**3GPP TSG RAN WG1 Meeting #102-e R1-200xxxx**

**Aug 17th – 24th, 2020**

**Agenda item: 7.2.2.1.1**

**Source: Moderator (Qualcomm Incorporated)**

**Title: FL summary for initial access signals and channels for NR-U**

**Document for: Discussion and Decision**

# Introduction

This paper summarizes the text proposals submitted to agenda item 7.2.2.1.1.

# SSB and Type0-PDCCH monitoring

**Issue 2.1. Type0-PDCCH monitoring**

[2] and [8] discussed enhancements to Type0-PDCCH monitoring by focusing on M=1/2 and support Type0-PDCCH monitoring in the same slot as SSB only.

In [2], it is proposed to keep M=1/2 for Type0-PDCCH monitoring only.

The proposals and TPs are captured below:

**Proposal in [2]: For NR-U, only configuration parameter M = 1/2 in Table 13-11 in 3GPP TS 38.213 should be supported to let SS/PBCH block and its associated Type-0 PDCCH in the same slot, and the following TP#1 can be considered.**

-------------------------------------------- < Start of text proposal #1 for 38.213 [1]> -------------------------------------------

13 UE procedure for monitoring Type0-PDCCH CSS sets

< Unchanged parts are omitted >

Table 13-11A: Parameters for PDCCH monitoring occasions for Type0-PDCCH CSS set - SS/PBCH block and CORESET multiplexing pattern 1 and FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index |  | Number of search space sets per slot |  | **First symbol index** |
| 0 | 0 | 1 | 1/2 | 0 |
| 1 | 0 | 2 | 1/2 | {0, if  is even}, {, if  is odd} |
|  |  |  |  |  |
|  |  |  |  |  |
| 2 | 5 | 1 | 1/2 | 0 |
| 3 | 5 | 2 | 1/2 | {0, if  is even}, {, if  is odd} |
|  |  |  |  |  |
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| 4-15 | / | / | / | / |

< Unchanged parts are omitted >

--------------------------------------------------- < End of text proposal #1> -----------------------------------------------------

**Proposal in [8]: In the table 13-11 in 38.213, remove M=2, and replace M=1 with M=1/2 in the table, and reserve last 8 rows for new band (e.g. 6GHz)**

------------------------------------------------------ Start of Text Proposal ----------------------------------------------------------

13 UE procedure for monitoring Type0-PDCCH CSS sets

------------------------------------------------------ Unchanged parts omitted ------------------------------------------------------

For operation with shared spectrum channel access and for the SS/PBCH block and CORESET multiplexing pattern 1, a UE monitors PDCCH in the Type0-PDCCH CSS set over slots that include Type0-PDCCH monitoring occasions associated with SS/PBCH blocks that are quasi co-located with the SS/PBCH block that provides a CORESET for Type0-PDCCH CSS set with respect to average gain, QCL-TypeA, and QCL-TypeD properties, when applicable [6, TS 38.214]. For a candidate SS/PBCH block index , where , two consecutive slots starting from slot include the associated Type0-PDCCH monitoring occasions. The UE determines an index of slot as that is in a frame with system frame number (SFN) satisfying if , or in a frame with SFN satisfying if . and are provided by Table 13-11A, and based on the SCS for PDCCH receptions in the CORESET [4, TS 38.211]. The index for the first symbol of the CORESET in slots and is the first symbol index provided by Table 13-11A. The UE does not expect to be configured with , or with , when .

------------------------------------------------------ Unchanged parts omitted ------------------------------------------------------

Table 13-11A: Parameters for PDCCH monitoring occasions for Type0-PDCCH CSS set - SS/PBCH block and CORESET multiplexing pattern 1 and FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index |  | Number of search space sets per slot |  | **First symbol index** |
| 0 | 0 | 1 | 1/2 | 0 |
| 1 | 0 | 2 | 1/2 | {0, if  is even}, {, if  is odd} |
| 2 | 2 | 1 | 1/2 | 0 |
| 3 | 2 | 2 | 1/2 | {0, if  is even}, {, if  is odd} |
| 4 | 5 | 1 | 1/2 | 0 |
| 5 | 5 | 2 | 1/2 | {0, if  is even}, {, if  is odd} |
| 6 | 7 | 1 | 1/2 | 0 |
| 7 | 7 | 2 | 1/2 | {0, if  is even}, {, if  is odd} |
| 8 |  | 1 |  | 0 |
| 9 |  | 1 |  | 0 |
| 10 |  | 1 |  | 1 |
| 11 |  | 1 |  | 2 |
| 12 |  | 1 |  | 1 |
| 13 |  | 1 |  | 2 |
| 14 |  | 1 |  | 1 |
| 15 |  | 1 |  | 2 |

-------------------------------------------------------- End of Text Proposal --------------------------------------------------------

**Issue 2.2: PDSCH rate matching**

[6] discussed PDSCH rate matching SSB enhancement with rate matching bits in DCI 1\_1. Basically supporting rate matching into SSB when indicated by the bit in DCI 1\_1.

**Proposal in [6]: When DCI format 1\_1 contains rate matching indication and at least one configured rate-match pattern overlaps the REs of candidate SSB, UE shall perform the rate-matching around candidate SSB for PDSCH reception based on rate matching indication; otherwise, UE shall perform the rate-matching around candidate SSB for PDSCH reception based on ssb-PositionsInBurst.**

---------------------------------------------------- TP3 38.214 ---------------------------------------------------------------

5.1.4 PDSCH resource mapping

When receiving the PDSCH scheduled with SI-RNTI and the system information indicator in DCI is set to 0, the UE shall assume that no SS/PBCH block is transmitted in REs used by the UE for a reception of the PDSCH.

When receiving the PDSCH scheduled with SI-RNTI and the system information indicator in DCI is set to 1, RA-RNTI, MsgB-RNTI, P-RNTI or TC-RNTI, the UE assumes SS/PBCH block transmission according to *ssb-PositionsInBurst*, and if the PDSCH resource allocation overlaps with PRBs containing candidate SS/PBCH block transmission resources the UE shall assume that the PRBs containing candidate SS/PBCH block transmission resources are not available for PDSCH in the OFDM symbols where candidate SS/PBCH block ~~is~~ may be transmitted.

A UE expects a configuration provided by *ssb-PositionsInBurst* in *ServingCellConfigCommon* to be same as a configuration provided by *ssb-PositionsInBurst* in *SIB1*.

When receiving PDSCH scheduled by PDCCH with CRC scrambled by C-RNTI, MCS-C-RNTI, CS-RNTI, or PDSCHs with SPS, the REs corresponding to the configured or dynamically indicated resources in Clauses 5.1.4.1, 5.1.4.2 are not available for PDSCH. Furthermore, if the Rate matching indicator field is not present in the DCI format carried by the PDCCH, or the RateMatchPattern(s), as described in Clause 5.1.4.1, do not overlap with the PRBs containing candidate SS/PBCH block transmission resources, the UE assumes SS/PBCH block transmission according to *ssb-PositionsInBurst* if the PDSCH resource allocation overlaps with PRBs containing candidate SS/PBCH block transmission resources, the UE shall assume that the PRBs containing candidate SS/PBCH block transmission resources are not available for PDSCH in the OFDM symbols where candidate SS/PBCH block ~~is~~ may be transmitted.

A UE is not expected to handle the case where PDSCH DM-RS REs are overlapping, even partially, with any RE(s) not available for PDSCH*.*

**<Unchanged parts are omitted>**

--------------------------------------------------------- END -----------------------------------------------------------

**Issue 2.3: MIB interpretation of overlapping frequency bands**

[4], [5], and [6] consider the problem that a part of 6GHz band can be either licensed or unlicensed band depending on region.

[4] believes the discussion is not in scope of Rel.16 and can be solved in RAN2 ro RAN4 in the future.

In [5], the following options and proposals are provided:

Option 1) The UE attempts SIB1 reception during initial access based on two different hypotheses on the MIB content (legacy content, and new content including Q). Once SIB1 is successfully decoded, the UE will know if shared/licensed spectrum channel access shall be used on the accessed carrier.

Option 2) A PBCH CRC scrambling, similar as for PDCCH, can be introduced, where the scrambling would be different depending on if the new MIB or legacy MIB interpretation should be used.

Option 3) RAN4 can define non-overlapping GSCN points depending on which channel access requirements that apply to the band.

**Proposal in [5]. RAN1 should discuss the MIB interpretation ambiguity issue for overlapping frequency bands and agree on if and how the issue should be resolved.**

**Proposal in [6]: The MIB interpretation ambiguity issue for overlapping frequency bands should be resolved. Different sync raster point are defined for licensed and unlicensed operation.**

TP to indicate allowed sync raster

------------------------------------------------------TP1 TS 38.213 --------------------------------------------------------

13 UE procedure for monitoring Type0-PDCCH CSS sets

**<Unchanged parts are omitted>**

If a UE detects a first SS/PBCH block and determines that a CORESET for Type0-PDCCH CSS set is not present, for operation without shared spectrum channel access, and for  for FR1 or for  for FR2, the UE may determine the nearest (in the corresponding frequency direction) global synchronization channel number (GSCN) of a second SS/PBCH block having a CORESET for an associated Type0-PDCCH CSS set as .  is the GSCN of the first SS/PBCH block and  is a GSCN offset provided by Table 13-16 for FR1 and Table 13-17 for FR2. For operation with shared spectrum channel access, and for  for FR1, the UE may determine the nearest (in the corresponding frequency direction) allowed global synchronization channel number (GSCN) of a second SS/PBCH block having a CORESET for an associated Type0-PDCCH CSS set as.  is the GSCN of the first SS/PBCH block and  is a GSCN offset provided by Table 13-16 for FR1. UE assumes the GSCN offset refers to the nearest allowed GSCN as defined in [8-1, TS 38.101-1] for FR1. If the GSCN offset refers to a GSCN which is not allowed in [8-1, TS 38.101-1] for FR1, UE may ignore the information related to GSCN of SS/PBCH locations in performing cell search. If the UE detects the second SS/PBCH block and the second SS/PBCH block does not provide a CORESET for Type0-PDCCH CSS set, as described in Clause 4.1, the UE may ignore the information related to GSCN of SS/PBCH block locations for performing cell search.

If a UE detects a SS/PBCH block and determines that a CORESET for Type0-PDCCH CSS set is not present, and for  for FR1 or for  for FR2, the UE determines that there is no SS/PBCH block having an associated Type0-PDCCH CSS set within a GSCN range . and  are respectively determined by *controlResourceSetZero* and *searchSpaceZero* in *pdcch-ConfigSIB1*. If the GSCN range is , the UE determines that there is no information for a second SS/PBCH block with a CORESET for an associated Type0-PDCCH CSS set on the detected SS/PBCH block.

If a UE does not detect any SS/PBCH block providing a CORESET for Type0-PDCCH CSS set, as described in Clause 4.1, within a time period determined by the UE, the UE may ignore the information related to GSCN of SS/PBCH locations in performing cell search.

Table 13-16: Mapping between the combination of  and *controlResourceSetZero* and *searchSpaceZero* in *pdcch-ConfigSIB1* to  for FR1

|  |  |  |
| --- | --- | --- |
|  | *16×controlResourceSetZero +searchSpaceZero* |  |
| 24 | 0, 1, …, 255 | 1, 2, …, 256 |
| 25 | 0, 1, …, 255 | 257, 258, …, 512 |
| 26 | 0, 1, …, 255 | 513, 514, …., 768 |
| 27 | 0, 1, …, 255 | -1, -2, …, -256 |
| 28 | 0, 1, …, 255 | -257, -258, …, -512 |
| 29 | 0, 1, …, 255 | -513, -514, …., -768 |
| 30 | 0, 1, …, 255 | Reserved, Reserved, …, Reserved |

Table 13-17: Mapping between the combination of  and *controlResourceSetZero* and *searchSpaceZero* in *pdcch-ConfigSIB1* to  for FR2

|  |  |  |
| --- | --- | --- |
|  | *16×controlResourceSetZero +searchSpaceZero* |  |
| 12 | 0, 1, …, 255 | 1, 2, …, 256 |
| 13 | 0, 1, …, 255 | -1, -2, …, -256 |
| 14 | 0, 1, …, 255 | Reserved, Reserved, …, Reserved |

**<Unchanged parts are omitted>**

--------------------------------------------------------- END -----------------------------------------------------------

# CSI-RS enhancements in DRS

**Issue 3.1: On CSI-RS configuration enhancements:**

[2], [3], and [6] discussed CSI-RS configurations in NR-U.

[2] and [3] believes CSI-RS configuration enhancements are not needed

In [6], it is proposed to have different rules for CSI-RS QCL association inside and outside DRS window.

**Proposal in [6]: For the CSI-RS outside DRS window, the associated SSB index should be the SSB index, for the CSI-RS inside DRS window, the associated SSB should be the candidate SSB index.**

**Issue 3.2: On CSI-RS validation in DRS**

[3], [4], and [7] discussed CSI-RS validation in DRS

[4] believes no more discussion is needed in Release 16 for CSI-RS validation during DRS for RRM measurements.

In [3], using SSB detection to validate the closest CSI-RS with same QCL is proposed

In [7], it is proposed to use SSB detection to validate configured CSI-RS in the same slot with the same QCL is proposed

**Proposal in [3]: The valid CSI-RS resource in a DRS window is the one closest to the detected SSB and with TCI state associating with the same SSB index.**

**Proposal in [7]: If a UE detects a SS/PBCH block, the UE assumes**

* **a CSI-RS is transmitted, if it is configured in the slot as the detected SS/PBCH block and QCLed with the detected SS/PBCH block;**
* **a CSI-RS is not transmitted, if it is configured in the slots containing candidate SS/PBCH block QCLed with the detected SS/PBCH block and QCLed with the candidate SS/PBCH block.**

=========================== Start of TP for TS 38.213 ===================================

For operation with shared spectrum channel access, and for a set of symbols of a slot configured by higher layer parameters to receive CSI-RS, if the UE receives a SS/PBCH block within the slot, wherein the CSI-RS is configured to be QCLed with the received SS/PBCH block, the UE receives the CSI-RS.

For operation with shared spectrum channel access, and for a set of symbols of a slot configured by higher layer parameters to receive CSI-RS, if the UE detects a first SS/PBCH block in a discovery burst transmission window, and the set of symbols of the slot for receiving CSI-RS are within the same slot as the symbols for a second SS/PBCH block, wherein the second SS/PBCH block is within the same discovery burst transmission window as the first SS/PBCH block and QCLed with the first SS/PBCH block, then the UE cancels the reception of CSI-RS.

============================= End of TP for TS 38.213 ==================================

**Issue 3.3: On CSI-RS transmission in different slots within DRS with the same QCL**

In [3], it is further proposed to assume only one CSI-RS with the same QCL is transmitted in DRS window

**Proposal in [3]: Once gNB transmits CSI-RS on a CSI-RS resource together with its corresponding SSB on a candidate SSB position, gNB can stop transmitting CSI-RS on the following CSI-RS resources corresponding to other candidate SSB positions with same SSB index in the same DRS window.**

# PRACH enhancements

**Issue 4.1: LBT gap between PRACH**

In [1], it is proposed to add an LBT gap between PRACH with even or odd only RO being valid.

Proposal in [1]: To reduce the PRACH delay caused by the blockage issue, LBT gap between RACH occasions should be supported, i.e. only even or odd numbered time domain RACH occasions in a RACH slot are used based on existing PRACH configurations.

----------------------------------------TP1: Start TP for Section 8.1 of TS 38.213 -------------------------------------

For unpaired spectrum,

- if a UE is not provided *tdd-UL-DL-ConfigurationCommon*, a PRACH occasion in a PRACH slot is valid if it does not precede a SS/PBCH block in the PRACH slot and starts at least  symbols after a last SS/PBCH block reception symbol, where  is provided in Table 8.1-2.

- the index of the SS/PBCH block is provided by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon*

- If a UE is provided *tdd-UL-DL-ConfigurationCommon*, a PRACH occasion in a PRACH slot is valid if

- it is within UL symbols, or

- it does not precede a SS/PBCH block in the PRACH slot and starts at least  symbols after a last downlink symbol and at least  symbols after a last SS/PBCH block symbol, where  is provided in Table 8.1-2, and if *ChannelAccessType-r16* = *semistatic* is provided, does not overlap with a set of consecutive symbols before the start of a next channel occupancy time where there shall not be any transmissions, as described in [15, TS 37.213]

- the index of the SS/PBCH block is provided by *ssb-PositionsInBurst* in *SIB1* or in
*ServingCellConfigCommon*.

- when operation with shared spectrum access, only odd numbered RACH occasions within one slot in time domain based on higher layer configuration for PRACH transmission [4, TS 38.211] are valid.

----------------------------------------TP1: End TP for Section 8.1 of TS 38.213 -------------------------------------

**Issue 4.2: RO validation in FBE**

In [6], it is proposed to further validate RO with RMSI location

**Proposal 1 in [6]: If a PRACH occasion is overlapped (fully or partially) with a slot which contains RMSI, the PRACH occasion should be treated as invalid PRACH occasion.**

**Proposal 2 in [6]: If long PRACH sequence is configured, UE is not expected to be configured with FDMed PRACH occasions.**

**Issue 4.3: LBT for 2-step RACH**

In [8], further clarification on PO LBT requirement in 2-step RACH is provided

**Proposal in [6]: In 2-step RACH, if a PO is within a COT initiated by a UE for PRACH transmission on an associated RO, for PUSCH transmission on the PO,**

* **If the gap between the RO and the PO is smaller than 16, type 2C channel access procedure should be used.**
* **If the gap between the RO and the PO is more than or equal to 16 but less than 25, type 2B channel access procedure should be used.**
* **If the gap between the RO and the PO is more than or equal to 25, type 2A channel access procedure should be used.**

----------------------------------- TP4: Start of TP 37.213 section 4.2.1 ---------------------------------------------

4.2.1 Channel access procedures for uplink transmission(s)

<Unchanged parts are omitted>

A UE shall use Type 1 channel access procedure for transmissions related to random access procedure that initiate a channel occupancy with UL channel access priority class in Table 4.2.1-1.

In Type-2 random access procedure, a UE may transmit a PUSCH on a PUSCH occasion within a channel occupancy that the UE initiated for a PRACH transmission on an associated RACH occasion after a gap as follows:

- If the gap is up to, the UE can transmit the PUSCH on the channel after performing Type 2C UL channel access as described in subclause 4.2.1.2.3.

- If the gap is more than or equal to 16 but less than 25,the UE can transmit the PUSCH on the channel after performing Type 2B UL channel access as described in subclause 4.2.1.2.2.

- If the gap is more than or equal to 25, the UE can transmit the PUSCH on the channel after performing Type 2A UL channel access as described in subclause 4.2.1.2.1.

<Unchanged parts are omitted>

----------------------------------------End of TP 37.213 section 4.2.1 ---------------------------------------------

**Issue 4.4: PRACH configuration in multiple RB sets**

In [7] and [9], it is proposed to support FDM ROs in different RB sets

**Proposal in [7]: Support RACH occasions over multiple consecutive RB sets based on *msg1-FDM*. Confine one RACH occasion within one RB set by applying *msg1-FrequencyStart* to *i*-th FDMed RACH occasion (1< *i* ≤ *msg1-FDM*) with the reference point of the start CRB of the RB set *s.***

============================ Start of TP for TS 38.211 ===================================

5.3.2 OFDM baseband signal generation for PRACH

The time-continuous signal  on antenna port for PRACH is defined by

, if or , if or

where  and

-  is given by clause 6.3.3;

-  is the subcarrier spacing of the initial uplink bandwidth part during initial access. Otherwise,  is the subcarrier spacing of the active uplink bandwidth part;

- is the largest value among the subcarrier spacing configurations by the higher-layer parameter *scs-SpecificCarrierList*;

-  is the lowest numbered resource block of the initial uplink bandwidth part and is derived by the higher-layer parameter *initialUplinkBWP* during initial access. Otherwise,  is the lowest numbered resource block of the active uplink bandwidth part and is derived by the higher-layer parameter *BWP-Uplink*;

- is the frequency offset of the lowest PRACH transmission occasion in frequency domain with respect to physical resource block 0 of the active uplink bandwidth part, if or . is the frequency offset of the lowest PRACH transmission occasion in frequency domain with respect to start CRB of a RB set in the active uplink bandwidth part, if or . The quantity is given by the higher-layer parameter *frequencyStartMsgA-PUSCH* if configured and a type-2 random-access procedure is initiated as described in clause 8.1 of [5, TS 38.213], otherwise by *msg1-FrequencyStart* as described in clause 8.1 of [5 TS 38.213];

-  is the PRACH transmission occasion index in frequency domain for a given PRACH transmission occasion in one time instance as given by clause 6.3.3.2;

- is the start CRB of a RB set in which the PRACH transmission occasion with index is [6, TS 38.214].

-  is the number of resource blocks occupied and is given by the parameter allocation expressed in number of RBs for PUSCH in Table 6.3.3.2-1.

============================ End of TP for TS 38.211 ==================================

**Proposal 1 in [9]: In case when the long PRACH sequence (i.e., L\_"RA" =1151 or L\_"RA" =571) is configured, multiple FDMed ROs are supported in active UL BWP with multiple RB sets.**

**Proposal 2 in [9]: In case when the multiple ROs are configured in active UL BWP with multiple RB sets, RO offset is supported, and each RO is allocated with a gap as much as the RO offset from the lowest indexed PRB of each RB set.**

**Issue 4.5 Msg A PUSCH RB set determination**

In [7], it is proposed to confine each Msg A PUSCH inside one RB set.

**Proposal in [7]: For 2-step RACH, a Msg A PUSCH is confined within one RB set which is the same RB set for its associated Msg A PRACH.**

=========================== Start of TP for TS 38.213 ===================================

8.1A PUSCH for Type-2 random access procedure

=========================== Unchanged Text Omitted ===================================

A UE determines time resources and frequency resources for PUSCH occasions in an active UL BWP from *msgA-PUSCH-Config* for the active UL BWP. If the active UL BWP is not the initial UL BWP and *msgA-PUSCH-Config* is not provided for the active UL BWP, the UE uses the *msgA-PUSCH-Config* provided for the initial UL BWP. If a UE is configured with interlaced PUSCH, the RB set for a MsgA PUSCH transmission is the RB set of the associated Msg A PRACH transmission.

A UE determines a first interlace for a first PUSCH occasion in the RB set in active UL BWP or first RB for a first PUSCH occasion in an active UL BWP respectively from *interlaceIndexFirstPO-MsgA-PUSCH* or from *frequencyStartMsgA-PUSCH* that provides an offset, in number of RBs in the active UL BWP, from a first RB of the RB set in the active UL BWP or of the active UL BWP. A PUSCH occasion includes a number of interlaces within the RB set or a number of RBs provided by *nrofInterlacesPerMsgA-PO* or by *nrofPRBs-perMsgA-PO*, respectively. Consecutive PUSCH occasions in the frequency domain of an UL BWP are separated by a number of RBs provided by *guardBandMsgA-PUSCH*. A number of PUSCH occasions in the frequency domain of an UL BWP is provided by *nrMsgA-PO-FDM*.

============================= End of TP for TS 38.213 ==================================

# Preparation phase discussion

In the preparation stage of the email discussion, we need to identify which issue(s) need further email discussion. Please provide your view below. Note that many (most) of the topics have been discussed before without any conclusion. Seems that only issue **4.4** and **4.5** are new topics and all other topics are previous discussed. Please take that into consideration as well. Given the email discussion thread limited, it is very unlikely we will have more than 1 email thread for this agenda item, each company please provide the top 2 issues you are interested in.

Table 1. View on priority

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | 2.1 | 2.2 | 2.3 | 3.1 | 3.2 | 3.3 | 4.1 | 4.2 | 4.3 | 4.4 | 4.5 |
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Please provide additional view below:

|  |  |
| --- | --- |
| Company | Comments |
|  |  |
|  |  |
|  |  |

# Reference

[1]. R1-2005330, Remaining issues on initial access signals and channles, vivo

[2]. R1-2005597, Remaining issues on the initial access signals for NR-U, ZTE, Sanechips

[3]. R1-2005789, Maintenance on initial access signals and channels, Huawei, HiSilicon

[4]. R1-2005904, Remaining issues on Initial Access Signals and Channels for NR-U, Nokia, Nokia Shanghai Bell

[5]. R1-2005910, Initial access signals and channels, Ericsson

[6]. R1-2006017, Discussion on the remaining issues of initial access signal/channel, OPPO

[7]. R1-2006092, Initial access signals and channels for NR-U, Samsung

[8]. R1-2006288, Remaining issues on initial access signals, Spreadtrum Communications

[9]. R1-2006298, Remaining issues of initial access signals and channels for NR-U, LG Electronics