

Search query (4): [SP]: technical field[0001] this disclosure relates to wireless communication, and in particular to configuring channel state information-reference signal (csi-rs) resources in a wireless communication system.background[0002] in third generation partnership project (3gpp) long term evolution (lte) systems, data transmissions in both downlink, i.e. from a network node or base station such as an enodeb (enb) to a wireless device such as a user equipment (ue) and uplink, i.e., from a wireless device or wireless device to a network node or base station or enb, are organized into radio frames of 10 ms, each radio frame consisting of ten equally-sized subframes of length tsubframe=1 ms, as shown in fig. 1.[0003] lte uses orthogonal frequency division multiplexing (ofdm) in the downlink and single carrier ofdm (sc-ofdm) in the uplink. the basic lte downlink physical resource can thus be seen as a time-frequency grid as illustrated in fig. 2 where each resource element corresponds to one ofdm subcarrier during one ofdm symbol interval.[0004] furthermore, the resource allocation in lte is typically described in terms of resource blocks (rbs), where a resource block corresponds to one slot (0.5 ms) in the time domain and 12 contiguous subcarriers in the frequency domain. resource blocks are numbered in the frequency domain, starting with 0 from one end of the system bandwidth.[0005] similarly, the lte uplink resource grid is illustrated in fig. 3, where nrbul is the number of resource blocks (rb) contained in the uplink system bandwidth, nscrb is the number of subcarriers in each rb, where typically, nscrb=12, nsymbul is the number of sc-ofdm symbols in each slot, where nsymbul=7 for normal cyclic prefix (cp) and nsymbul=6 for extended cp. a subcarrier and a sc-ofdm symbol form an uplink (ul) resource element (re).[0006] downlink data transmissions from a network node to a wireless device are dynamically scheduled, i.e., in each subframe the network node transmits control information about which terminal's data is transmitted and upon which resource blocks the data is transmitted, in the current downlink subframe. this control signaling is typically transmitted in the first 1, 2, 3 or 4 ofdm symbols in each subframe. a downlink system with 3 ofdm symbols as control is illustrated in fig. 4.[0007] similar to downlink, uplink transmissions from a wireless device to a network node are also dynamically scheduled through the downlink control channel. when a wireless device receives an uplink grant in subframe n, it transmits data in the uplink at subframe n+k, where k=4 for frequency division duplex (fdd) system and k varies for tdd systems.[0008] in lte, a number of physical channels are supported for data transmissions. a downlink or an uplink physical channel corresponds to a set of resource elements carrying information originating from higher layers while a downlink or an uplink physical signal is used by the physical layer but does not carry information originating from higher layers.[0009] some of the downlink physical channels and signals supported in lte are:[0010] physical downlink shared channel (pdsch)[0011] physical downlink control channel (pdccch)[0012] enhanced physical downlink control channel (epdccc)[0013] reference signals: cell specific reference signals (crs)demodulation reference signal for pdschchannel state information reference signals (csi-rs) pdsch is used mainly for carrying user traffic data and higher layer messages in the downlink and is transmitted in a dl subframe outside of the control region as shown in fig. 4. both pdccch and epdccc are used to carry downlink control information (dci) such as prb allocation, modulation level and coding scheme (mcs), precoder used at the transmitter, and etc. pdccch is transmitted in the first one to four ofdm symbols in a dl subframe, i.e. the control region, while epdccc is transmitted in the same region as pdsch. [0017] some of the uplink physical channels and signals supported in lte are: [0018] physical uplink shared channel (pusch)[0019] physical uplink control channel (pucch)[0020] demodulation reference signal (dmrs) for pusch[0021] demodulation reference signal (dmrs) for pucch the pusch is used to carry uplink data from the wireless device to the network node. the pucch is used to carry uplink control information from the wireless device to the network node.[0022] in the 3gpp ran1#86 standardization meeting an agreement on aperiodic csi reporting for nr was made to study aperiodic csi reporting in conjunction with aperiodic rs transmission. in particular, it was agreed to study dynamic indication of aperiodic rs and interference measurement resource including resource pool sharing for aperiodic channel and interference measurement resources.[0023] solutions for resource pool sharing for aperiodic channel and interference measurement resources are therefore still needed.summary[0024] a method, wireless device and network node for configuring and using csi-rs are disclosed. according to one embodiment, a method includes transmitting to a wireless device an indication of channel state information reference signals, csi-rs, resources, the indication indicating one or more than one csi-rs resources within a configured plurality of csi-rs resources configured to be used by the wireless device for csi signaling.[0025] in some embodiments, a method at a network node is provided, the method including transmitting to a wireless device an indication of channel state information reference signals, csi-rs, resources, the indication indicating one or more than one csi-rs resources within a configured plurality of csi-rs resources configured to be used by the wireless device for csi signaling.[0026] in some embodiments, the plurality of csi-rs resources configured to be used by the wireless device for csi signaling are configured through higher layers. in some embodiments, the indication is transmitted dynamically. in some embodiments, the indication is transmitted with one of downlink control information, dci, and medium access control control element, mac ce signaling. in some embodiments, the indication indicates two temporally-successive orthogonal frequency division multiplex, ofdm, symbols, each of the two temporally-successive ofdm symbols being associated with at least one of two ports to form a resource element. in some embodiments, the indication indicates two successive frequency units forming one orthogonal frequency division multiplex, ofdm, symbol, each of the two frequency units being associated with at least one of two ports to form a resource element. in some embodiments, multiple different indications of different aggregations of resource elements are configured for the wireless device. in some embodiments, at least two different aggregations of resource elements share at least a pair of csi-rs resources in common. in some embodiments, a number of resources sets are configured from a pool of n csi-rs resources. in some embodiments, a report setting is based on resource settings applicable to a set of csi-rs resources.[0027] in some embodiments, a network node is provided and includes a transceiver configured to transmit to a wireless device an indication of channel state information reference signals, csi-rs, resources, the indication indicating one or more than one csi-rs resource within a configured plurality of csi-rs resources configured to be used by the wireless device for csi signaling.[0028] in some embodiments, the plurality of csi-rs resources configured to be used by the wireless device for csi signaling are configured through higher layers. in some embodiments, the indication is transmitted dynamically. in some embodiments, the indication is transmitted with one of downlink control information, dci, and medium access control control element, mac ce signaling. in some embodiments, the indication indicates two temporally-successive orthogonal frequency division multiplex, ofdm, symbols, each of the two temporally-successive ofdm symbols being associated with at least one of two ports to form a resource element. in some embodiments, the indication indicates two successive frequency units forming one orthogonal frequency division multiplex, ofdm, symbol, each of the two frequency units being associated with at least one of two ports to form a resource element. in some embodiments, multiple different indications of different aggregations of resource elements are configured for the wireless device. in some embodiments, at least two different aggregations of resource elements share at least a pair of csi-rs resources in common. in some embodiments, a number of resources set is configured from a pool of n csi-rs resources. in some embodiments, a report setting is based on resource settings applicable to a set of csi-rs resources.[0029] in some embodiments, a network node is provided and includes a transceiver module configured to transmit to a wireless device an indication of channel state information reference signals, csi-rs, resources, the indication indicating one or more than one csi-rs resource within a configured plurality of csi-rs resources configured to be used by the wireless device for csi signaling.[0030] in some embodiments, a method at a network node of configuring channel state information reference signals, csi-rs, is provided. the method includes determining a set of csi-rs resource elements, the set comprising at least two csi-rs resources. the method also includes aggregating a plurality of csi-rs resou

Results: 4

1) Family number: 49241115 (US2012300652A)

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Title: RADIO BASE STATION APPARATUS, MOBILE TERMINAL DEVICE AND WIRELESS COMMUNICATION METHOD

Priority: JP20100001139 20100106 WO2011JP50036 20110105 JP20130222040 20131025

Family:	Publication number	Publication date	Application number	Application date
	CA2785856 AA	20110714	CA20112785856	20110105
	CA2785856 C	20151201	CA20112785856	20110105
	CN102714563 A	20121003	CN201180005444	20110105
	CN102714563 B	20160120	CN201180005444	20110105
	EP2523377 A1	20121114	EP20110731793	20110105
	EP2523377 A4	20150422	EP20110731793	20110105
	IN05954CN2012 A	20140103	IN2012CN05954	20120706
	IN05954CN2012 A	20160831	IN2012CN05954	20120706
	IN319744 B	20190906	IN2012CN05954	20120706
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	JP2014053942 A2	20140320	JP20130222040	20131025
	JP5781139 B2	20150916	JP20130222040	20131025
	KR101440430 B1	20140917	KR20127017349	20110105
	KR20120103675 A	20120919	KR20127017349	20110105
	MX2012007877 A1	20120803	MX20120007877	20110105
	RU2012129728 A	20140220	RU20120129728	20110105

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■ US2012300652 AA	20121129	US20110519895	20110105
■ US9325443 BB	20160426	US20110519895	20110105
■ VN20342 A1	20190125	VN20120002308	20120803
■ WO11083795 A1	20110714	WO2011JP50036	20110105

Probable Assignee: NTT DOCOMO INC

Assignee(s):(std): KISHIYAMA YOSHIHISA ; NTT DOCOMO INC ; OHWATARI YUSUKE ; TAKEDA KAZUAKI

Assignee(s): NTT DOSOMO INK

Inventor(s):(std): OHWATARI YUSUKE ; TAKEDA KAZUAKI ; KISHIYAMA YOSHIHISA ; OWATARI YUSUKE ; KISHIYAMA SACHIHISA ; YOSHIHISA KISHIYAMA ; KAZUAKI TAKEDA ; YUSUKE OHWATARI ; TAKEDA KADZUAKI ; OVATARI JUSUKE ; KISIJAMA ESIKHISA

Agent(s): OYEN WIGGS GREEN AND MUTALA LLP; HOFFMANN EITLE; OSHA LIANG LLP; AOKI HIROYOSHI ET AL

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International class (IPC 8-9): H04B7/26 H04J11/00 H04J13/00 H04L1/20 H04L5/00 H04W16/28 H04W24/10 H04W28/00 H04W28/06 H04W72/04 (Advanced/Invention); H04L5/00 H04W24/10 H04W28/04 H04W48/08 H04W8/24 H04W88/08 (Advanced/Non-invention)

International class (IPC 1-7): H04J11/00 H04W28/06 H04W72/04

CPC: H04L5/0023 H04L5/0039 H04L5/0051 H04L5/0057 H04L5/0073 H04L5/0082 H04W88/08 H04J11/003 H04J11/0026 H04J11/0059 H04L1/20 H04W8/24 H04W24/10 H04W28/04 H04W48/08 H04L5/0053 H04B17/336 H04B17/345

European class: H04J11/00F H04J11/00F1 H04J11/00F1A H04L1/20 T04J11/00F2C T04W24/00 T04W24/10 T04W28/04 T04W28/04N T04W48/08 T04W8/24 T04W88/08

US class: 1/1 370/252 370/329

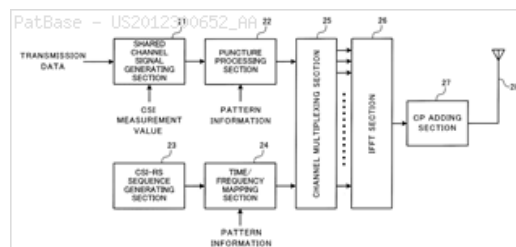
[Classification Explorer](#)

Cited documents: WO09035246 A2, WO09035246, US7697409 BB, US2014334453 AA, US2012120903 AA, US2012027120 AA, US2012002740 AA, US2011244877 AA, US2010254471 AA, US2008013500 AA, US2004266358 AA, RU2364043, RU2236757, JP2009544249 T2, JP2008524957 T2, JP2008524957, JP2004096186 A2, EP1873925 A1, CN101180804 A,

Forward Citations: WO13069664, WO13069345, US9999074, US9941938, US9578603, US9571170, US9564954, US9564953, US9369890, US9344241, US2017202014, US2014162717, US10484949, JP6069216, JP5970170, JP5273886, JP2019533931, JP2013102301, JP2013069345, JP2012514960, JP2012514443, EP2522189, EP2522189, EP2522189, CN103918204, CN103918204, CN103368875,

Abstract:

To provide a radio base station apparatus, mobile terminal device and wireless communication method for transmitting and receiving downlink channel quality measurement reference signals in consideration of interference estimation of high accuracy, in a wireless communication method of the invention, a radio base station apparatus generates channel quality measurement reference signals, and maps the channel quality measurement reference signals to two adjacent symbols, and a mobile terminal device receives a downlink signal including the channel quality measurement reference signals mapped to two adjacent symbols, and performs interfering power estimation using the channel quality measurement reference signals mapped to two adjacent symbols.



2) Family number: 69106823 (US2020022132A)

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Title: APERIODIC CHANNEL STATE INFORMATION (CSI) AND CSI-REFERENCE SIGNAL (RS) RESOURCE POOLING

Priority: US20160403035P 20160930 US20170335464 20170929 WO2017IB56044 20170929

Family:

Publication number	Publication date	Application number	Application date
■ BR112019006068 A2	20190618	BR20191106068	20170929
■ CL2019000842 A1	20190621	CL20190000842	20190328
■ CN109792356 A	20190521	CN201780060334	20170929
■ CO20190003376 A2	20190412	CO20190003376	20190404
■ EP3520305 A1	20190807	EP20170791462	20170929
■ IN201917010029 A	20190614	IN201917010029	20190314
■ JP2019533931 T2	20191121	JP20190516476T	20170929
■ MX2019003659 A1	20190805	MX20190003659	20170929
■ US2020022132 AA	20200116	US20170335464	20170929
■ WO18060971 A1	20180405	WO2017IB56044	20170929

Probable Assignee: TELEFONAKTIEBOLAGET LM ERICSSON PUBL

Assignee(s):(std): ERICSSON AB ; ERICSSON TELEFON AB L M ; TELEFONAKTIEBOLAGET L M ERICSSON PUBL ; TELEFONAKTIEBOLAGET LM ERICSSON PUBL

Inventor(s):(std): GRANT STEPHEN ; FRENNE MATTIAS ; STEPHEN GRANT ; MATTIAS FRENNE

Agent(s): SARGENT AND KRAHN; LAQUA BERND CHRISTIAN KURT; WEISBERG ALAN M

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DJ DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU

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ZM ZW

International class
(IPC 8-9): H04L5/00 H04W72/04 H04W72/08 (Advanced/Invention)

International class
(IPC 1-7): H04L5/00

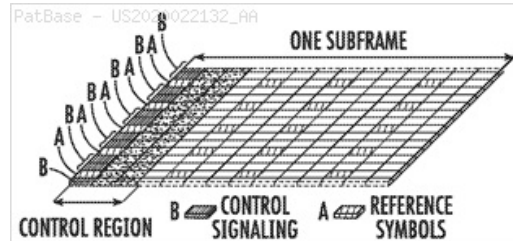
CPC: H04L5/0057 H04W72/0413 H04W72/082 H04L5/0053 H04L5/0051

[Classification Explorer](#)

Cited documents: WO16056980, WO11100520 A1, JP2014053942,

Abstract:

A method, wireless device and network node for configuring and using CSI-RS are disclosed. According to one embodiment, a method includes transmitting to a wireless device an indication of channel state information reference signals, CSI-RS, resources, the indication indicating one or more than one CSI-RS resources within a configured plurality of CSI-RS resources configured to be used by the wireless device for CSI signaling.



3) Family number: 49405958 (US2011199986A)

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Title: REFERENCE SIGNAL FOR A COORDINATED MULTI-POINT NETWORK IMPLEMENTATION

Priority: US20100705491 20100212 WO2011US24486 20110211

Family:

Publication number	Publication date	Application number	Application date
CA2789503 AA	20120809	CA20112789503	20110211
CA2789503 C	20160329	CA20112789503	20110211
CN102754457 A	20121024	CN201180009133	20110211
CN102754457 B	20150415	CN201180009133	20110211
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EP2534856 A4	20170215	EP20110742848	20110211
IN06199CN2012 A	20131129	IN2012CN06199	20120713
JP2013519337 T2	20130523	JP20120553022T	20110211
KR101530119 B1	20150618	KR20127021750	20110211
KR20120120317 A	20121101	KR20127021750	20110211
US2011199986 AA	20110818	US20100705491	20100212
US8305987 BB	20121106	US20100705491	20100212
WO11100520 A1	20110818	WO2011US24486	20110211

Probable Assignee: BLACKBERRY LTD

Assignee(s):(std): BLACKBERRY LTD ; CAI ZHIJUN ; FONG MO HAN ; GUO SHIGUANG ; HEO YOUN HYOUNG ; NOVAK ROBERT ; YU DONGSHENG ; XU HUA ; RESEARCH IN MOTION LTD

Assignee(s): RESEARCH IN MOTION CORP ; RESEARCH IN MOTION LIMITED

Inventor(s):(std): FONG MO HAN ; GUO SHIGUANG ; YU DONGSHENG ; XU HUA ; HEO YOUN HYOUNG ; NOVAK ROBERT ; CAI ZHIJUN ; HYOUNG HEO YOUN ; ZHIJUN CAI ; HUA XU ; ROBERT NOVAK ; MO HAN FONG ; DONGSHENG YU ; SHIGUANG GUO

Agent(s): RIDOUT AND MAYBEE LLP; FINNIE PETER JOHN; FISH AND RICHARDSON PC; HAMILTON GARY W

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

International class
(IPC 8-9): H04B1/38 H04L27/26 H04L5/00 H04W16/32 H04W24/00 H04W28/16 H04W4/00 H04W72/00 H04W72/04 (Advanced/Invention)

CPC: H04L5/0026 H04L5/0073 H04L5/0091 H04L5/0035 H04L5/0048

European class: H04L5/00C1B H04L5/00C5 H04L5/00E

US class: 370/329 370/329P 455/450 455/561 455/561S

[Classification Explorer](#)

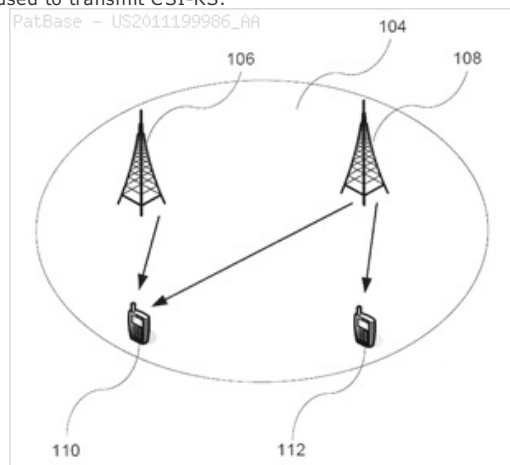
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Abstract:

A method of decoding a channel state information reference signal (CSI-RS) is presented. An indication of a resource element (RE) configuration allocated for transmission of CSI-RSs by a first cell is received from a second cell. The method includes at least one of using the indication of the RE configuration to decode a first CSI-RS received from the first cell, and using the indication of the RE configuration to mute one or more REs within a data channel transmission received from a third cell. The first cell, second cell and third cell may be associated within a CSI-RS group. In some cases, at least two of the first cell, the second cell, and the third cell are mutually interfering cells. The indication of the RE configuration may include a plurality of logical indices having incremental values, the plurality of logical indices identifying REs used to transmit CSI-RS.



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	ZA201708371 A	20190626	ZA20170008371	20151006

Probable Assignee: TELEFONAKTIEBOLAGET L M ERICSSON PUBL
Assignee(s):(std): ERICSSON TELEFON AB L M ; ERICSSON TELEFON AB L M PUBL ; TELEFONAKTIEBOLAGET L M ERICSSON PUBL ; TELEFONAKTIEBOLAGET LM ERICSSON PUBL
Assignee(s): TELEFONAKTIEBOLAGET LM ERICSSON ; PUBL ; TELEFON AB L M ERICSSON
Inventor(s):(std): FURUSKOG JOHAN ; HARRISON MARK ; FRENNE MATTIAS ; JONGREN GEORGE ; HARRISON ROBERT MARK ; JOENGREN GEORGE ; JOHAN FURUSKOG ; ROBERT MARK HARRISON ; GEORGE JOENGREN ; MATTIAS FRENNE ; J NGREN GEORGE ; FRENNE MATTAS ; HARRSON ROBERT MARK ; HARRISSON ROBERT MARK ; HARRISON ROBERT M
Inventor(s): HARRISON ROBERT MARK GRAPEVINE ; ROBERTMARK HARRISON
Agent(s): WATERMARK INTELLECTUAL PROPERTY PTY LTD; ERICSSON; LINAGE RAFAEL; MARKS AND CLERK; PARDOMUAN OLOAN LUBIS; WOLFF BREGMAN AND GOLLER; OOO SOYUZPATENT; SOYUZPATENT OOO; HALISE BETUEL ATABAY VARLIK; WITHROW AND TERRANOVA PLLC; BOU FAICAL ROGER
Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW
International class (IPC 8-9): H04B H04B17/382 H04B7/0413 H04B7/06 H04L H04L1/00 H04L27/26 H04L5/00 H04W16/00 H04W16/28 H04W24/10 H04W72/04 H04W72/08 H04W76/04 H04W76/27 (Advanced/Invention); H04L5/00 (Core/Invention)
CPC: H04W72/042 H04L5/005 H04W76/046 H04B7/0626 H04B7/0647 H04L5/0023 H04L5/0035 H04L5/0048 H04L5/0057 H04L5/0094 H04L1/0026 H04L5/0053 H04W24/10 H04W72/0413 H04W72/082 H04W76/27
US class: 1/1 370/252 370/329
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Abstract:

Embodiments of systems and methods for flexible Channel State Information (CSI) feedback in a cellular communications network are disclosed. In some embodiments, a base station configures a wireless device with a set of CSI-RS resources, dynamically configures a CSI-RS resource from the set of CSI-RS resources for measurement, and receives a CSI report from the wireless device determined from the CSI-RS resource dynamically configured for measurement. In this manner, the base station is enabled to dynamically configure and re-configure the CSI-RS resource(s) for measurement by the wireless device, which in turn provides flexible CSI feedback that is particularly well-suited for embodiments in which the base station transmits beamformed CSI-RS.

