/0413 (KR) - H04B7/0617 (KR) - H04B7/0682 (EP, KR) - H04B7/0691 (EP, KR) - H04B17/11 (KR) - H04B17/12 (EP, KR) - H04B17/29 (KR) - H04B17/309 (EP, KR) - H04W72/02 (KR, US)
PA	- (B2) DAKSHINAMURTHYSRIRAMAN [US]; LORENZ ROBERT GUSTAV [US]; BROADCOM CORP [US]
TI	- (A1) METHOD AND SYSTEM FOR UPLINK BEAMFORMING CALIBRATION IN A MULTI-ANTENNA WIRELESS COMMUNICATION SYSTEM - (B2) Method and system for uplink beamforming calibration in a multi-antenna wireless communication system
AB	- (A1 B2) A wireless transceiver, comprising a transmitter, a receiver and a plurality of antennas, determines transmit phase relationship between at least two of antennas based on radio frequency (RF) signals received via the at least two antennas from one or more antennas of a base station. RF signals are transmitted via the at least two antennas utilizing the determined transmit phase relationship. The receiver is calibrated based on receiver performance determined from the received RF signals for subsequent reception of RF signals. The transmit phase relationship is dynamically

adjusted based on the transmit RF measurements and the determined receiver performance. Transmit channel qualities are determined for each transmit antenna based on the transmit RF measurements and the dynamically adjusted transmit phase relationship. Transmit antennas are dynamically selected based on the adjusted transmit phase relationship, the characterized transmit channel qualities and the determined receiver performance for subsequent transmission to the base station.

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PN - [US2011170520](#) A1 20110714

PNFP - US8121648 B2 20120221

PR - US201113070647 20110324; US20100700118 20100204; US20070743741 20070503

AP - US201113070647 20110324

DT - **

CT - || R141 (A1)
[US2008008143](#) A1 20080110 [] (ROBERTSON IAN MICHAEL [CA], et al);
[US7684370](#) B2 20100323 [] (KEZYS VYTAUTAS ROBERTAS [CA]);
[US7936724](#) B2 20110503 [] (KEZYS VYTAUTAS ROBERTAS [CA]);
[US2008144528](#) A1 20080619 [] (GRAVES ALAN [CA], et al);
[US2009154426](#) A1 20090618 [] (PERRAUD ERIC [FR], et al);
[US2008182565](#) A1 20080731 [] (LAZARIDIS MIHAL [CA], et al);
[US6956527](#) B2 20051018 [] (ROGERS CHRISTOPHER B [US], et al);
[US6965576](#) B1 20051115 [] (LEE CHIAO-WEI [US], et al);
[US7493127](#) B2 20090217 [] (MORGAN EDWARD JAMES [US], et al)
 - || STSE (B2)
[US7684370](#) B2 20100323 [] (KEZYS VYTAUTAS ROBERTAS [CA]);
[US7936724](#) B2 20110503 [] (KEZYS VYTAUTAS ROBERTAS [CA]);
[US2008008143](#) A1 20080110 [] (ROBERTSON IAN MICHAEL [CA], et al);
[US2008144528](#) A1 20080619 [] (GRAVES ALAN [CA], et al);
[US2008182565](#) A1 20080731 [] (LAZARIDIS MIHAL [CA], et al);
[US2009154426](#) A1 20090618 [] (PERRAUD ERIC [FR], et al)

CCI - [H04W24/02](#)

CCA - [H04W16/18](#) ; [H04W28/08](#) ; [H04W36/0083](#)

CI - H04W24/02 (EP, US)

CA - H04W16/18 (EP, US)
 - H04W28/08 (EP, US)
 - H04W36/0083 (EP, US)

PA - (A1)
 RESEARCH IN MOTION LTD [CA]
 - (B2)
 KEZYS VYTAUTAS ROBERTAS [CA]; RESEARCH IN MOTION LTD [CA]

TI - (A1)
 Adaptive **Beamforming** Configuration Methods And Apparatus For Wireless Access Points Serving As Handoff Indication Mechanisms In Wireless Local Area Networks
 - (B2)
 Adaptive **beamforming** configuration methods and apparatus for wireless access points serving as handoff indication mechanisms in wireless local area networks

AB - (A1 B2)
 In one illustrative example, a technique for use in operating a wireless access point (AP) for

serving as a handoff indication mechanism in a first wireless network is described. The handoff indication mechanism is configured to communicate handoff indications in response to mobile devices leaving coverage of the first wireless network, via an RF coverage region of the AP, for mobile device handoff to a second wireless network. The AP is provided in an ingress or egress region of the first wireless network, where it receives RF signals from one or more communication devices and determines and sets **wireless transceiver** parameters for adjusting boundaries of its RF coverage region. The AP also operates with the adjusted RF coverage region to serve as part of the handoff indication mechanism in the first wireless network, so that the handoff indications are communicated in response to the mobile devices leaving coverage of the first wireless network, via the adjusted RF coverage region, for mobile device handoff to the second wireless network.

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PN - [US2010135184](#) A1 20100603

PNFP - US7936724 B2 20110503

PR - US20100700118 20100204; US20070743741 20070503

AP - US20100700118 20100204

DT - **

CT - || R141 (A1)
[US7684370](#) B2 20100323 [] (KEZYS VYTAUTAS ROBERTAS [CA]);
[US5715516](#) A 19980203 [] (HOWARD DAVID AMUNDSON [US], et al);
[US2004009792](#) A1 20040115 [] (WEIGAND GILBERT G [US]);
[US2004170122](#) A1 20040902 [] (GUO ZIHUA [CN], et al);
[US2004192211](#) A1 20040930 [] (GALLAGHER MICHAEL D [US], et al);
[US2005048972](#) A1 20050303 [] (DORENBOSCH JHEROEN P [US], et al);
[US6980527](#) B1 20051227 [] (LIU HUI [US], et al);
[US2006221920](#) A1 20061005 [] (GOPALAKRISHNAN PRAVEEN [US], et al);
[US2006287016](#) A1 20061221 [] (PORTARO JAMES D [US], et al);
[US2007026807](#) A1 20070201 [] (KISH WILLIAM [US]);
[US2008008143](#) A1 20080110 [] (ROBERTSON IAN MICHAEL [CA], et al);
[US2008144528](#) A1 20080619 [] (GRAVES ALAN [CA], et al);
[US2008182565](#) A1 20080731 [] (LAZARIDIS MIHAL [CA], et al);
[US2009111469](#) A1 20090430 [] (LEE JI-HOON [KR], et al);
[US7536186](#) B2 20090519 [] (DORENBOSCH JHEROEN P [US], et al);
[US2009154426](#) A1 20090618 [] (PERRAUD ERIC [FR], et al)
- || STSE (B2)
[US7684370](#) B2 20100323 [] (KEZYS VYTAUTAS ROBERTAS [CA])

CCI - [H04W24/02](#)

CCA - [H04W16/18](#) ; [H04W28/08](#) ; [H04W36/0083](#)

CI - H04W24/02 (EP, US)

CA - H04W16/18 (EP, US)
H04W28/08 (EP, US)
H04W36/0083 (EP, US)

PA - (A1 B2)
RESEARCH IN MOTION LTD [CA]

TI - (A1)
Adaptive **Beamforming** Configuration Methods And Apparatus For Wireless Access Points Serving As Handoff Indication Mechanisms In Wireless Local Area Networks
- (B2)
Adaptive **beamforming** configuration methods and apparatus for wireless access points serving as handoff indication mechanisms in wireless local area networks

AB - (A1 B2)
In one illustrative example, a wireless access point of a wireless local area network (WLAN) includes an antenna array, a **wireless transceiver** array coupled to the antenna array, and one or more processors which are coupled to the **wireless transceiver** array. The one or more processors are adapted to operate the wireless access point in a configuration mode and a handoff

indication mode. In the configuration mode, the one or more processors are adapted to operate the wireless access point to receive, via the **wireless transceiver** array, RF signals from one or more communication devices and determine and set **wireless transceiver** parameters for adjusting boundaries of an RF coverage region of the wireless access point based on these RF signals. In the handoff indication mode, the one or more processors set the wireless access point with the adjusted RF coverage region (adjusted from the configuration mode), where handoff indications are communicated in response to mobile devices leaving the WLAN coverage region through the adjusted RF coverage region for handoff to a wireless wide area network (WWAN).

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PN	- CA2693730 A1 20090305
PNFP	- CA2693730 C 20130716
PR	- WO2008US71943 20080801; US20070953861P 20070803; US20080182247 20080730
AP	- CA20082693730 20080801
DT	- I
CCI	- A61B8/08 ; A61B8/4227 ; A61B8/4236 ; A61B8/4438 ; A61B8/4461 ; A61B8/4472 ; A61B8/56 ; A61B8/565 ; A61B8/582
CCA	- A61B8/12
CI	- A61B8/08 (EP) - A61B8/4227 (EP) - A61B8/4236 (EP) - A61B8/4438 (EP) - A61B8/4461 (EP) - A61B8/4472 (EP) - A61B8/56 (EP) - A61B8/565 (EP) - A61B8/582 (EP)
CA	- A61B8/12 (EP)
PA	- (A1 C) INNOSCION LLC [US]
TI	- (A1 C) WIRED OR WIRELESS REMOTELY CONTROLLED ULTRASONIC TRANSDUCER AND IMAGING APPARATUS
AB	- (A1 C) A remotely manipulatable ultrasound transducer element or transducer array permits an operator of an ultrasound system to be remotely located from a patient and yet remotely control the location of the element or array on a patient's body such as on the skin surface or within a body cavity. The transducer element or transducer array associated with motors and control circuits comprises an assembly within a housing for fixation to or within a human body and is intended to be placed one time and then remotely manipulated in directions of rotation, twist, and linearly in first and second perpendicular directions within a plane parallel to the surface of the human body and remotely controlled to provide therapeutic or diagnostic treatment or imaging of an internal body region of interest under study. In one embodiment, the housing comprises at least one motor and one of a transducer element and a transducer array which is mounted to a rotor of the motor via an optional gear assembly for rotation, for example, in a range of 180 degrees so that multiple planes of imaging can be obtained, for example, of a heart or other body organ from the skin surface. The remotely manipulatable ultrasound transducer or transducer array assembly may comprise a wireless transceiver having a unique identifier for communication with one or more remote workstations, each having a unique identifier. Motors may provide linear, longitudinal axis movement, perpendicular movement to a longitudinal axis, rotation, twist and focus. Control information may comprise pulsing frequency, delay between elements, beamforming , time of day, direction, frequency, amplitude and the like to control one or more transducer elements or transducer arrays for therapeutic, diagnostic or imaging purposes.

17/21 © EPODOC / EPO

PN - [EP2192802](#) A1 20100602

PNFP - EP2192802 B1 20110622

PR - EP20070107452 20070503

AP - EP20100157501 20070503

DT - **

CT - || STSE (A1)
[US2004009792](#) A1 00000000 [A] (WEIGAND GILBERT G [US])
[A] 1-15
* paragraphs [0004] - [0013] *
* paragraphs [0038] - [0042] - [0056] *
* paragraphs [0057] , [0061] , [0073] *
* paragraphs [0081] , [0105] - [0108] *
* claims 1-19 *;
[US2005048972](#) A1 00000000 [A] (DORENBOSCH JHEROEN P [US] ET AL)
[A] 1-15
* paragraphs [0010] - [0017] *
* paragraphs [0047] - [0059] *
* abstract *;
[EP1152628](#) A1 00000000 [A] (MATSUSHITA ELECTRIC IND CO LTD [JP])
[A] 1,10,13
* paragraphs [0013] , [0023] - [0025] *
* claims 1,2,4,5,9 *

CCI - [H04W24/02](#)

CCA - [H04W16/18](#) ; [H04W36/0083](#) ; [H04W88/08](#)

CI - H04W24/02 (EP)

CA - H04W16/18 (EP)
H04W36/0083 (EP)
H04W88/08 (EP)

PA - (A1 B1)
RESEARCH IN MOTION LTD [CA]

TI - (A1 B1)
Adaptive **beamforming** configuration methods and apparatus for wireless access points serving as handoff indication mechanisms in wireless local area networks

AB - (A1)
Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. **Wireless transceiver** parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the **wireless transceiver** are determined through use of an adaptive **beamforming** technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured **wireless transceiver** parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

PNFP - WO2009029388 A3 20090423

PR - US20070953861P 20070803; US20080182247 20080730

AP - WO2008US71943 20080801

DT - **

CT - |KR| ISR (A3)
[WO2007014292](#) A2 00000000 [X] (ANDERSON, TOR, C., CHEN, JIAYU);
[KR20050001074](#) A 00000000 [A] (COUVILLON, LUCIEN, ALFRED, JR. ET AL);
[WO2006036870](#) A1 00000000 [A] (SLAYTON, MICHAEL, H., MAKIN, INDER, RAJ, S., BARTHE, PETER, G.)

CCI - [A61B8/08](#) ; [A61B8/4227](#) ; [A61B8/4236](#) ; [A61B8/4438](#) ; [A61B8/4461](#) ; [A61B8/4472](#) ; [A61B8/56](#) ;
[A61B8/565](#) ; [A61B8/582](#)

CCA - [A61B8/12](#)

CI - A61B8/08 (EP)
A61B8/4227 (EP)
A61B8/4236 (EP)
A61B8/4438 (EP)
A61B8/4461 (EP)
A61B8/4472 (EP)
A61B8/56 (EP)
A61B8/565 (EP)
A61B8/582 (EP)

CA - A61B8/12 (EP)

PA - (A2 A3)
INNOSCION LLC [US]; ABRAHAM THEODORE P [US]

TI - (A2 A3)
WIRED OR WIRELESS REMOTELY CONTROLLED ULTRASONIC TRANSDUCER AND IMAGING APPARATUS

AB - (A2 A3)
A remotely manipulatable ultrasound transducer element or transducer array permits an operator of an ultrasound system to be remotely located from a patient and yet remotely control the location of the element or array on a patient's body such as on the skin surface or within a body cavity. The transducer element or transducer array associated with motors and control circuits comprises an assembly within a housing for fixation to or within a human body and is intended to be placed one time and then remotely manipulated in directions of rotation, twist, and linearly in first and second perpendicular directions within a plane parallel to the surface of the human body and remotely controlled to provide therapeutic or diagnostic treatment or imaging of an internal body region of interest under study. In one embodiment, the housing comprises at least one motor and one of a transducer element and a transducer array which is mounted to a rotor of the motor via an optional gear assembly for rotation, for example, in a range of 180 degrees so that multiple planes of imaging can be obtained, for example, of a heart or other body organ from the skin surface. The remotely manipulatable ultrasound transducer or transducer array assembly may comprise a **wireless transceiver** having a unique identifier for communication with one or more remote workstations, each having a unique identifier. Motors may provide linear, longitudinal axis movement, perpendicular movement to a longitudinal axis, rotation, twist and focus. Control information may comprise pulsing frequency, delay between elements, **beamforming**, time of day, direction, frequency, amplitude and the like to control one or more transducer elements or transducer arrays for therapeutic, diagnostic or imaging purposes.

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PN - [CA2630390](#) A1 20081103

PNFP - CA2630390 C 20130108

PR - EP20070107452 20070503

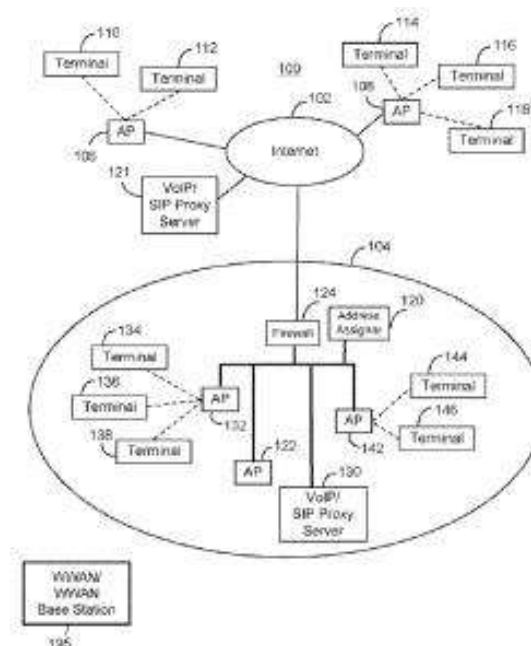
AP - CA20082630390 20080505

DT - I

CCI - [H04W24/02](#)

CCA	- H04W16/18 ; H04W36/0083 ; H04W88/08
CI	- H04W24/02 (EP)
CA	- H04W16/18 (EP) - H04W36/0083 (EP) - H04W88/08 (EP)
PA	- (A1 C) RESEARCH IN MOTION LTD [CA]
TI	- (A1) ADAPTIVE BEAMFORMING CONFIGURATION METHODS AND APPARATUS FOR WIRELESS ACCESS POINTS SERVING AS HANDOFF INDICATION MECHANISMS IN WIRELESS LOCAL AREA NETWORKS - (C) ADAPTIVE BEAMFORMING CONFIGURATION METHODS AND APPARATUS FOR WIRELESS ACCESS POINTS SERVING AS HANDOFF INDICATION MECHANISMS IN WIRELESS LOCAL AREA NETWORKS
AB	- (A1) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. Wireless transceiver parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the wireless transceiver are determined through use of an adaptive beamforming technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured wireless transceiver parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN. - (C) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. Wireless transceiver parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the wireless transceiver are determined through use of an adaptive beamforming technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured wireless transceiver parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

PN	- US2008273506 A1 20081106
PNFP	- US7684370 B2 20100323
PR	- US20070743741 20070503
AP	- US20070743741 20070503
DT	- *; Rep
CT	- R141 (A1) US2008008143 A1 20080110 [] (ROBERTSON IAN MICHAEL [CA], et al); US5715516 A 19980203 [] (HOWARD DAVID AMUNDSON [US], et al); US2008144528 A1 20080619 [] (GRAVES ALAN [CA], et al); US2009154426 A1 20090618 [] (PERRAUD ERIC [FR], et al); US2008182565 A1 20080731 [] (LAZARIDIS MIHAL [CA], et al); US2004009792 A1 20040115 [] (WEIGAND GILBERT G [US]); US2005048972 A1 20050303 [] (DORENBOSCH JHEROEN P [US], et al) - STSE (B2) US5715516 A 19980203 [] (HOWARD DAVID AMUNDSON [US], et al); US2008008143 A1 20080110 [] (ROBERTSON IAN MICHAEL [CA], et al); US2008144528 A1 20080619 [] (GRAVES ALAN [CA], et al); US2008182565 A1 20080731 [] (LAZARIDIS MIHAL [CA], et al); US2009154426 A1 20090618 [] (PERRAUD ERIC [FR], et al)
CCI	- H04W24/02
CCA	- H04W16/18 ; H04W28/08 ; H04W36/0083
CI	- H04W24/02 (EP, US)
CA	- H04W16/18 (EP, US) - H04W28/08 (EP, US) - H04W36/0083 (EP, US)
PA	- (A1 B2) RESEARCH IN MOTION LTD [CA]
TI	- (A1) Adaptive Beamforming Configuration Methods And Apparatus For Wireless Access Points Serving As Handoff Indication Mechanisms In Wireless Local Area Networks - (B2) Adaptive beamforming configuration methods and apparatus for wireless access points serving as handoff indication mechanisms in wireless local area networks
AB	- (A1) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication



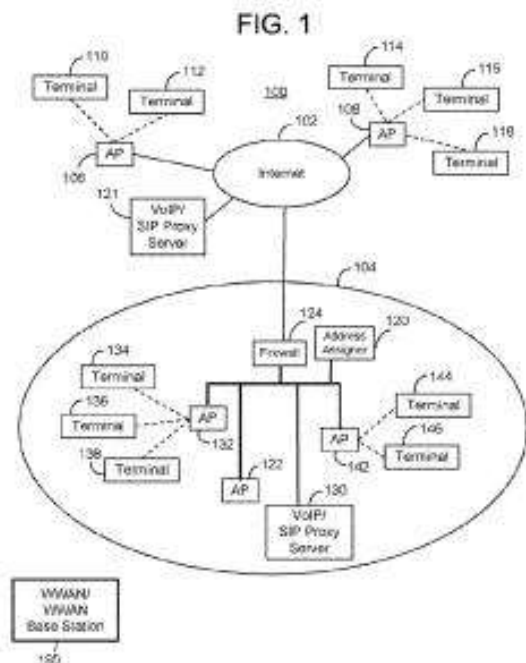
mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. **Wireless transceiver** parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the **wireless transceiver** are determined through use of an adaptive **beamforming** technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured **wireless transceiver** parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

- (B2)

Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an

RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. **Wireless transceiver** parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the **wireless transceiver** are determined through use of an adaptive **beamforming** technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured **wireless transceiver** parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

- 21/21 © EPODOC / EPO
- PN - [EP1988727](#) A1 20081105
- PNFP - EP1988727 B1 20100414
- PR - EP20070107452 20070503
- AP - EP20070107452 20070503
- DT - *; Rep
- CT - || STSE (A1)
[US2004009792](#) A1 20040115
 [Y] (WEIGAND GILBERT G [US])
 [Y] 1,2,4,6-9,11,13-18,20
 * paragraphs [0004] - [0013] *
 * paragraphs [0038] - [0042] - [0056] *
 * paragraphs [0057] , [0061] , [0073] *
 * paragraphs [0081] , [0105] - [0108] *
 * claims 1-19 *;
[US2005048972](#) A1 20050303
 [Y] (DORENBOSCH JHEROEN P [US], et al)
 [Y] 1,2,4,6-9,11,13-18,20
 * paragraphs [0010] - [0017] *
 * paragraphs [0047] - [0059] *
 * abstract *;
[EP1152628](#) A1 20011107 [A] (MATSUSHITA ELECTRIC IND CO LTD [JP])
 [A] 1,8,15
 * paragraphs [0013] , [0023] - [0025] *
 * claims 1,2,4,5,9 *
- CCI - [H04W24/02](#)
- CCA - [H04W16/18](#) ; [H04W36/0083](#) ;
[H04W88/08](#)



CI	- H04W24/02 (EP)
CA	- H04W16/18 (EP) - H04W36/0083 (EP) - H04W88/08 (EP)
PA	- (A1 B1) RESEARCH IN MOTION LTD [CA]
TI	- (A1 B1) Adaptive beamforming configuration methods and apparatus for wireless access points serving as handoff indication mechanisms in wireless local area networks
AB	- (A1) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. Wireless transceiver parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the wireless transceiver are determined through use of an adaptive beamforming technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured wireless transceiver parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

TXT - h04w
- multi-system

[SS 33] beamforming and wireless and transceiver and radio

Results in EPODOC 44

[SS 34] ..li



1/44 © EPODOC / EPO

PN - [WO2020068125](#) A1 20200402
PR - WO2018US53493 20180928
AP - WO2018US53493 20180928
DT - *; Rep
CT - [US] ISR (A1)
[US2009189801](#) A1 20090730
[A] (FORSTNER HANS PETER [DE], et al)
[A] 1-37
* ; paragraphs [0028-0029, 0031, 0033] *;
[US2008075021](#) A1 20080327
[A] (ROFOUGARANAHMADREZA REZA [US])
[A] 1-37
* ; abstract; figure 2; paragraphs [0037, 0072, 0076, 0084] *;
[US2014132450](#) A1 20140515
[A] (CHEN PING-YU [TW], et al)
[A] 1-37
* ; paragraphs [0011, 0041, 0045-0046] *

CCI - [H04B7/0632](#) ; [H04B7/0686](#) ;
[H04B7/0695](#)

CCA - [Y02D30/70](#)

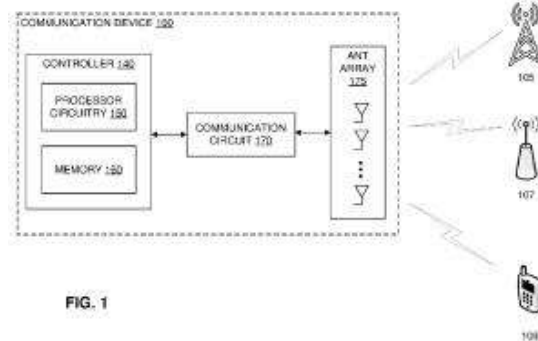
CI - H04B7/0632 (EP)
- H04B7/0686 (EP)
- H04B7/0695 (EP)

CA - Y02D30/70 (EP)

PA - INTEL CORP [US]

TI - COMMUNICATION SCANNING METHOD AND SYSTEM

AB - In a communication device and corresponding methods, a hierarchical, reduced power, beam search process includes a hierarchical activation of the **radio** frequency frontend (RFFE), **transceiver**, and baseband integrated circuit (BBIC) for a beam searching operations. For example, a first signal metric measurements can be performed to determine signal information. An operating



mode can be determined based on the signal information. In a first operating mode, one or more second signal metric measurements can be performed for a subset of **beamforming** configurations of the **wireless** communication device to determine **beamforming** information. In a second operating mode, one or more third signal metric measurements can be performed on the **beamforming** configurations to determine the **beamforming** information.

2/44 © EPODOC / EPO

- PN - [US2020091985](#) A1 20200319
- PR - US201916694511 20191125; US201615321206 20161206; WO2016EP79807 20161206
- AP - US201916694511 20191125
- DT - **
- CCI - [H04B7/0617](#) ; [H04B7/0695](#)
- CI - H04B7/0617 (EP, RU, US)
- H04B7/0626 (RU, US)
- H04B7/0695 (EP, RU, US)
- CA - H04W16/28 (US)
- H04W72/046 (US)
- PA - ERICSSON TELEFON AB L M [SE]
- TI - CONFIGURATION OF **BEAMFORMING** SETTINGS FOR A **WIRELESS RADIO TRANSCEIVER** DEVICE
- AB - There is provided mechanisms for configuring **beamforming** settings. A method is performed by a **wireless radio transceiver** device configured to communicate in directional beams. The method comprises obtaining a performance indication requiring configuration of the **beamforming** settings of the **wireless radio transceiver** device. The method comprises selecting a similarity measure objective based on what kind of performance indication was obtained. The method comprises determining, based on the similarity measure objective and results from a similarity measure procedure applied to pairs of received signals, an order in which to evaluate the directional beams when configuring the **beamforming** settings.

3/44 © EPODOC / EPO

- PN - [PH12019501094](#) A1 20191211
- PR - WO2016EP79807 20161206
- AP - PH20191501094 20190516
- DT - I
- CCI - [H04B7/0617](#) ; [H04B7/0695](#)
- CI - H04B7/0617 (EP, RU, US)
- H04B7/0626 (RU, US)
- H04B7/0695 (EP, RU, US)
- CA - H04W16/28 (US)
- H04W72/046 (US)
- PA - ERICSSON TELEFON AB L M [SE]

- TI - CONFIGURATION OF **BEAMFORMING** SETTINGS FOR A **WIRELESS RADIO TRANSCEIVER** DEVICE
- AB - There is provided mechanisms for configuring **beamforming** settings. A method is performed by a **wireless radio transceiver** device configured to communicate in directional beams. The method comprises obtaining a performance indication requiring configuration of the **beamforming** settings of the **wireless radio transceiver** device. The method comprises selecting a similarity measure objective based on what kind of performance indication was obtained. The method comprises determining, based on the similarity measure objective and results from a similarity measure procedure applied to pairs of received signals, an order in which to evaluate the directional beams when configuring the **beamforming** settings.

4/44 © EPODOC / EPO

- PN - [CN110546897](#) A 20191206
- PR - US201715585831 20170503; WO2018US26916 20180410
- AP - CN20188027191 20180410
- DT - I
- CCI - [H04B7/0421](#) ; [H04B7/0634](#)
- CI - H04B7/0421 (EP, US)
- H04B7/0452 (US)
- H04B7/046 (US)
- H04B7/0634 (EP, US)
- H04B17/0085 (US)
- H04B17/24 (US)
- PA - LITEPOINT CORP
- TI - METHOD FOR ENABLING CONFIRMATION OF EXPECTED PHASE SHIFTS OF **RADIO** FREQUENCY SIGNALS EMITTED FROM AN ANTENNA ARRAY
- AB - A method for assessing receiver signal reception performance during **wireless** beam steering operation of a **radio** frequency (RF) data packet signal **transceiver** capable of multiple input, multiple output (MTMO) operation. In response to transmissions of a sounding packet (SP) from a **beamforming** device ("beamformer"), a receiving device ("beamformee") transmits a response data packet containing matrix data representing a **beamforming** feedback matrix (BFM) related to signal attenuation by the **wireless** signal path environment through which the beamformer and beamformee are communicating. Using the matrix data, a statistical variation can be computed which is indicative of signal reception performance of the beamformee.

5/44 © EPODOC / EPO

- PN - [MX2019006394](#) A 20190812
- PR - WO2016EP79807 20161206
- AP - MX20190006394 20161206
- DT - I
- CCI - [H04B7/0617](#) ; [H04B7/0695](#)
- CI - H04B7/0617 (EP, RU, US)
- H04B7/0626 (RU, US)
- H04B7/0695 (EP, RU, US)
- CA - H04W16/28 (US)
- H04W72/046 (US)
- PA - ERICSSON TELEFON AB L M [SE]
- TI - CONFIGURATION OF **BEAMFORMING** SETTINGS FOR A **WIRELESS RADIO TRANSCEIVER** DEVICE.
- AB - There is provided mechanisms for configuring **beamforming** settings. A method is performed by a **wireless radio transceiver** device configured to communicate in directional beams. The method comprises obtaining a performance indication

requiring configuration of the **beamforming** settings of the **wireless radio transceiver** device. The method comprises selecting a similarity measure objective based on what kind of performance indication was obtained. The method comprises determining, based on the similarity measure objective and results from a similarity measure procedure applied to pairs of received signals, an order in which to evaluate the directional beams when configuring the **beamforming** settings.

6/44 © EPODOC / EPO

PN - [WO2020052880](#) A1 20200319

PR - EP20180193368 20180910

AP - WO2019EP71568 20190812

DT - **

CT - |EP| ISR (A1)
[US2002154687](#) A1 20021024 [XI] (BIERLY SCOTT [US], et al)
 [X] 1-5,7-12,14,15
 * paragraph [0028] - paragraph [0034]; figure 1 *
 [I] 6,13;
[WO2017044038](#) A1 20170316 [XD] (TÖRMÄNEN MARKUS [SE], et al)
 [XD] 1
 * figure 3 *;
[WO2010132801](#) A1 20101118 [X] (QUALCOMM INC [US], et al)
 [X] 1
 * figure 3 *;
[WO2017037861](#) A1 20170309 [X] (FUJITSU LTD [JP])
 [X] 1
 * paragraph [0035] *;
[US2017272146](#) A1 20170921 [X] (MATSUO RYOKO [JP])
 [X] 1
 * paragraph [0151] *

CCI - [H04B1/0053](#) ; [H04B7/0617](#)

CCA - [H04B7/0897](#)

CI - H04B1/0053 (EP)
 - H04B7/0617 (EP)

CA - H04B7/0897 (EP)

PA - BEAMMWAVE AB [SE]

TI - **TRANSCEIVERELEMENT FOR BEAMFORMING**

AB - This disclosure relates to a **transceiver** element comprising receiving circuitry, down-converting circuitry, extracting circuitry and output circuitry. The receiving circuitry is configured to receive a **radio** frequency signal via an antenna element associated with the receiving circuitry. The **radio** frequency signal comprises a first received signal part and a second received signal part. The down-converting circuitry is configured to down-convert the **radio** frequency signal to provide a down-converted signal. The down-converted signal comprises a first down-converted signal part corresponding to the first received signal part and a second down-converted signal part corresponding to the second received signal part. The extracting circuitry is configured to extract at least the second down-converted signal part from the down-converted signal. The output circuitry is configured to provide an output signal comprising a first output signal part and a second output signal part. The first output signal part comprises at least a first intermediate signal part which comprises at least the first down-converted signal part. The second output signal part comprises at least the second down-converted signal part extracted from the down-converted signal. Corresponding **transceiver**, **wireless** communication apparatus, method and computer program product are also disclosed.

7/44 © EPODOC / EPO

PN - [US2019222276](#) A1 20190718

PR - WO2016US55024 20160930
AP - US201616329028 20160930
DT - **
CCI - [H04B7/0478](#) ; [H04L25/03343](#)
CI - H01Q3/36 (US)
- H04B1/0475 (US)
- H04B1/38 (US)
- H04B7/0465 (US)
- H04B7/0478 (EP)
- H04B7/0482 (US)
- H04B17/345 (US)
- H04L25/03343 (EP)
PA - INTEL IP CORP [US]
TI - **BEAMFORMING**FOR HYBRID ANTENNA ARRAYS
AB - A **wireless** device, comprising: a hybrid antenna array configured to receive a signal transmitted by another **wireless** device over a **wireless** channel; and a **transceiver** configured to update analog **radio** frequency precoders of a hierarchical codebook based on magnitudes of multipath components of the **wireless** channel.

8/44 © EPODOC / EPO

PN - [CN109983709](#) A 20190705
PR - WO2016EP82720 20161227
AP - CN20168090962 20161227
DT - I
CCI - [H04B7/0469](#) ; [H04B7/0617](#) ; [H04L25/0204](#)
CI - H04B7/0469 (EP, US)
- H04B7/0617 (EP, US)
- H04L25/0204 (EP, US)
PA - ERICSSON TELEFON AB L M
TI - CHANNEL CONDITION ESTIMATION
AB - There is provided mechanisms for obtaining channel conditions per antenna element. A method is performed by a **wireless radio transceiver** device comprising N antenna elements in an antenna array with analog **beamforming** and being configured to communicate using beams. The method comprises obtaining, for a stationary **radio** propagation channel, channel conditions for signals received by the **wireless radio transceiver** device in M beams, where M>1. The method comprises transforming the channel conditions for the M beams to channel conditions for the N antenna elements by using a relation based on **beamforming** weights that map the N antenna elements to the M beams.

9/44 © EPODOC / EPO

PN - [AU2016432029](#) A1 20190704
PR - WO2016EP79807 20161206
AP - AU20160432029 20161206
DT - I
CCI - [H04B7/0617](#) ; [H04B7/0695](#)
CI - H04B7/0617 (EP, RU, US)
- H04B7/0626 (RU, US)
- H04B7/0695 (EP, RU, US)
CA - H04W16/28 (US)
- H04W72/046 (US)
PA - ERICSSON TELEFON AB L M [SE]

- TI - Configuration of **beamforming** settings for a **wireless radio transceiver** device
- AB - There is provided mechanisms for configuring **beamforming** settings. A method is performed by a **wireless radio transceiver** device configured to communicate in directional beams. The method comprises obtaining a performance indication requiring configuration of the **beamforming** settings of the **wireless radio transceiver** device. The method comprises selecting a similarity measure objective based on what kind of performance indication was obtained. The method comprises determining, based on the similarity measure objective and results from a similarity measure procedure applied to pairs of received signals, an order in which to evaluate the directional beams when configuring the **beamforming** settings.

10/44 © EPODOC / EPO

- PN - [CA3046140](#) A1 20180614
- PR - WO2016EP79807 20161206
- AP - CA20163046140 20161206
- DT - I
- CCI - [H04B7/0617](#) ; [H04B7/0695](#)
- CI - H04B7/0617 (EP, RU, US)
- H04B7/0626 (RU, US)
- H04B7/0695 (EP, RU, US)
- CA - H04W16/28 (US)
- H04W72/046 (US)
- PA - ERICSSON TELEFON AB L M [SE]
- TI - CONFIGURATION OF **BEAMFORMING** SETTINGS FOR A **WIRELESS RADIO TRANSCEIVER** DEVICE
- AB - There is provided mechanisms for configuring **beamforming** settings. A method is performed by a **wireless radio transceiver** device configured to communicate in directional beams. The method comprises obtaining a performance indication requiring configuration of the **beamforming** settings of the **wireless radio transceiver** device. The method comprises selecting a similarity measure objective based on what kind of performance indication was obtained. The method comprises determining, based on the similarity measure objective and results from a similarity measure procedure applied to pairs of received signals, an order in which to evaluate the directional beams when configuring the **beamforming** settings.

11/44 © EPODOC / EPO

- PN - [TW201843948](#) A 20181216
- PR - US201715585831 20170503
- AP - TW20180111002 20180329
- DT - I
- CCI - [H04B7/0421](#) ; [H04B7/0634](#)
- CI - H04B7/0421 (EP, US)
- H04B7/0452 (US)
- H04B7/046 (US)
- H04B7/0634 (EP, US)
- H04B17/0085 (US)
- H04B17/24 (US)
- PA - LITEPOINT CORP [US]
- TI - Method for enabling confirmation of expected phase shifts of **radio** frequency signals emitted from an antenna array
- AB - A method for assessing receiver signal reception performance during **wireless** beam steering operation of a **radio** frequency (RF) data packet signal **transceiver** capable of multiple input, multiple output (MIMO) operation. In response to transmissions of a sounding packet (SP) from a **beamforming** device ("beamformer"), a receiving device

("beamformee") transmits a response data packet containing matrix data representing a **beamforming** feedback matrix (BFM) related to signal attenuation by the **wireless** signal path environment through which the beamformer and beamformee are communicating. Using the matrix data, a statistical variation can be computed which is indicative of signal reception performance of the beamformee.

12/44 © EPODOC / EPO

PN - [CN109004373](#) A 20181214
 PR - CN201810824016 20180725
 AP - CN201810824016 20180725
 DT - I
 CI - H01Q1/36 (CN)
 - H01Q1/38 (CN)
 - H01Q1/50 (CN)
 - H01Q19/104 (CN)
 - H01Q21/065 (CN)
 - H01Q23/00 (CN)
 - H04B7/0413 (CN)
 PA - NANJING HOWKING COMMUNICATION TECH CO LTD
 TI - A highly integrated active integrated antenna module for fifth generation mobile communication
 AB - The invention relates to the technical field of **wireless** communication, In particular, the invention relates to a highly integrated and integrated antenna module for the fifth generation mobile communication, which comprises a 2x2 miniaturized antenna array, an antenna interface, a reference clock interface, a power interface, a serial interface, an I/Q signal interface, a **radio** frequency front end unit, a **transceiver** unit, an MCU unit, an operational amplifier unit, a power management unit and the like. The invention provides a novel antenna structure aiming at the frequency band of 3.3 GHz -3.5 GHz in the 5G medium frequency band. A circularly polarized miniaturized antenna is designed by means of cutting angle metal patch and loading metal patch, and the size is simple and compact. Antenna and system circuits can be designed as a whole, and large-scale MIMO antenna arrays can be formed freely according to different antenna topologies to realize antenna multi-**beamforming**.

13/44 © EPODOC / EPO

PN - [WO2018204037](#) A1 20181108
 PR - US201715585831 20170503
 AP - WO2018US26916 20180410
 DT - **
 CT - | KR| ISR (A1)
 [US2016373196](#) A1 20161222 [Y] (STOTT LESTER NOEL [US], et al)
 [Y] 1-19
 * See paragraphs 0023 [0049]-[0052], [0058], [01021; and figure 7. *;
 [US2017063438](#) A1 20170302 [Y] (BAIK EUGENE [US], et al)
 [Y] 1-19
 * See paragraphs [0039]-[0040], [0067]; and figures 2-5. *;
 [US2012269288](#) A1 20121025 [Y] (OLGAARD CHRISTIAN VOLF [US], et al)
 [Y] 4-5, 14-15
 * See paragraph [0037]; and figure 3. *;
 [US2017064568](#) A1 20170302 [A] (ELSHERIF AHMED RAGAB [US], et al)
 [A] 1-19
 * See paragraphs [0088]-[0098]; and figure 5. *;
 [US2015092824](#) A1 20150402 [A] (WICKER JR DAVID JENNINGS [US], et al)
 [A] 1-19
 * See paragraphs [0060]-[0101]; and figures 13-17. *

CCI	- H04B7/0421 ; H04B7/0634
CI	- H04B7/0421 (EP, US) - H04B7/0452 (US) - H04B7/046 (US) - H04B7/0634 (EP, US) - H04B17/0085 (US) - H04B17/24 (US)
PA	- LITEPOINT CORP [US]
TI	- METHOD FOR ENABLING CONFIRMATION OF EXPECTED PHASE SHIFTS OF RADIO FREQUENCY SIGNALS EMITTED FROM AN ANTENNA ARRAY
AB	- A method for assessing receiver signal reception performance during wireless beam steering operation of a radio frequency (RF) data packet signal transceiver capable of multiple input, multiple output (MTMO) operation. In response to transmissions of a sounding packet (SP) from a beamforming device ("beamformer"), a receiving device ("beamformee") transmits a response data packet containing matrix data representing a beamforming feedback matrix (BFM) related to signal attenuation by the wireless signal path environment through which the beamformer and beamformee are communicating. Using the matrix data, a statistical variation can be computed which is indicative of signal reception performance of the beamformee.

14/44 © EPODOC / EPO

PN	- US2018323839 A1 20181108
PNFP	- US10720976 B2 20200721
PR	- WO2016EP82720 20161227
AP	- US201615325846 20161227
DT	- **
CT	- STSE (B2) US8181076 B2 20120515 [] (LOU HANQING [US], et al); US8502733 B1 20130806 [] (NEGUS KEVIN J [US], et al); US2009168912 A1 20090702 [] (LI XIAODONG [US], et al); US2010251038 A1 20100930 [] (OYAMA TEPPEI [JP]); US2012033761 A1 20120209 [] (GUO YINGJIE JAY [AU], et al); US2013044683 A1 20130221 [] (MALTSEV ALEXANDER [RU], et al); US2013090071 A1 20130411 [] (ABRAHAM SANTOSH PAUL [US], et al); US2016197709 A1 20160707 [] (SHEN JIYUN [JP], et al); US2016359596 A1 20161208 [] (WILD THORSTEN [DE])
CCI	- H04B7/0469 ; H04B7/0617 ; H04L25/0204
CI	- H04B7/0469 (EP, US) - H04B7/0617 (EP, US) - H04L25/0204 (EP, US)
PA	- (A1 B2) ERICSSON TELEFON AB L M [SE]
TI	- (A1) CHANNEL CONDITION ESTIMATION - (B2) Channel condition estimation
AB	- (A1 B2) There is provided mechanisms for obtaining channel conditions per antenna element, A method is performed by a wireless radio transceiver device comprising N antenna elements in an antenna array with analog beamforming and being configured to communicate using beams. The method comprises obtaining, for a stationary radio propagation channel, channel conditions for signals received by the wireless radio transceiver device in M beams, where M>1. The method comprises transforming the channel conditions for the M beams to channel conditions for the N antenna elements by using a relation based on beamforming weights that map the N

antenna elements to the M beams.

15/44 © EPODOC / EPO

- PN - [US10079626](#) B1 20180918
- PR - US201715585831 20170503
- AP - US201715585831 20170503
- DT - *; Rep
- CT - || STSE (B1)
[US2016233932](#) A1 20160811 [] (HEDAYAT AHMAD REZA [US], et al);
[US2016254884](#) A1 20160901 [] (HEDAYAT AHMAD REZA [US], et al);
[US2017111092](#) A1 20170420 [] (GOYAL GAGAN [IN], et al);
[US2017134187](#) A1 20170511 [] (CHEN CHIN-HUNG [US], et al);
[US2017195026](#) A1 20170706 [] (GHOSH CHITTABRATA [US], et al);
[US2017290045](#) A1 20171005 [] (NAIR MADHAVAN [US], et al);
[US2018123655](#) A1 20180503 [] (YAO ZONGMING [CN], et al)
- CCI - [H04B7/0421](#) ; [H04B7/0634](#)
- CI - H04B7/0421 (EP, US)
- H04B7/0452 (US)
- H04B7/046 (US)
- H04B7/0634 (EP, US)
- H04B17/0085 (US)
- H04B17/24 (US)
- PA - LITEPOINT CORP [US]
- TI - Method for enabling confirmation of expected phase shifts of **radio** frequency signals emitted from an antenna array
- AB - A method for assessing receiver signal reception performance during **wireless** beam steering operation of a **radio** frequency (RF) data packet signal **transceiver** capable of multiple input, multiple output (MIMO) operation. In response to transmissions of a sounding packet (SP) from a **beamforming** device ("beamformer"), a receiving device ("beamformee") transmits a response data packet containing matrix data representing a **beamforming** feedback matrix (BFM) related to signal attenuation by the **wireless** signal path environment through which the beamformer and beamformee are communicating. Using the matrix data, a statistical variation can be computed which is indicative of signal reception performance of the beamformee.

16/44 © EPODOC / EPO

PN - [EP3621214](#) A1 20200311
 PR - EP20180193368 20180910
 AP - EP20180193368 20180910
 DT - *; Rep
 CT - || STSE (A1)
 [US2002154687](#) A1 20021024
 [XI] (BIERLY SCOTT [US], et al)
 [X] 1-5,7-12,14,15
 * paragraph [0028] -
 paragraph [0034]; figure 1 *
 [I] 6,13;
 [WO2017044038](#) A1 20170316
 [XD] (TÖRMÄNEN MARKUS [SE], et al)
 [XD] 1
 * figure 3 *;
 [WO2010132801](#) A1 20101118
 [X] (QUALCOMM INC [US], et al)
 [X] 1
 * figure 3 *;
 [WO2017037861](#) A1 20170309
 [X] (FUJITSU LTD [JP])
 [X] 1
 * paragraph [0035] *;
 [US2017272146](#) A1 20170921
 [X] (MATSUO RYOKO [JP])
 [X] 1
 * paragraph [0151] *
 CCI - [H04B1/0053](#) ; [H04B7/0617](#)
 CCA - [H04B7/0897](#)
 CI - H04B1/0053 (EP)
 - H04B7/0617 (EP)
 CA - H04B7/0897 (EP)
 PA - BEAMMWAVE AB [SE]
 TI - **TRANSCEIVERELEMENT
FOR BEAMFORMING**
 AB - This disclosure relates to a **transceiver** element comprising receiving circuitry, down-converting circuitry, extracting circuitry and output circuitry. The receiving circuitry is configured to receive a **radio** frequency signal via an antenna element associated with the receiving circuitry. The **radio** frequency signal comprises a first received signal part and a second received signal part. The down-converting circuitry is configured to down-convert the **radio** frequency signal to provide a down-converted signal. The down-converted signal comprises a first down-converted signal part corresponding to the first

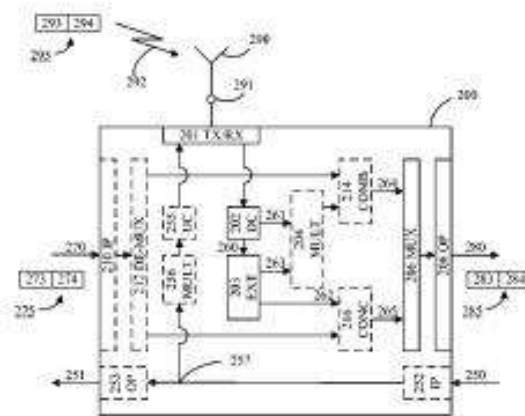


FIG. 2A

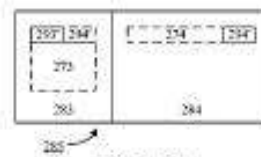


FIG. 2B

received signal part and a second down-converted signal part corresponding to the second received signal part. The extracting circuitry is configured to extract at least the second down-converted signal part from the down-converted signal. The output circuitry is configured to provide an output signal comprising a first output signal part and a second output signal part. The first output signal part comprises at least a first intermediate signal part which comprises at least the first down-converted signal part. The second output signal part comprises at least the second down-converted signal part extracted from the down-converted signal. Corresponding **transceiver**, **wireless** communication apparatus, method and computer program product are also disclosed.

17/44 © EPODOC / EPO

PN - [US2018205420](#) A1 20180719

PNFP - US10389413 B2 20190820

PR - WO2016EP72660 20160923

AP - US201615302616 20160923

DT - **

CT - || STSE (A1)
[US2014341310](#) A1 20141120 [X] (RAHMAN MD SAIFUR [US], et al)
[X] 1-19, 21-23
* Fig. 5 Fig. 12 | [0072]-[0110] | claim 2 | claim 1 | claim 3 | Page 4 | claim 4 | claim 6 | claim 7 | claim 8 | claim 9 | claim 10 | claim 11 | claim 12 | claim 14 | claim 15 | claim 17 | Page 6 *
- || STSE (B2)
[US2014341310](#) A1 20141120 [] (RAHMAN MD SAIFUR [US], et al)

CCI - [H04B7/0408](#) ; [H04B7/088](#)

CCA - [H04B7/0874](#)

CI - H04B7/0408 (EP, US)
- H04B7/0617 (US)
- H04B7/0632 (US)
- H04B7/088 (EP, US)
- H04L5/0057 (US)
- H04W72/085 (US)

CA - H04B7/0874 (EP, US)

PA - (A1 B2)
ERICSSON TELEFON AB L M [SE]

TI - (A1)
Configuration of **Beamforming** Settings
- (B2)

	Configuration of beamforming settings
AB	- (A1) There is provided mechanisms for configuring beamforming settings. A method is performed by a wireless radio transceiver device comprising at least two receiver chains. The method comprises receiving transmission from an access node in at least two beams, each beam using a separate one of the two receiver chains. The method comprises configuring beamforming settings in at least one of the receiver chains for reception of the transmission in at least one of the beams for evaluating at least one candidate beam. The method comprises fixing beamforming settings in at least one other of the receiver chains for reception of the transmission in at least one other of the beams - (B2) There is provided mechanisms for configuring beamforming settings. A method is performed by a wireless radio transceiver device comprising at least two receiver chains. The method comprises receiving transmission from an access node in at least two beams, each beam using a separate one of the two receiver chains. The method comprises configuring beamforming settings in at least one of the receiver chains for reception of the transmission in at least one of the beams for evaluating at least one candidate beam. The method comprises fixing beamforming settings in at least one other of the receiver chains for reception of the transmission in at least one other of the beams.
18/44	© EPODOC / EPO
PN	- US2018198509 A1 20180712
PNFP	- US10536204 B2 20200114
PR	- WO2016EP79807 20161206
AP	- US201615321206 20161206
DT	- **
CT	- STSE (A1) US2008085681 A1 20080410 [A] (WANG ZHAOCHENG [DE], et al); US2018084585 A1 20180322 [A] (LEE SUNYOUNG [KR], et al); US2017055187 A1 20170223 [A] (KANG HYUN-JEONG [KR], et al) - STSE (B2) US2008085681 A1 20080410 [] (WANG ZHAOCHENG [DE], et al); US2017055187 A1 20170223 [] (KANG HYUN-JEONG [KR], et al); US2018084585 A1 20180322 [] (LEE SUNYOUNG [KR], et al)
CCI	- H04B7/0617 ; H04B7/0695
CI	- H04B7/0617 (EP, RU, US) - H04B7/0626 (RU, US) - H04B7/0695 (EP, RU, US)
CA	- H04W16/28 (US) - H04W72/046 (US)
PA	- (A1 B2) ERICSSON TELEFON AB L M [SE]
TI	- (A1) CONFIGURATION OF BEAMFORMING SETTINGS FOR A WIRELESS RADIO TRANSCEIVER DEVICE - (B2) Configuration of beamforming settings for a wireless radio transceiver device
AB	- (A1 B2) There is provided mechanisms for configuring beamforming settings. A method is performed by a wireless radio transceiver device configured to communicate in directional beams. The method comprises obtaining a performance indication requiring configuration of the beamforming settings of the wireless radio transceiver device. The method comprises selecting a similarity measure objective based on what kind of performance indication was obtained. The method comprises

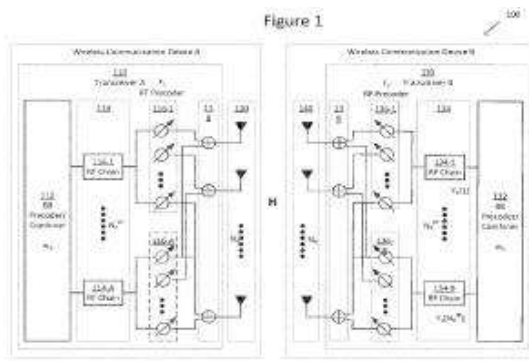
determining, based on the similarity measure objective and results from a similarity measure procedure applied to pairs of received signals, an order in which to evaluate the directional beams when configuring the **beamforming** settings.

19/44 © EPODOC / EPO

- PN - [GB2571917](#) A 20190918
- PNFP - GB2571917 A8 20191009
- PR - GB20180003007 20180225
- AP - GB20180003007 20180225
- DT - **
- CT - || STSE (A)
[GB2552960](#) A 20180221 [] (BLUWIRELESS TECH LIMITED [GB]);
[EP2096781](#) A1 20090902 [] (YOKOGAWA ELECTRIC CORP [JP], et al);
[WO2014077673](#) A1 20140522 [] (MIMOS BERHAD [YE]);
[WO2010123700](#) A1 20101028 [] (INTEL CORP [US], et al);
[US2003153294](#) A1 20030814 [] (HATA YOSHIYUKI [JP])
- CCI - [H04W72/0453](#)
- CCA - [H04B7/0617](#) ; [H04W72/082](#) ; [H04W84/18](#)
- CI - H04W72/0453 (EP)
H04W84/18 (GB)
- CA - H04B2001/0491 (GB)
H04B1/707 (GB)
H04B7/0617 (EP, GB)
H04W72/082 (EP)
H04W72/10 (GB)
H04W84/18 (EP)
- PA - (A A8)
BLUWIRELESS TECH LIMITED [GB]
- TI - (A A8)
Wireless communications networks
- AB - (A A8)
A method of mitigating start-of-packet interference in a millimetre waveband **wireless** mesh network which comprises a plurality of nodes each having a **transceiver** including a **beamforming** antenna, and a plurality of **wireless** communications links interconnecting pairs of transceivers of the nodes. The method comprises: allocating respective baseband centre frequencies to pairs of transceivers for use with respective links, each allocated baseband centre frequency being offset from other allocated frequencies by a predetermined offset amount. A **transceiver** of a pair encodes a data packet using an encoding signal having the allocated baseband frequency. The **transceiver** may modulate the encoded signal with a **radio** frequency carrier to generate a transmission signal. The other **transceiver** of the pair may demodulate a received signal at the carrier frequency and decode at the allocated baseband centre frequency to recover the data packet. As different **wireless** links use different baseband frequencies, the nodes will not decode packets from incorrect links, avoiding start-of-packet interference caused by attempting to process a spurious packet.

20/44 © EPODOC / EPO

PN - [WO2018063401](#) A1 20180405
PR - WO2016US55024 20160930
AP - WO2016US55024 20160930
DT - *; Rep
CT - |US| ISR (A1)
[US2014334564](#) A1 20141113
[X] 1-5, 7/1-7/5, 8/1-8/5, 9/1-9/5
*, figures 1, 4, abstract,
paragraphs [0026], [0029],
[0048], [0057], [0061], [0064].
*
[Y] 6,0/6, 8/6, 9/6
[A] 15-25;
[US2015289147](#) A1 20151008
[Y] (LOU HANQING [US], et al)
[Y] 6, 7/6, 8/6, 9/6
*, paragraph [0227]. *;
[US2013057432](#) A1 20130307
[A] (RAJAGOPAL SRIDHAR [US],
et al)
[A] 1-25
*, entire document. *;
[US2016269093](#) A1 20160915
[A] (SEOL JI-YUN [KR], et al)
[A] 1-25
*, entire document. *
CCI - [H04B7/0478](#) ; [H04L25/03343](#)
CI - H01Q3/36 (US)
- H04B1/0475 (US)
- H04B1/38 (US)
- H04B7/0465 (US)
- H04B7/0478 (EP)
- H04B7/0482 (US)
- H04B17/345 (US)
- H04L25/03343 (EP)
PA - INTEL IP CORP [US]
TI - **BEAMFORMING** FOR HYBRID
ANTENNA ARRAYS
AB - A **wireless** device, comprising:
a hybrid antenna array
configured to receive a signal
transmitted by
another **wireless** device over
a **wireless** channel; and
a **transceiver** configured to
update analog **radio** frequency
precoders of a hierarchical
codebook based on
magnitudes of multipath
components of the **wireless**
channel.



PN - [US2016380690](#) A1 20161229

PNFP - US10020866 B2 20180710

PR - WO2013EP75683 20131205

AP - US201315101519 20131205

DT - **

CT - || R141 (A1)
[US2012007789](#) A1 20120112 [] (PETERSSON SVEN [SE], et al);
[US6697643](#) B1 20040224 [] (HAGERMAN BO [SE], et al);
[US2003161410](#) A1 20030828 [] (SMITH MARTIN [GB], et al);
[WO2011134519](#) A1 20111103 [] (ERICSSON TELEFON AB L M [SE], et al);
[US9768494](#) B2 20170919 [] (JOHANSSON STEFAN [SE], et al);
[US9680434](#) B2 20170613 [] (YAN SHENG-HONG [TW], et al);
[US2014187174](#) A1 20140703 [] (SAFAVI SAEID [US], et al);
[US2011170625](#) A1 20110714 [] (BLANKENSHIP YUFEI [US], et al);
[US2017374607](#) A1 20171228 [] (WU CHIH-HSIANG [TW])
- || STSE (B2)
[US6697643](#) B1 20040224 [] (HAGERMAN BO [SE], et al);
[US9680434](#) B2 20170613 [] (YAN SHENG-HONG [TW], et al);
[US9768494](#) B2 20170919 [] (JOHANSSON STEFAN [SE], et al);
[US2003161410](#) A1 20030828 [] (SMITH MARTIN [GB], et al);
[US2011170625](#) A1 20110714 [] (BLANKENSHIP YUFEI [US], et al);
[US2012007789](#) A1 20120112 [] (PETERSSON SVEN [SE], et al);
[US2014187174](#) A1 20140703 [] (SAFAVI SAEID [US], et al);
[US2017374607](#) A1 20171228 [] (WU CHIH-HSIANG [TW]);
[WO2011134519](#) A1 20111103 [] (ERICSSON TELEFON AB L M [SE], et al)

CCI - [H04B7/0617](#) ; [H04B7/10](#)

CI - H04B7/0617 (EP, US)
- H04B7/10 (EP, US)

PA - (A1)
ERICSSON TELEFON AB L M (PUBL) [SE]
- (B2)
ERICSSON TELEFON AB L M [SE]

TI - (A1)
Wireless Communication Node With Adaptive Communication
- (B2)
Wireless communication node with adaptive communication

AB - (A1 B2)
The present invention relates to a **wireless** communication node (1) comprising at least one antenna arrangement (2, 3, 4). Each antenna arrangement (2, 3, 4) comprises at least three antenna devices (5, 6, 7, 8), comprising corresponding pairs of antenna ports (A, B, C, D) with a corresponding first and second antenna port (P1A, P1 B, P1 C, P1D; P2A, P2B, P2C, P2D). Each antenna port (P1A, P1 B, P1C, P1D; P2A, P2B, P2C, P2D) is arranged downlink and uplink and is connected to a corresponding **radio transceiver** unit (11, 12, 13, 14, 15, 16, 17, 18). Each antenna device (5, 6, 7, 8) comprises at least one corresponding dual polarized antenna element (19, 20, 21, 22) arranged for transmitting and receiving signals at a first polarization (P1) via the corresponding first antenna port (P1A, P1B, P1 C, P1 D) and for transmitting and receiving signals at a second polarization (P2) via the corresponding second antenna port (P2A, P2B, P2C, P2D). A **beamforming** arrangement (23) is arranged to apply **beamforming** on downlink signals. For an adaptive mode of operation for downlink, the **beamforming** arrangement (23) is arranged to apply **beamforming** such that one or two antenna beams (48a, 48b) is/are directed in a first direction (49), and such that one or two antenna beams (32a, 32b) is/are directed in a second direction (33).

- PN - [WO2018121843](#) A1 20180705
- PR - WO2016EP82720 20161227
- AP - WO2016EP82720 20161227
- DT - *; Rep
- CT - |EP| ISR (A1)
[XP011232515](#) A[XI];
[US2013301454](#) A1 20131114
[Y] (SEOL JI-YUN [KR], et al)
[Y] 5,6,9-17
* abstract *
* paragraphs [0051] , [0 52] ,
[0064] , [0 68] , [0 69] , [0 73] -
[0088] *
* figures 3b, 4, 6 *;
[US2015358132](#) A1 20151210
[Y] (WALLEN ANDERS [SE], et al)
[Y] 2
* abstract *
* paragraphs [0051] , [0 52] *
- CTNP - |EP| ISR (A1)
[XI] - TAILLEFER E ET AL,
"Enhanced Reactance-Domain
ESPRIT Algorithm Employing
Multiple Beams and
Translational-Invariance Soft
Selection for Direction-of-
Arrival Estimation in the Full
Azimuth", IEEE TRANSACTIONS
ON ANTENNAS AND
PROPAGATION, IEEE SERVICE
CENTER, PISCATAWAY, NJ, US,
(20080801), vol. 55, no. 8,
ISSN 0018-926X, pages 2514 -
2526, XP011232515
[X] 1,3,4,7,8,18-20,23,24
* abstract *
* page 2514 - page 2517 *
* figure 1 *
[Y] 2,5,6,9-17
[I] 21,22
- CCI - [H04B7/0469](#) ; [H04B7/0617](#) ;
[H04L25/0204](#)
- CI - H04B7/0469 (EP, US)
- H04B7/0617 (EP, US)
- H04L25/0204 (EP, US)
- PA - ERICSSON TELEFON AB L M [SE]
- TI - CHANNEL CONDITION
ESTIMATION
- AB - There is provided mechanisms
for obtaining channel
conditions per antenna
element. A method is
performed by a **wireless radio
transceiver** device comprising
N antenna elements in an
antenna array with
analog **beamforming** and

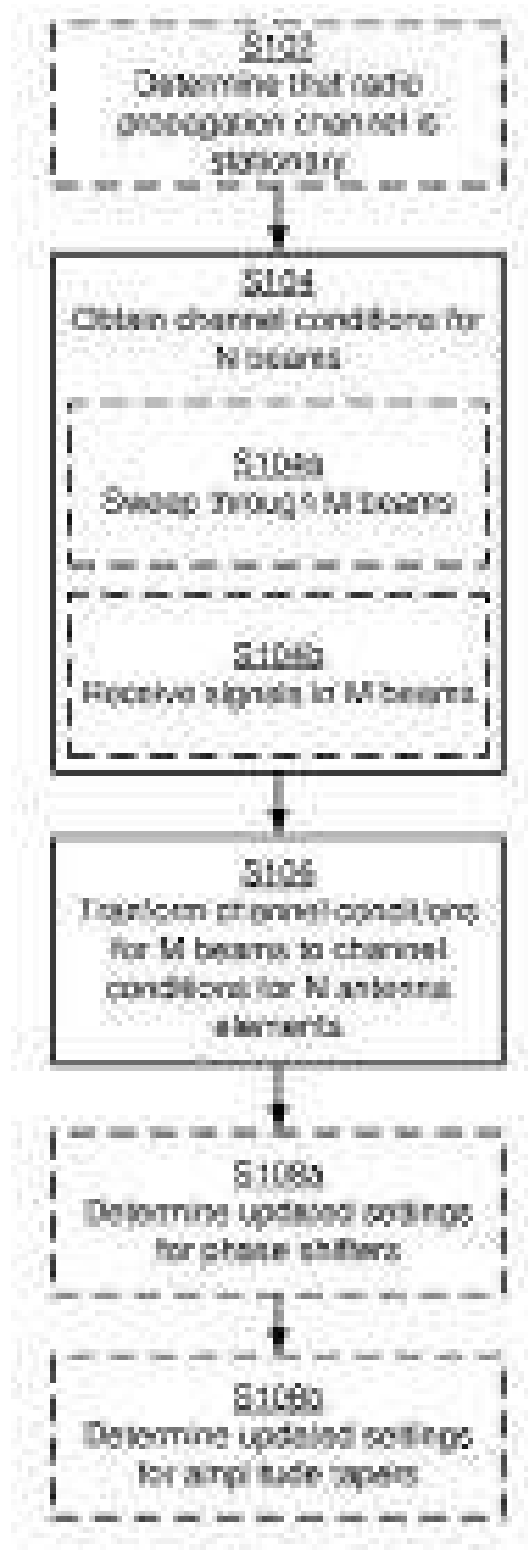


Fig. 4

being configured to communicate using beams. The method comprises obtaining, for a stationary **radio** propagation channel, channel conditions for signals received by the **wireless radio transceiver** device in M beams, where $M > 1$. The method comprises transforming the channel conditions for the M beams to channel conditions for the N antenna elements by using a relation based on **beamforming** weights that map the N antenna elements to the M beams.

23/44	© EPODOC / EPO
PN	- EP3552319 A1 20191016
PR	- WO2016EP79807 20161206
AP	- EP20160808895 20161206
DT	- I
CCI	- H04B7/0617 ; H04B7/0695
CI	- H04B7/0617 (EP, RU, US) - H04B7/0626 (RU, US) - H04B7/0695 (EP, RU, US)
CA	- H04W16/28 (US) - H04W72/046 (US)
PA	- ERICSSON TELEFON AB L M [SE]
TI	- CONFIGURATION OF BEAMFORMING SETTINGS FOR A WIRELESS RADIO TRANSCEIVER DEVICE

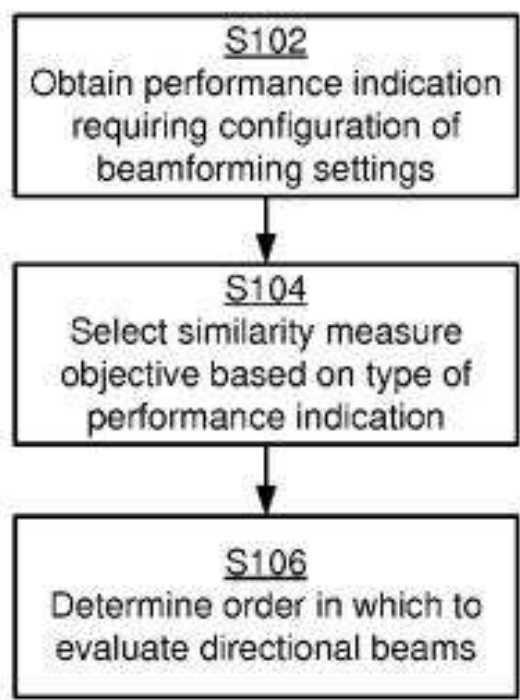


Fig. 3

PN - [WO2018103820](#) A1 20180614
PR - WO2016EP79807 20161206
AP - WO2016EP79807 20161206
DT - *; Rep
CT - |EP| ISR (A1)
[US2011110453](#) A1 20110512
[XI] (PRASAD NARAYAN [US],
et al)
[X] 1-3,5,6,9,11-16,20-27
* paragraphs [0027] - [0029] -
[0031] - [0035] - [0044] -
[0045] - [0093] - [0104]; figure
6 *
[Y] 4,7,8,17-19
[I] 10;
[US2014334566](#) A1 20141113
[YA] (KIM CHAN-HONG [KR], et
al)
[Y] 4,7,8,17-19
* paragraphs [0124] - [0129];
figures 1,15 *
[A] 1-3,5,6,9-16,20-27
CCI - [H04B7/0617](#) ; [H04B7/0695](#)
CI - H04B7/0617 (EP, RU, US)
- H04B7/0626 (RU, US)
- H04B7/0695 (EP, RU, US)
CA - H04W16/28 (US)
- H04W72/046 (US)
PA - ERICSSON TELEFON AB L M [SE]
TI - CONFIGURATION
OF **BEAMFORMING** SETTINGS
FOR A **WIRELESS RADIO**
TRANSCIVER DEVICE
AB - There is provided mechanisms
for configuring **beamforming**
settings. A method is
performed by a **wireless radio**
transceiver device configured
to communicate in directional
beams. The method comprises
obtaining a performance
indication requiring
configuration of
the **beamforming** settings of
the **wireless radio transceiver**
device. The method comprises
selecting a similarity measure
objective based on what kind
of performance indication was
obtained. The method
comprises determining, based
on the similarity measure
objective and results from a
similarity measure procedure
applied to pairs of received
signals, an order in which to
evaluate the directional beams

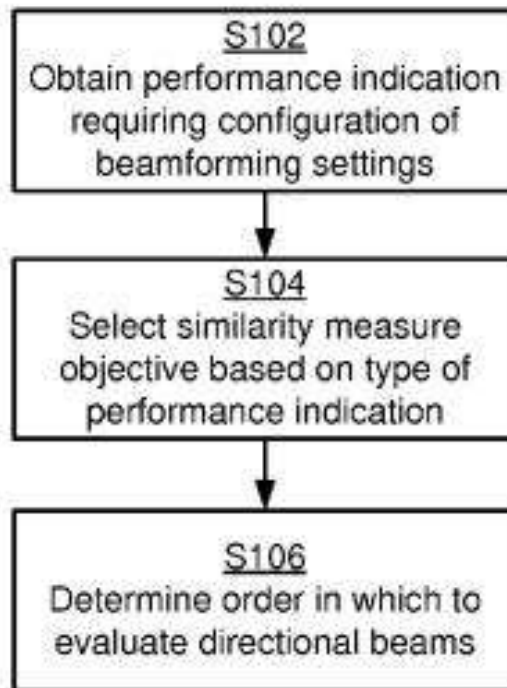


Fig. 3

when configuring
the **beamforming** settings.

25/44 © EPODOC / EPO

- PN - [WO2018054477](#) A1 20180329
- PR - WO2016EP72660 20160923
- AP - WO2016EP72660 20160923
- DT - *; Rep
- CT - |EP| ISR (A1)
[US2014341310](#) A1 20141120
 [XI] (RAHMAN MD SAIFUR [US],
 et al)
 [X] 1-7,9,16-20,23
 * paragraphs [0072] , [0077] ,
 [0110] , [0085] , [0082] ,
 [0086] , [0087]; figures 5-7,11 *
 [I] 8,10-15,21,22,24;
[US2013028341](#) A1 20130131
 [A] (AYACH OMAR EL [US], et al)
 [A] 1-24
 * figures 6-8 *;
[US2014185481](#) A1 20140703
 [A] (SEOL JI-YUN [KR], et al)
 [A] 1-24
 * the whole document *
- CCI - [H04B7/0408](#) ; [H04B7/088](#)
- CCA - [H04B7/0874](#)
- CI - H04B7/0408 (EP, US)
 - H04B7/0617 (US)
 - H04B7/0632 (US)
 - H04B7/088 (EP, US)
 - H04L5/0057 (US)
 - H04W72/085 (US)
- CA - H04B7/0874 (EP, US)
- PA - ERICSSON TELEFON AB L M [SE]
- TI - CONFIGURATION
 OF **BEAMFORMING**SETTINGS
- AB - There is provided mechanisms
 for configuring **beamforming**
 settings. A method is
 performed by a **wireless radio**
transceiver device comprising
 at least two receiver chains.
 The method comprises
 receiving transmission from
 an access node in at least two
 beams, each beam using a
 separate one of the two
 receiver chains. The method
 comprises
 configuring **beamforming**
 settings in at least one of the
 receiver chains for reception
 of the transmission in at least
 one of the beams for
 evaluating at least one

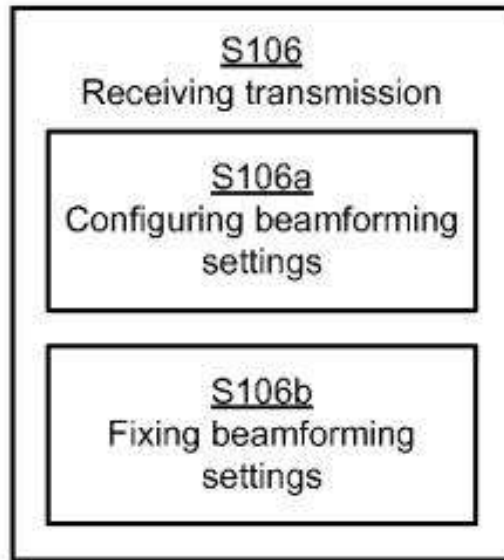


Fig. 3

candidate beam. The method comprises fixing **beamforming** settings in at least one other of the receiver chains for reception of the transmission in at least one other of the beams.

26/44 © EPODOC / EPO

PN - [US9450620](#) B1 20160920
 PR - US201514749892 20150625
 AP - US201514749892 20150625
 DT - *; Rep
 CT - || STSE (B1)
[US2005213399](#) A1 00000000 [];
[US2006133160](#) A1 00000000 [];
[US2008214132](#) A1 00000000 [];
[US2009167532](#) A1 00000000 []
 CCI - [H01Q3/38](#) ; [H04B1/40](#)
 CI - H01Q3/36 (US)
 - H01Q3/38 (EP)
 - H04B1/40 (EP)
 PA - NITERO PTY LTD [AU]
 TI - Fast indirect antenna control
 AB - A digital interface and control module and a multi-function digital bus for use in a **wireless radio** frequency receiver, transmitter, or **transceiver** that communicates over a millimeter-wave band at multi-gigabit speeds. The control module provides a low power, low cost, small form factor, and low pin-count solution for high-speed control of a multi-gigabit **radio** frequency circuitry. The control module may be used to steer an antenna array for **beamforming** including selecting different antennas and different phases in compliance with IEEE 802.11ad/WiGig specifications. The control module may also be used for individually controlling variable gain amplifiers and low noise amplifiers and for phase shift controls, gain settings, and other controls.

27/44 © EPODOC / EPO

PN - [KR20160048557](#) A 20160504
 PR - KR20140145464 20141024
 AP - KR20140145464 20141024
 DT - I
 PA - EUN SE YOUNG [KR]
 TI - SYSTEM AND METHOD OF **WIRELESS** COMMUNICATION REALIZING SOFTWARE DEFINED **RADIO** USING **RADIO** FREQUENCY **TRANSCEIVER** ARRAY
 AB - A **wireless** communication system and a **wireless** communication method of realizing software defined **radio** (SDR) using a **radio** frequency (RF) **transceiver** array are disclosed. The **wireless** communication system comprises: an SDR baseband signal processing module processing a baseband signal; an SDR RF **transceiver** array wirelessly including a plurality of SDR RF transceivers that receive a **wireless** signal, amplify the received **wireless** signal, perform RF signal processing for the amplified **wireless** signal, and transmit the processed **wireless** signal to the SDR baseband signal processing module, or amplify a signal received from the SDR baseband signal processing module, perform RF signal processing for the amplified signal, and wirelessly transmit the processed signal to the SDR baseband signal processing module; and an array processing control module controlling array processing using the SDR RF transceivers. The **wireless** communication system and

the **wireless** communication method of realizing SDR using an RF **transceiver** array may control array processing, such as **beamforming**, for a plurality of SDR RF transceivers to be performed to increase the phase and output of RF transceivers, thus enabling **wireless** communications without a hardware element, such as an antenna or a power amplifier.

28/44 © EPODOC / EPO

PN - [US2014160957](#) A1 20140612
PR - US201213730771
20121228; US201261735939P
20121211

AP - US201213730771 20121228

DT - *; Rep

CT - || R141 (A1)
[US2005185728](#) A1 00000000 [];
[US2007165737](#) A1 00000000 [];
[US2008080449](#) A1 00000000 [];
[US2008089396](#) A1 00000000 [];
[US2012051287](#) A1 00000000 [];
[US8229017](#) B1 00000000 [];
[US8498363](#) B2 00000000 [];
[US8781020](#) B1 00000000 []

CCI - [H04L25/0224](#)

CCA - [H04L5/0048](#) ; [H04W24/06](#)

CI - H04L25/0224 (EP)

- H04W24/02 (US)

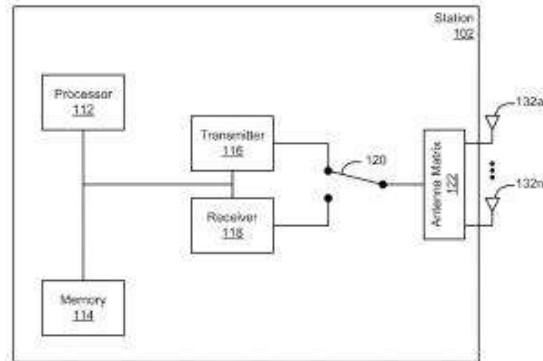
CA - H04L5/0048 (EP)

- H04W24/06 (EP)

PA - BROADCOM CORP [US]

TI - CHANNEL STATE INFORMATION
CALIBRATION

AB - A dedicated calibration device may be utilized by a **wireless transceiver** device, such as a base station, to compute compensation matrices. The **wireless transceiver** device and the dedicated calibration device can exchange training sequence signals. Based on the exchanged training sequence signals, the **wireless transceiver** device and the dedicated calibration device can estimate overall baseband to baseband channel responses taking into account the amplitude and phase responses of the respective transmit and



receive **radio** chains, and the **wireless transceiver** device can determine the compensation matrices. Furthermore, the **wireless transceiver** device can estimate a baseband-to-baseband uplink channel response relative to actual user equipment, approximate a downlink channel response using only one of the determined compensation matrices, and perform **beamforming** to the actual user equipment using the approximated downlink channel response.

29/44 © EPODOC / EPO
 PN - [WO2015082008](#) A1 20150611
 PR - WO2013EP75683 20131205
 AP - WO2013EP75683 20131205
 DT - *; Rep
 CT - |KR| ISR (A1)

[US2011085448](#) A1 00000000
 [I] (KUWAHARA MIKIO [JP])
 [I] 1-13
 * figure 26 *
 * paragraph [0065] -
 paragraph [0075] *

- |KR| ISR (A1)
[WO2011098975](#) A1 00000000
 [I] (KONINKL PHILIPS ELECTRONICS NV [NL]; TESANOVIC MILOS [GB]; MOULSLEY TI)
 [I] 1-13
 * figure 1 *
 * page 7, line 4 - page 11, line 20 *

CCI - [H04B7/0617](#) ; [H04B7/10](#)
 CI - H04B7/0617 (EP, US)
 - H04B7/10 (EP, US)
 PA - ERICSSON TELEFON AB L M [SE]
 TI - A **WIRELESS** COMMUNICATION NODE USING USING ADAPTIVE **BEAMFORMING** WITH POLARIZED ANTENNAS
 AB - The present invention relates to a **wireless** communication node (1) comprising at least one antenna arrangement (2, 3, 4). Each antenna arrangement (2, 3, 4) comprises at least three antenna devices (5, 6, 7, 8), comprising corresponding pairs

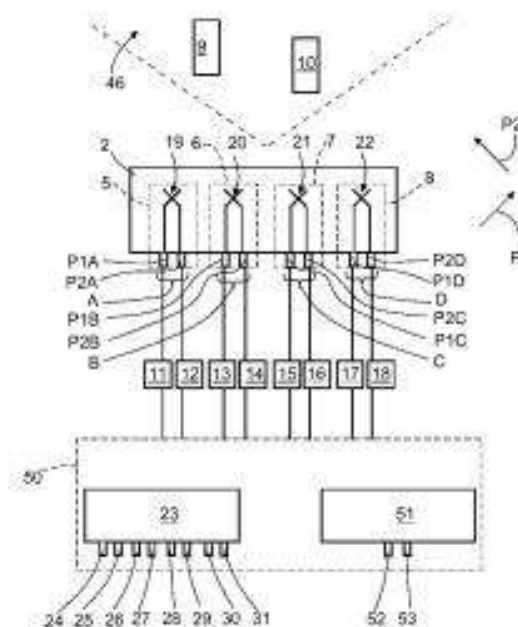


FIG. 2

of antenna ports (A, B, C, D) with a corresponding first and second antenna port (P1A, P1 B, P1 C, P1D; P2A, P2B, P2C, P2D). Each antenna port (P1A, P1 B, P1C, P1D; P2A, P2B, P2C, P2D) is arranged downlink and uplink and is connected to a corresponding **radio transceiver** unit (11, 12, 13, 14, 15, 16, 17, 18). Each antenna device (5, 6, 7, 8) comprises at least one corresponding dual polarized antenna element (19, 20, 21, 22) arranged for transmitting and receiving signals at a first polarization (P1) via the corresponding first antenna port (P1A, P1B, P1 C, P1 D) and for transmitting and receiving signals at a second polarization (P2) via the corresponding second antenna port (P2A, P2B, P2C, P2D). A **beamforming** arrangement (23) is arranged to apply **beamforming** on downlink signals. For an adaptive mode of operation for downlink, the **beamforming** arrangement (23) is arranged to apply **beamforming** such that one or two antenna beams (48a, 48b) is/are directed in a first direction (49), and such that one or two antenna beams (32a, 32b) is/are directed in a second direction (33).

30/44 © EPODOC / EPO

PN - [RU2012105918](#) A 20130827
 PNFP - RU2498505 C2 20131110
 PR - US20090460521 20090720; WO2010US41027 20100706
 AP - RU20120105918 20100706
 DT - I
 CCI - [H04B7/0602](#) ; [H04B7/0634](#)
 CCA - [H04L25/0204](#)
 CI - H04B7/0417 (KR)
 - H04B7/0452 (CN)
 - H04B7/0602 (EP, KR)
 - H04B7/0617 (CN, KR)
 - H04B7/0619 (CN)
 - H04B7/0634 (EP, KR)
 - H04B7/0641 (CN)
 CA - H04L25/0204 (EP)
 PA - (C2)
 INTEL CORP [US]

- TI - (C2)
TECHNIQUES FOR MIMO **BEAMFORMING** FOR FREQUENCY SELECTIVE CHANNELS
IN **WIRELESS** COMMUNICATION SYSTEMS
- AB - (C2)
FIELD: **radio** engineering, communication. SUBSTANCE: invention particularly discloses
an apparatus which may include a **transceiver** operable as a base station (BS) in
a **wireless** network and adapted for multiple input multiple output
(MIMO) **beamforming** and further adapted for **wireless** communication with a
receiver which feeds back to the **transceiver** a plurality of **beamforming** matrices per
subband and interpolates the **beamforming** matrices across the subband. EFFECT:
higher efficiency. 24 cl, 7 dwg

31/44 © EPODOC / EPO

- PN - [US2013230005](#) A1 20130905
- PR - US201313867299 20130422; US201113023539 20110208; US20100302214P
20100208
- AP - US201313867299 20130422
- DT - **
- CT - || R141 (A1)
[US2010075594](#) A1 20100325 [] (KIM SUNG-MAN [KR], et al);
[US2010150013](#) A1 20100617 [] (HARA YOSHITAKA [JP], et al)
- CCI - [H01Q3/2647](#) ; [H04B7/0682](#) ; [H04B7/0691](#) ; [H04B17/12](#) ; [H04B17/309](#)
- CI - H01Q3/2647 (EP, KR)
- H04B1/58 (KR)
- H04B7/0413 (KR)
- H04B7/0617 (KR)
- H04B7/0682 (EP, KR)
- H04B7/0691 (EP, KR)
- H04B17/11 (KR)
- H04B17/12 (EP, KR)
- H04B17/29 (KR)
- H04B17/309 (EP, KR)
- H04W72/02 (KR, US)
- PA - BROADCOM CORP [US]
- TI - Method and System for Uplink **Beamforming** Calibration in a Multi-Antenna **Wireless**
Communication System
- AB - A **wireless transceiver**, comprising a transmitter, a receiver and a plurality of
antennas, determines transmit phase relationship between at least two of antennas
based on **radio** frequency (RF) signals received via the at least two antennas from one
or more antennas of a base station. RF signals are transmitted via the at least two
antennas utilizing the determined transmit phase relationship. The receiver is
calibrated based on receiver performance determined from the received RF signals
for subsequent reception of RF signals. The transmit phase relationship is
dynamically adjusted based on the transmit RF measurements and the determined
receiver performance. Transmit channel qualities are determined for each transmit
antenna based on the transmit RF measurements and the dynamically adjusted
transmit phase relationship. Transmit antennas are dynamically selected based on
the adjusted transmit phase relationship, the characterized transmit channel
qualities and the determined receiver performance for subsequent transmission to
the base station.

32/44 © EPODOC / EPO

- PN - [KR20130047639](#) A 20130508
- PNFP - KR101466185B B1 20141127
- PR - US201113329296 20111218; US201161552835P 20111028

AP - KR20120120236 20121029

DT - I

CCI - [H04B7/0408](#) ; [H04B7/0617](#) ; [H04L25/03949](#)

CI - H04B7/0408 (EP, KR)
- H04B7/0617 (EP, KR)
- H04L25/0202 (KR)
- H04L25/03949 (EP)

PA - (A)
BROADCOM CORP [US]

TI - (A B1)
REVERSE CHANNEL ESTIMATION FOR RF **TRANSCEIVER** WITH **BEAMFORMING**ANTENNA

AB - (A)
PURPOSE: A reverse direction channel estimation device for a **wireless transceiver** including a beam forming antenna is provided to receive second transmission from a first remote station by generating first transmission in the first remote station based on a plurality of first steering weighted values for a plurality of antennas.
CONSTITUTION: A plurality of RF(**Radio** Frequency) transceivers generates the first transmission of a first remote station based on a plurality of first steering weighted values for a plurality of antennas. A plurality of the RF transceivers receives the second transmission from the first remote station. The first transmission and the second transmission are generated by a first communication channel. A configuration controller(104) generates a plurality of the first steering weighted values based on the reverse direction channel estimation of the first communication channel. [Reference numerals] (100) Array antenna; (104) Configuration controller; (106) Control signals; (108) Feedback signals; (110) **Wireless transceiver**; (111) RF transceiving unit; (112) RF **transceiver**; (152) Inward RF signal; (160) Inward data; (162) Outward data; (170) Outward RF signal

33/44 © EPODOC / EPO

PN - [KR20130047635](#) A 20130508

PNFP - KR101511649B B1 20150413

PR - US201113329302 20111218; US201161552835P 20111028

AP - KR20120120108 20121029

DT - I

CCI - [H04B7/0617](#) ; [H04B7/0623](#) ; [H04B7/0695](#)

CI - H04B7/0617 (EP, KR, US)
- H04B7/0623 (EP, KR, US)
- H04B7/0695 (EP, KR, US)

PA - (A)
BROADCOM CORP [US]

TI - (A B1)
RF **TRANSCEIVER** WITH **BEAMFORMING**ANTENNA AND METHODS FOR USE THEREWITH

AB - (A)
PURPOSE: An RF(**Radio** Frequency) **transceiver** including a beam-forming antenna and a using method thereof are provided to generate a control signal for selecting a first candidate emission pattern for a beam forming antenna. CONSTITUTION: A configuration controller(104) generates a control signal for selecting a first candidate emission pattern for a plurality of antennas based on a plurality of first steering weighted values. An RF **transceiver** broadcasts first beacon transmission as a first candidate emission pattern for generating a feedback signals for allowing a first remote station to respond the first beacon transmission. [Reference numerals] (100) Array antenna; (104) Configuration controller; (106) Control signals; (108) Feedback signals; (110) **Wireless transceiver**; (111) RF transceiving unit; (112) RF **transceiver**; (152) Inward RF signal; (160) Inward data; (162) Outward data; (170) Outward RF signal

34/44 © EPODOC / EPO

PN - [CN102835039](#) A 20121219

PNFP - CN102835039B B 20151216

PR - WO2011US24112 20110208; US20100302214P 20100208

AP - CN20118018118 20110208

DT - I

CT - || STSE (A)
[US2007222677](#) A1 20070927 [A] (STRONG PETER N [GB]);
[WO2009078529](#) A1 20090625 [YX] (KOREA ELECTRONICS TELECOMM [KR], et al);
[US7280515](#) B2 20071009 [A] (RANTA PEKKA [FI]);
[EP1198151](#) A2 20020417 [A] (NOKIA CORP [FI]);
[US5412414](#) A 19950502 [A] (AST HARRY C [US], et al);
[CN101610233](#) A 20091223 [Y] (FUJITSU LTD [JP])

CCI - [H01Q3/2647](#) ; [H04B7/0682](#) ; [H04B7/0691](#) ; [H04B17/12](#) ; [H04B17/309](#)

CI - H01Q3/2647 (EP, KR)
- H04B1/58 (KR)
- H04B7/0413 (KR)
- H04B7/0617 (KR)
- H04B7/0682 (EP, KR)
- H04B7/0691 (EP, KR)
- H04B17/11 (KR)
- H04B17/12 (EP, KR)
- H04B17/29 (KR)
- H04B17/309 (EP, KR)
- H04W72/02 (KR, US)

PA - (A)
BROADCOM CORP

TI - (A)
Method and system for uplink **beamforming** calibration in a multi-antenna **wireless** communication system

AB - (A)
A **wireless transceiver**, comprising a transmitter, a receiver and a plurality of antennas, determines transmit phase relationship between at least two of antennas based on **radio** frequency (RF) signals received via the at least two antennas from one or more antennas of a base station. RF signals are transmitted via the at least two antennas utilizing the determined transmit phase relationship. The receiver is calibrated based on receiver performance determined from the received RF signals for subsequent reception of RF signals. The transmit phase relationship is dynamically adjusted based on the transmit RF measurements and the determined receiver performance. Transmit channel qualities are determined for each transmit antenna based on the transmit RF measurements and the dynamically adjusted transmit phase relationship. Transmit antennas are dynamically selected based on the adjusted transmit phase relationship, the characterized transmit channel qualities and the determined receiver performance for subsequent transmission to the base station.

35/44 © EPODOC / EPO

PN - [WO2011097652](#) A1 20110811

PR - US20100302214P 20100208

AP - WO2011US24112 20110208

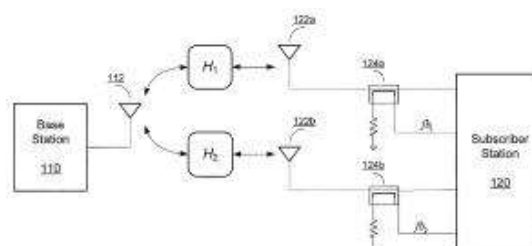
DT - **

CT - |US| ISR (A1)
[WO2009078529](#) A1 20090625 [X] (KOREA ELECTRONICS TELECOMM [KR], et al);
[US2007222677](#) A1 20070927 [Y] (STRONG PETER N [GB]);

	US5412414 A 19950502 [Y] (AST HARRY C [US], et al); US5581548 A 19961203 [Y] (UGLAND JON K [SE], et al); US2008153433 A1 20080626 [A] (PALLONEN JORMA [FI], et al)
CCI	- H01Q3/2647 ; H04B7/0682 ; H04B7/0691 ; H04B17/12 ; H04B17/309
CI	- H01Q3/2647 (EP, KR) - H04B1/58 (KR) - H04B7/0413 (KR) - H04B7/0617 (KR) - H04B7/0682 (EP, KR) - H04B7/0691 (EP, KR) - H04B17/11 (KR) - H04B17/12 (EP, KR) - H04B17/29 (KR) - H04B17/309 (EP, KR) - H04W72/02 (KR, US)
PA	- BROADCOM CORP [US]; LORENZ ROBERT G [US]
TI	- METHOD AND SYSTEM FOR UPLINK BEAMFORMING CALIBRATION IN A MULTI-ANTENNA WIRELESS COMMUNICATION SYSTEM
AB	- A wireless transceiver , comprising a transmitter, a receiver and a plurality of antennas, determines transmit phase relationship between at least two of antennas based on radio frequency (RF) signals received via the at least two antennas from one or more antennas of a base station. RF signals are transmitted via the at least two antennas utilizing the determined transmit phase relationship. The receiver is calibrated based on receiver performance determined from the received RF signals for subsequent reception of RF signals. The transmit phase relationship is dynamically adjusted based on the transmit RF measurements and the determined receiver performance. Transmit channel qualities are determined for each transmit antenna based on the transmit RF measurements and the dynamically adjusted transmit phase relationship. Transmit antennas are dynamically selected based on the adjusted transmit phase relationship, the characterized transmit channel qualities and the determined receiver performance for subsequent transmission to the base station.

36/44 © EPODOC / EPO

PN	- US2011195670 A1 20110811
PNFP	- US8428529 B2 20130423
PR	- US201113023539 20110208; US20100302214P 20100208
AP	- US201113023539 20110208
DT	- *; Rep
CT	- R141 (A1) US7280515 B2 20071009 [] (RANTA PEKKA [FI]); US7154442 B2 20061226 [] (VAN WONTERGHEM JARI [CA], et al); US7324794 B2 20080129 [] (CHARI SUJAI [US], et al); US2004017326 A1 20040129 [] (MERRILL JEFFREY C [US]); US2009005120 A1 20090101 [] (YLITALO JUHA [FI]); US5412414 A 19950502 [] (AST HARRY C [US], et al); US5530449 A 19960625 []



] (WACHS MARVIN R [US], et al);
[US2008153433](#) A1 20080626 [] (PALLONEN JORMA [FI], et al);
[US2007173277](#) A1 20070726 [] (YUN LOUID C [US]);
[US7245257](#) B1 20070717 [] (BRUCE GREGORY S [US], et al);
[US7248216](#) B2 20070724 [] (AKIYAMA CHIYOSHI [JP], et al);
[US2011176635](#) A1 20110721 [] (HOCHWALD BERTRAND M [US], et al);
[US2010214017](#) A1 20100826 [] (COUCHMAN ALAN DAVID [GB], et al);
[US2011201283](#) A1 20110818 [] (LORENZ ROBERT GUSTAV [US], et al);
[US4612548](#) A 19860916 [] (BELTRAN FERNANDO [US]);
[US2003179138](#) A1 20030925 [] (CHEN MICHAEL [TW]);
[US2007222677](#) A1 20070927 [] (STRONG PETER N [GB]);
[US7286855](#) B2 20071023 [] (RALEIGH GREGORY GENE [US], et al);
[US6320540](#) B1 20011120 [] (MEREDITH SHELDON K [US]);
[US2004228422](#) A1 20041118 [] (SILVEIRA MARTINUS W DA [CA], et al);
[US7450065](#) B1 20081111 [] (BRUCE GREGORY S [US], et al);
[US7616704](#) B2 20091110 [] (LI QINGHUA [US], et al);
[US8055216](#) B2 20111108 [] (DENT PAUL WILKINSON [US]);
[US5581548](#) A 19961203 [] (UGLAND JON K [SE], et al);
[US7308705](#) B2 20071211 [] (GORDY STEPHEN C [US], et al)
 - || STSE (B2)
[US7154442](#) B2 20061226 [] (VAN WONTERGHEM JARI [CA], et al);
[US7280515](#) B2 20071009 [] (RANTA PEKKA [FI]);
[US7324794](#) B2 20080129 [] (CHARI SUJAI [US], et al)
 CCI - [H01Q3/2647](#) ; [H04B7/0682](#) ;
[H04B7/0691](#) ; [H04B17/12](#) ;
[H04B17/309](#)
 CI - H01Q3/2647 (EP, KR)
 - H04B1/58 (KR)

	- H04B7/0413 (KR) - H04B7/0617 (KR) - H04B7/0682 (EP, KR) - H04B7/0691 (EP, KR) - H04B17/11 (KR) - H04B17/12 (EP, KR) - H04B17/29 (KR) - H04B17/309 (EP, KR) - H04W72/02 (KR, US)
PA	- (B2) DAKSHINAMURTHY SRIRAMAN [US]; LORENZ ROBERT GUSTAV [US]; BROADCOM CORP [US]
TI	- (A1) METHOD AND SYSTEM FOR UPLINK BEAMFORMING CALIBRATION IN A MULTI-ANTENNAWIRELESS COMMUNICATION SYSTEM - (B2) Method and system for uplink beamforming calibration in a multi-antenna wireless communication system
AB	- (A1 B2) A wireless transceiver, comprising a transmitter, a receiver and a plurality of antennas, determines transmit phase relationship between at least two of antennas based on radio frequency (RF) signals received via the at least two antennas from one or more antennas of a base station. RF signals are transmitted via the at least two antennas utilizing the determined transmit phase relationship. The receiver is calibrated based on receiver performance determined from the received RF signals for subsequent reception of RF signals. The transmit phase relationship is dynamically adjusted based on the transmit RF measurements and the determined receiver performance. Transmit channel qualities are determined for each transmit antenna based on the transmit RF measurements and the dynamically adjusted transmit phase relationship. Transmit antennas are

dynamically selected based on the adjusted transmit phase relationship, the characterized transmit channel qualities and the determined receiver performance for subsequent transmission to the base station.

37/44 © EPODOC / EPO

- PN - [US2010311469](#) A1 20101209
- PNFP - US8406812 B2 20130326
- PR - US20100857622 20100817; US20030358914 20030205
- AP - US20100857622 20100817
- DT - **
- CT - || R141 (A1)
 - [US6697643](#) B1 20040224 [] (HAGERMAN BO [SE], et al);
 - [US2003190897](#) A1 20031009 [] (LEI ZHONGDING [SG], et al);
 - [US6850741](#) B2 20050201 [] (LEI ZHONGDING [SG], et al);
 - [US6801790](#) B2 20041005 [] (RUDRAPATNA ASHOK N [US]);
 - [US6016123](#) A 20000118 [] (BARTON PAUL [GB], et al);
 - [US7039441](#) B1 20060502 [] (REUDINK DOUGLAS O [US], et al);
 - [US2002080073](#) A1 20020627 [] (WASTBERG BO GUNNAR [SE]);
 - [US7058367](#) B1 20060606 [] (LUO HUI [US], et al);
 - [US6094165](#) A 20000725 [] (SMITH MARTIN STEVENS [GB]);
 - [US2003139198](#) A1 20030724 [] (JOHANNISSON BJORN [SE], et al);
 - [US7079083](#) B2 20060718 [] (GOTTL MAXIMILIAN [DE], et al);
 - [US7248841](#) B2 20070724 [] (AGEE BRIAN G [US], et al);
 - [US6275484](#) B1 20010814 [] (LYNCH MICHAEL A [US], et al);
 - [US5565873](#) A 19961015 [] (DEAN STUART J [CA]);
 - [US2004204111](#) A1 20041014 [] (YLITALO JUHA [FI]);
 - [US7289826](#) B1 20071030 [] (HOVERS OMRI [IL], et al);
 - [US6480524](#) B1 20021112 [] (SMITH MARTIN STEVENS [GB], et al)
- || STSE (B2)
 - [US5565873](#) A 19961015 [] (DEAN STUART J [CA]);
 - [US6480524](#) B1 20021112 [] (SMITH MARTIN STEVENS [GB], et al);
 - [US6697643](#) B1 20040224 [] (HAGERMAN BO [SE], et al);
 - [US6801790](#) B2 20041005 [] (RUDRAPATNA ASHOK N [US]);
 - [US6850741](#) B2 20050201 [] (LEI ZHONGDING [SG], et al);
 - [US7248841](#) B2 20070724 [] (AGEE BRIAN G [US], et al);
 - [US7289826](#) B1 20071030 [] (HOVERS OMRI [IL], et al);
 - [US2003190897](#) A1 20031009 [] (LEI ZHONGDING [SG], et al)
- CCI - [H04B7/0408](#)
- CI - H04B7/0408 (EP)
 - H04W72/046 (US)
- PA - (A1)
 - NORTEL NETWORKS LTD [CA]
- (B2)
 - SMITH MARTIN STEVENS [GB]; URQUHART ANDREW JAMES [GB]; ROBSON JULIUS GEORGE [GB]; BEVAN DAVID DAMIAN NICHOLS [GB]; APPLE INC [US]
- TI - (A1 B2)
 - Downlink and uplink array and **beamforming** arrangement for **wireless** communication networks
- AB - (A1 B2)
 - The invention provides an antenna array suitable for use in a base station in a **wireless** communications network, the antenna array having a first **beamforming**

arrangement for producing uplink beams and a second **beamforming** arrangement for producing downlink beams, wherein the first and second **beamforming** arrangements are different from one another. Preferably the first and second **beamforming** arrangements feed a common antenna array to produce the uplink and downlink beams. Particularly preferably a plurality of (sin x/x) beams are formed for the uplink, and a plurality of low cusp beams are formed for the downlink. These are advantageously dual polar, in order to achieve diversity gain. In a preferred embodiment, the antenna array is arranged such that three dual polar low cusp beams are formed for the downlink, and six dual polar (sin x/x) beams are formed for the uplink. A cellular communications network and a base station **transceiver** having such antenna arrays are also provided, as are a **radio** signal transmitted as a plurality of (sin x/x) beams forming an uplink of a cellular communications network, and a method of operating a **wireless** communications network.

38/44 © EPODOC / EPO

PN - [US7792547](#) B1 20100907
 PR - US20030358914 20030205
 AP - US20030358914 20030205
 DT - *; Rep
 CT - || STSE (B1)
 [US6016123](#) A 00000000 [];
 [US6094165](#) A 00000000 [];
 [US6275484](#) B1 00000000 [];
 [US6480524](#) B1 00000000 [];
 [US6870515](#) B2 00000000 [];
 [US7039441](#) B1 00000000 [];
 [US7058367](#) B1 00000000 [];
 [US7079083](#) B2 00000000 [];
 [US2002080073](#) A1 00000000 [];
 [US2002085643](#) A1 00000000 [];
 [US2003139198](#) A1 00000000 [];
 [US2004204111](#) A1 00000000 []

CCI - [H04B7/0408](#)

CI - H04B7/0408 (EP)
 H04W72/046 (US)

PA - NORTEL NETWORKS LTD [CA]

TI - Downlink and uplink array and **beamforming** arrangement for **wireless** communication networks

AB - The invention provides an antenna array suitable for use in a base station in a **wireless** communications network, the antenna array having a first **beamforming** arrangement for producing uplink beams and a second **beamforming** arrangement for producing downlink beams, wherein the first and second **beamforming** arrangements are different from one another. Preferably the first and second **beamforming** arrangements feed a common antenna array to produce the uplink and downlink beams. Particularly preferably a plurality of (sin x/x) beams are formed for the uplink, and a plurality of low cusp beams are formed for the downlink. These are advantageously dual polar, in order to achieve diversity gain. In a preferred embodiment, the antenna array is arranged such that three dual polar low cusp beams are formed for the downlink, and six dual polar (sin x/x) beams are formed for the uplink. A cellular communications network and a base station **transceiver** having such antenna arrays are also provided, as are a **radio** signal transmitted as a plurality of (sin x/x) beams forming an uplink of a cellular communications network, and a method of operating a **wireless** communications network.

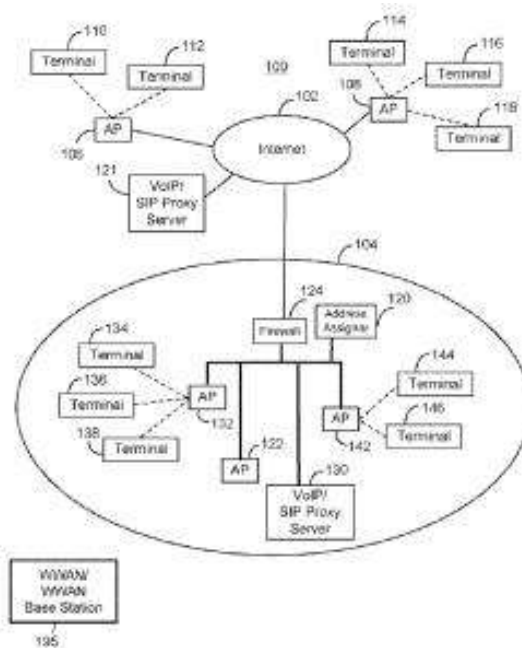
39/44 © EPODOC / EPO

PN	- EP2192802 A1 20100602
PNFP	- EP2192802 B1 20110622
PR	- EP20070107452 20070503
AP	- EP20100157501 20070503
DT	- **
CT	- STSE (A1) US2004009792 A1 00000000 [A] (WEIGAND GILBERT G [US]) [A] 1-15 * paragraphs [0004] - [0013] * * paragraphs [0038] - [0042] - [0056] * * paragraphs [0057] , [0061] , [0073] * * paragraphs [0081] , [0105] - [0108] * * claims 1-19 *; US2005048972 A1 00000000 [A] (DORENBOSCH JHEROEN P [US] ET AL) [A] 1-15 * paragraphs [0010] - [0017] * * paragraphs [0047] - [0059] * * abstract *; EP1152628 A1 00000000 [A] (MATSUSHITA ELECTRIC IND CO LTD [JP]) [A] 1,10,13 * paragraphs [0013] , [0023] - [0025] * * claims 1,2,4,5,9 *
CCI	- H04W24/02
CCA	- H04W16/18 ; H04W36/0083 ; H04W88/08
CI	- H04W24/02 (EP)
CA	- H04W16/18 (EP) - H04W36/0083 (EP) - H04W88/08 (EP)
PA	- (A1 B1) RESEARCH IN MOTION LTD [CA]
TI	- (A1 B1) Adaptive beamforming configuration methods and apparatus for wireless access points serving as handoff indication mechanisms in wireless local area networks
AB	- (A1) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. Wireless transceiver parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the wireless transceiver are determined through use of an adaptive beamforming technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured wireless transceiver parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

PN	- CA2630390 A1 20081103
PNFP	- CA2630390 C 20130108
PR	- EP20070107452 20070503
AP	- CA20082630390 20080505
DT	- I
CCI	- H04W24/02
CCA	- H04W16/18 ; H04W36/0083 ; H04W88/08
CI	- H04W24/02 (EP)
CA	- H04W16/18 (EP) - H04W36/0083 (EP) - H04W88/08 (EP)
PA	- (A1 C) RESEARCH IN MOTION LTD [CA]
TI	- (A1) ADAPTIVE BEAMFORMING CONFIGURATION METHODS AND APPARATUS FOR WIRELESS ACCESS POINTS SERVING AS HANDOFF INDICATION MECHANISMS IN WIRELESS LOCAL AREA NETWORKS - (C) ADAPTIVE BEAMFORMING CONFIGURATION METHODS AND APPARATUS FOR WIRELESS ACCESS POINTS SERVING AS HANDOFF INDICATION MECHANISMS IN WIRELESS LOCAL AREA NETWORKS
AB	- (A1) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. Wireless transceiver parameters of the wireless AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the wireless transceiver are determined through use of an adaptive beamforming technique (e.g. a minimax optimization) which is performed automatically by the wireless AP without user intervention. After the configuration procedure, the wireless AP operates with use of the configured wireless transceiver parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN. - (C) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN.

The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the **wireless** AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. **Wireless transceiver** parameters of the **wireless** AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the **wireless transceiver** are determined through use of an adaptive **beamforming** technique (e.g. a minimax optimization) which is performed automatically by the **wireless** AP without user intervention. After the configuration procedure, the **wireless** AP operates with use of the configured **wireless transceiver** parameters in a normal, steady- state mode of operation as the AP tripwire of the WLAN.

- 41/44** © EPODOC / EPO
- PN - [US2008273506](#) A1 20081106
- PNFP - US7684370 B2 20100323
- PR - US20070743741 20070503
- AP - US20070743741 20070503
- DT - *; Rep
- CT - || R141 (A1)
[US2008008143](#) A1 20080110 [] (ROBERTSON IAN MICHAEL [CA], et al);
[US5715516](#) A 19980203 [] (HOWARD DAVID AMUNDSON [US], et al);
[US2008144528](#) A1 20080619 [] (GRAVES ALAN [CA], et al);
[US2009154426](#) A1 20090618 [] (PERRAUD ERIC [FR], et al);
[US2008182565](#) A1 20080731 [] (LAZARIDIS MIHAL [CA], et al);
[US2004009792](#) A1 20040115 [] (WEIGAND GILBERT G [US]);
[US2005048972](#) A1 20050303 [] (DORENBOSCH JHEROEN P [US], et al)
 - || STSE (B2)
[US5715516](#) A 19980203 [] (HOWARD DAVID AMUNDSON [US], et al);
[US2008008143](#) A1 20080110 [] (ROBERTSON IAN MICHAEL [CA], et al);
[US2008144528](#) A1 20080619 [] (GRAVES ALAN [CA], et al);
[US2008182565](#) A1 20080731 [] (LAZARIDIS MIHAL [CA], et al);
[US2009154426](#) A1 20090618 [] (PERRAUD ERIC [FR], et al)
- CCI - [H04W24/02](#)
- CCA - [H04W16/18](#) ; [H04W28/08](#) ; [H04W36/0083](#)
- CI - H04W24/02 (EP, US)
- CA - H04W16/18 (EP, US)
 - H04W28/08 (EP, US)



	- H04W36/0083 (EP, US)
PA	- (A1 B2) RESEARCH IN MOTION LTD [CA]
TI	- (A1) Adaptive Beamforming Configuration Methods And Apparatus For Wireless Access Points Serving As Handoff Indication Mechanisms In Wireless Local Area Networks - (B2) Adaptive beamforming configuration methods and apparatus for wireless access points serving as handoff indication mechanisms in wireless local area networks
AB	- (A1) Methods and apparatus for use in configuring a wireless access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a wireless local area network (WLAN) for mobile device handoffs between the WLAN and a wireless wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the wireless AP, radio frequency (RF) signals transmitted from a plurality of communication devices are received at the wireless AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the wireless AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other wireless APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the wireless AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. Wireless transceiver parameters of the wireless AP

are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the **wireless transceiver** are determined through use of an adaptive **beamforming** technique (e.g. a minimax optimization) which is performed automatically by the **wireless** AP without user intervention. After the configuration procedure, the **wireless** AP operates with use of the configured **wireless transceiver** parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

- (B2)

Methods and apparatus for use in configuring a **wireless** access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a **wireless** local area network (WLAN) for mobile device handoffs between the WLAN and a **wireless** wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the **wireless** AP, **radio** frequency (RF) signals transmitted from a plurality of communication devices are received at the **wireless** AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the **wireless** AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other **wireless** APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of

the **wireless** AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. **Wireless transceiver** parameters of the **wireless** AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the **wireless transceiver** are determined through use of an adaptive **beamforming** technique (e.g. a minimax optimization) which is performed automatically by the **wireless** AP without user intervention. After the configuration procedure, the **wireless** AP operates with use of the configured **wireless transceiver** parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

42/44 © EPODOC / EPO

PN - [US2005113035](#) A1 20050526

PNFP - US7088964 B2 20060808

PR - US20030677704 20031002; US20020415477P 20021002; US20020431603P 20021206

AP - US20030677704 20031002

DT - **

CT - || R141 (A1)
[US6842144](#) B2 20050111 [] (GUO XIAOLING [US], et al);
[US6542720](#) B1 20030401 [] (TANDY PATRICK W [US]);
[US5754948](#) A 19980519 [] (METZE GEORGE M [US]);
[US5903820](#) A 19990511 [] (HAGSTROEM PANU [FI]);
[US4841738](#) A 19890627 [] (KATSUKI HIKARU [JP], et al);
[US6078791](#) A 20000620 [] (TUTTLE JOHN R [US], et al);
[US6243012](#) B1 20010605 [] (SHOBER R ANTHONY [US], et al);
[US6424315](#) B1 20020723 [] (GLENN THOMAS P [US], et al);
[US2004203478](#) A1 20041014 [] (SCOTT JEFFREY WAYNE [US]);
[US6480699](#) B1 20021112 [] (LOVOI PAUL A [US]);
[US6483427](#) B1 20021119 [] (WERB JAY [US]);
[US6483719](#) B1 20021119 [] (BACHMAN BRUCE [US]);
[US6815739](#) B2 20041109 [] (HUFF MICHAEL A [US], et al);
[US4890150](#) A 19891226 [] (VERA EDUARDO S [US], et al);
[US2004259604](#) A1 20041223 [] (MICKLE MARLIN H [US], et al)

- || STSE (B2)
[US4841738](#) A 19890627 [] (KATSUKI HIKARU [JP], et al);
[US4890150](#) A 19891226 [] (VERA EDUARDO S [US], et al);

	US5903820 A 19990511 [] (HAGSTROEM PANU [FI]); US6243012 B1 20010605 [] (SHOBER R ANTHONY [US], et al); US6480699 B1 20021112 [] (LOVOI PAUL A [US]); US6483427 B1 20021119 [] (WERB JAY [US]); US6483719 B1 20021119 [] (BACHMAN BRUCE [US]); US6815739 B2 20041109 [] (HUFF MICHAEL A [US], et al); US6842144 B2 20050111 [] (GUO XIAOLING [US], et al); US2004203478 A1 20041014 [] (SCOTT JEFFREY WAYNE [US]); US2004259604 A1 20041223 [] (MICKLE MARLIN H [US], et al); JPH03158296 A 19910708 [] (TOSHIBA CORP)
CCI	- H01Q1/38 ; H01Q1/525 ; H01Q23/00 ; H04B1/38 ; H04B1/3827 ; H04B1/40
CCA	- H04B1/7163
CI	- H01Q1/38 (EP) - H01Q1/525 (EP) - H01Q23/00 (EP) - H04B1/38 (EP) - H04B1/3827 (EP) - H04B1/40 (EP)
CA	- H04B1/7163 (EP)
PA	- (B2) UNIV FLORIDA [US]
TI	- (A1 B2) Single chip radio with integrated antenna
AB	- (A1 B2) A true single-chip radio for bidirectional wireless communications includes a bulk substrate, at least one integrated antenna, at least one transceiver , baseband circuitry and at least one filter all integrally formed in or on the substrate. The radio preferably includes a low-loss dielectric propagating layer disposed beneath the substrate to improve antenna gain. The integrated antenna can be an adaptive array for beamforming .
43/44	© EPODOC / EPO
PN	- WO2004032343 A2 20040415
PNFP	- WO2004032343 A3 20040701 - WO2004032343 A9 20040521 - WO2004032343 B1 20040902
PR	- US20020415477P 20021002; US20020431603P 20021206
AP	- WO2003US31221 20031002
DT	- *; Rep
CT	- US ISR (A3) US6542720 B1 00000000 [YP]; US6424315 B1 00000000 [Y]; US6078791 A 00000000 [Y]; US5754948 A 00000000 [Y]
CCI	- H01Q1/38 ; H01Q1/525 ; H01Q23/00 ; H04B1/38 ; H04B1/3827 ; H04B1/40
CCA	- H04B1/7163
CI	- H01Q1/38 (EP) - H01Q1/525 (EP) - H01Q23/00 (EP) - H04B1/38 (EP) - H04B1/3827 (EP) - H04B1/40 (EP)
CA	- H04B1/7163 (EP)
PA	- (A2 A3 A9 B1)

UNIV FLORIDA [US]

TI - (A2 A3 A9 B1)
SINGLE CHIP **RADIO** WITH INTEGRATED ANTENNA

AB - (A2 A3 A9 B1)
A true-chip **radio** for bi-directional **wireless** communications includes a bulk substrate, at least one integrated antenna, at least one **transceiver**, baseband circuitry and at least one filter all integrally formed in or on the substrate. The **radio** preferably includes a low-loss dielectric propagating layer disposed beneath the substrate to improve antenna gain. The integrated antenna can be an adaptive array for **beamforming**.

44/44 © EPODOC / EPO

PN - [EP1988727](#) A1 20081105

PNFP - EP1988727 B1 20100414

PR - EP20070107452 20070503

AP - EP20070107452 20070503

DT - *; Rep

CT - || STSE (A1)

[US2004009792](#) A1 20040115

[Y] (WEIGAND GILBERT G [US])

[Y] 1,2,4,6-9,11,13-18,20

* paragraphs [0004] - [0013] *

* paragraphs [0038] - [0042] -

[0056] *

* paragraphs [0057] , [0061] ,

[0073] *

* paragraphs [0081] , [0105] -

[0108] *

* claims 1-19 *;

[US2005048972](#) A1 20050303

[Y] (DORENBOSCH JHEROEN P

[US], et al)

[Y] 1,2,4,6-9,11,13-18,20

* paragraphs [0010] - [0017] *

* paragraphs [0047] - [0059] *

* abstract *;

[EP1152628](#) A1 20011107

[A] (MATSUSHITA ELECTRIC IND

CO LTD [JP])

[A] 1,8,15

* paragraphs [0013] , [0023] -

[0025] *

* claims 1,2,4,5,9 *

CCI - [H04W24/02](#)

CCA - [H04W16/18](#) ; [H04W36/0083](#) ;

[H04W88/08](#)

CI - H04W24/02 (EP)

CA - H04W16/18 (EP)

- H04W36/0083 (EP)

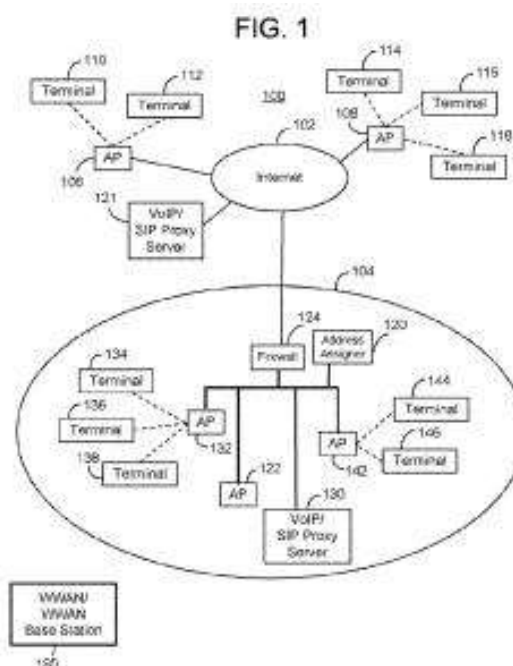
- H04W88/08 (EP)

PA - (A1 B1)

RESEARCH IN MOTION LTD [CA]

TI - (A1 B1)

Adaptive **beamforming**
configuration methods and
apparatus for **wireless** access



points serving as handoff
indication mechanisms
in **wireless** local area networks

AB

- (A1)

Methods and apparatus for use in configuring a **wireless** access point (AP) which serves as a handoff indication mechanism ("AP tripwire") in a **wireless** local area network (WLAN) for mobile device handoffs between the WLAN and a **wireless** wide area network (WWAN) are described. During a configuration procedure or training mode of operation of the **wireless** AP, **radio** frequency (RF) signals transmitted from a plurality of communication devices are received at the **wireless** AP. The plurality of communication devices include a first group of communication devices positioned at locations of undesired RF coverage of the **wireless** AP, outside of an RF coverage boundary of a WLAN coverage region of one or more other **wireless** APs of the WLAN. The plurality of communication devices also include a second group of communication devices positioned at locations of desired RF coverage of the **wireless** AP, around the RF coverage boundary of the WLAN coverage region and within the WWAN coverage region. **Wireless transceiver** parameters of the **wireless** AP are automatically determined and set to adjust boundaries of an RF coverage region, such that RF signal coverage of the first group of communication devices is minimized but RF signal coverage of the second group of communication devices is maximized. Preferably, the parameters of the **wireless transceiver** are determined through use of an adaptive **beamforming** technique (e.g. a minimax optimization) which is performed automatically by the **wireless** AP without user intervention. After the configuration procedure,

the **wireless** AP operates with use of the configured **wireless transceiver** parameters in a normal, steady-state mode of operation as the AP tripwire of the WLAN.

TXT

- h04w
- multi-system

[SS 34]