

Exhibit 1013

Source: CATT
Title: UL Absence Indicator for Secondary Cells
Agenda Item: 7.1.2.2
Document for: Discussion and Decision

1 Introduction

According to current agreements, when configuring a secondary cell, the UL and DL resources of this cell should obey the relationship indicated in SIB2. Meanwhile, it is permitted that only DL resources are configured to secondary cells. Then, there comes a question on how to indicate UL absence of secondary cells. This contribution mainly focuses on the detailed schemes of UL absence indication for secondary cells.

2 Discussion

2.1 Secondary cell uplink parameters

Before studying on detailed schemes, it is necessary to clarify which IEs correspond to the UL resources of a secondary cell.

In line with the latest 36.331 CR [1], the IEs including UL resource configurations of a secondary cell are listed below, where the UL resource configurations are highlighted:

```
RadioResourceConfigCommonSecCell-r10 ::= SEQUENCE {
    -- The field grouping, use of optional, conditional and need codes are FFS
    -- 1: Cell characteristics
    -- FFS if cellIdentity needs to be provided also
    dl-Bandwidth
        ENUMERATED {n6, n15,
                    n25, n50, n75, n100}
        OPTIONAL, -- Need
FFS
    ul-FreqInfo
        SEQUENCE {
            ul-CarrierFreq
                ARFCN-ValueEUTRA
                OPTIONAL, -- Need OP
            ul-Bandwidth
                ENUMERATED {n6, n15, n25, n50, n75, n100}
                OPTIONAL, -- Need
FFS
    additionalSpectrumEmission-r10
        AdditionalSpectrumEmission
        OPTIONAL, -- Need
FFS
    -- FFS if freqBandIndicator may be configured for each secondary cell
    -- 2: Physical configuration
    antennaInfoCommon-r10
        AntennaInfoCommon
        OPTIONAL, -- Need
FFS
    mbsfn-SubframeConfigList-r10
        MBSFN-SubframeConfigList
        OPTIONAL, -- Need
FFS
    pich-Config-r10
        PHICH-Config
        OPTIONAL, -- Need
FFS
    pdsch-ConfigCommon-r10
        PDSCH-ConfigCommon
        OPTIONAL, -- Need FFS
    -- FFS if p-Max-r10 may be configured for each secondary cell
    -- FFS if (part of) prach-Config-r10 may be configured for each secondary cell (TDD)
    pusch-ConfigCommon-r10
        PUSCH-ConfigCommon
        OPTIONAL, -- Need FFS
    soundingRS-UL-ConfigCommon-r10
        SoundingRS-UL-ConfigCommon
        OPTIONAL, -- Need FFS
    -- A special version of IE SoundingRS-UL-ConfigCommon may be introduced
    ul-CyclicPrefixLength-r10
        UL-CyclicPrefixLength
        OPTIONAL, -- Need
FFS
    uplinkPowerControlCommon-r10
        UplinkPowerControlCommon
        OPTIONAL, -- Need
FFS
    -- A special version of IE UplinkPowerControlCommon may be introduced
    ...
}

PhysicalConfigDedicatedSecCell-r10 ::= SEQUENCE {
    antennaInfo
        AntennaInfoDedicated
        OPTIONAL, --
Need FFS
    -- FFS if (<aperiodic> part of) CQI-ReportConfig is needed
```

```

    pdsch-ConfigDedicated          PDSCH-ConfigDedicated          OPTIONAL,      --
Need FFS
-- FFS if (part of) PUSCH-ConfigDedicated is needed
    soundingRS-UL-ConfigDedicated  SoundingRS-UL-ConfigDedicated  OPTIONAL,      --
Need FFS
-- FFS if (part of) tpc-PDCCH-ConfigPUSCH is needed
    uplinkPowerControlDedicated    UplinkPowerControlDedicated    OPTIONAL,      -- Need FFS
-- A special version of IE UplinkPowerControlDedicated may be introduced
-- Additional parameter for secondary cell deactivation (timer)
-- Additional parameters for cross carrier scheduling
-- Additional parameter for DL pathloss reference i.e. (SIB2, pCell)
    ...
}

```

Note: more IEs which correspond to UL resources may be included according to further discussion.

2.2 Options for indicating UL Absence/Deletion/Addition

After clarifying the UL resource configurations of a secondary cell in section 2.1, detailed schemes to indicate UL resource can be worked out. In our mind, there are 3 options to indicate UL absence/deletion/addition. In this section, UL absence means no UL resources are configured when a cell is added; UL deletion refers to delete existing cell's UL resources; UL addition only stands for separate UL resources configuration in RRC connection reconfiguration procedure.

➤ Opt 1: Using OPTIONAL statement

By using OPTIONAL statement, UL resource configurations' absence/presence is capable to indicate UL absence/deletion/addition. A simple way is to set these UL related IEs' Need code to be Need OR. When these IEs are present, UL resources are configured. When these IEs are absent, UL resources are not configured or deleted. Detailed descriptions are listed as follows:

- UL absence: the UL resource configurations are all absent when initially configuring a secondary cell;
- UL deletion: the UL resource configurations are all absent when re-configuring a secondary cell. Actually, UL absence and UL deletion are indicated in the same way;
- UL addition: the UL resource configurations are all present when re-configuring a secondary cell.

When the Need codes of these IEs are set to Need OR, all the UL resource configurations must be present or absent simultaneously in order to configure or delete UL resources. Thus, different eNB behaviors are introduced compared to Rel-8/9. Meanwhile, the flexibility is relatively low.

According to the latest 36.331 CR [1], UL related IEs are separately distributed in *RadioResourceConfigCommonSecCell-r10*. However, these IEs may be grouped under a single IE which includes all the UL resource configurations of a secondary cell. In this case, UL absence/deletion/addition can be indicated by the absence/presence of this IE. When this IE is present, UL resources are configured. When it is absent, UL resources are not configured or deleted. This needs to change current message structure, and it is not recommended.

Observation 1: Different behaviors compared to Rel-8/9 are introduced in Opt 1, which result in all UL resource configurations must be present or absent at the same time.

➤ Opt 2: Re-using existing IE

Opt 2 is another scheme to indicate UL absence/deletion/addition, e.g. by re-using *freqBandIndicator*. The IEs which are only necessary to primary cells and unrelated to secondary cells are all capable to be re-used as the UL absence indicator for secondary cells. The IE which is chosen to be re-used needs to be extended to each secondary cell's configuration.

Take *freqBandIndicator* as an example. Changes to the latest 36.331 CR[1] are highlighted:

```

RadioResourceConfigCommonSecCell-r10 ::= SEQUENCE {
-- The field grouping, use of optional, conditional and need codes are FFS
-- 1: Cell characteristics
-- FFS if cellIdentity needs to be provided also
    dl-Bandwidth          ENUMERATED {n6, n15,
                                     n25, n50, n75, n100}          OPTIONAL,      -- Need
FFS
    ul-FreqInfo           SEQUENCE {
        ul-CarrierFreq    ARFCN-ValueEUTRA          OPTIONAL,      -- Need OP
        ul-Bandwidth      ENUMERATED {n6, n15, n25, n50, n75, n100}
    }
}

```

	}		OPTIONAL,	-- Need
FFS	additionalSpectrumEmission-r10	AdditionalSpectrumEmission	OPTIONAL,	-- Need
FFS	freqBandIndicator	INTEGER (1..64)	OPTIONAL	-- Need ON
	-- 2: Physical configuration			
FFS	antennaInfoCommon-r10	AntennaInfoCommon	OPTIONAL,	-- Need
FFS	mbsfn-SubframeConfigList-r10	MBSFN-SubframeConfigList	OPTIONAL,	-- Need
FFS	phich-Config-r10	PHICH-Config	OPTIONAL,	-- Need
	pdsch-ConfigCommon-r10	PDSCH-ConfigCommon	OPTIONAL,	-- Need FFS
	-- FFS if p-Max-r10 may be configured for each secondary cell			
	-- FFS if (part of) prach-Config-r10 may be configured for each secondary cell (TDD)			
	pusch-ConfigCommon-r10	PUSCH-ConfigCommon	OPTIONAL,	-- Need FFS
	soundingRS-UL-ConfigCommon-r10	SoundingRS-UL-ConfigCommon	OPTIONAL,	-- Need FFS
	-- A special version of IE SoundingRS-UL-ConfigCommon may be introduced			
	ul-CyclicPrefixLength-r10	UL-CyclicPrefixLength	OPTIONAL,	-- Need
FFS	uplinkPowerControlCommon-r10	UplinkPowerControlCommon	OPTIONAL,	-- Need
FFS	-- A special version of IE UplinkPowerControlCommon may be introduced			
	...			
	}			

When there is no *freqBandIndicator* in a secondary cell's configuration, UL resources will not be configured by UE (i.e. The UE does not behave as described in the procedural text or in the field description.), or the UE deletes any existing UL resource configurations of this cell. If *freqBandIndicator* appears, UL resources are configured as normal. Note that when there is no *freqBandIndicator* in a secondary cell's configuration, eNB can choose to transmit or not to transmit this secondary cell's UL resources configurations to the UE. UE can ignore these configurations because of UL absence.

Observation 2: An obvious drawback for Opt 2 is that it is not easy for understanding when an IE refers to two functions and has different meanings. For detailed analysis, please refer to [2].

➤ Opt 3: Defining a new IE

In order to avoid the drawbacks of Opt 2, it is feasible to define a new IE to indicate UL absence/deletion/addition. For simplification, the position of this new defined IE will keep in accordance with *freqBandIndicator*.

Changes to the latest 36.331 CR[1] are highlighted:

RadioResourceConfigCommonSecCell-r10 ::= SEQUENCE {				
-- The field grouping, use of optional, conditional and need codes are FFS				
-- 1: Cell characteristics				
-- FFS if cellIdentity needs to be provided also				
dl-Bandwidth		ENUMERATED {n6, n15,		
n25, n50, n75, n100}	OPTIONAL,	-- Need FFS		
ul-FreqInfo		SEQUENCE {		
ul-CarrierFreq		ARFCN-ValueEUTRA	OPTIONAL,	-- Need OP
ul-Bandwidth		ENUMERATED {n6, n15, n25, n50, n75, n100}	OPTIONAL,	-- Need FFS
additionalSpectrumEmission-r10	AdditionalSpectrumEmission	OPTIONAL,	-- Need FFS	
ul-PresenceIndicator	BOOLEAN	OPTIONAL,	-- Need ON	
-- 2: Physical configuration				
antennaInfoCommon-r10	AntennaInfoCommon	OPTIONAL,	-- Need FFS	
mbsfn-SubframeConfigList-r10	MBSFN-SubframeConfigList	OPTIONAL,	-- Need FFS	
phich-Config-r10	PHICH-Config	OPTIONAL,	-- Need FFS	
pdsch-ConfigCommon-r10	PDSCH-ConfigCommon	OPTIONAL,	-- Need FFS	
-- FFS if p-Max-r10 may be configured for each secondary cell				
-- FFS if (part of) prach-Config-r10 may be configured for each secondary cell (TDD)				
pusch-ConfigCommon-r10	PUSCH-ConfigCommon	OPTIONAL,	-- Need FFS	
soundingRS-UL-ConfigCommon-r10	SoundingRS-UL-ConfigCommon	OPTIONAL,	-- Need FFS	
-- A special version of IE SoundingRS-UL-ConfigCommon may be introduced				
ul-CyclicPrefixLength-r10	UL-CyclicPrefixLength	OPTIONAL,	-- Need FFS	
uplinkPowerControlCommon-r10	UplinkPowerControlCommon	OPTIONAL,	-- Need FFS	
-- A special version of IE UplinkPowerControlCommon may be introduced				
...				
}				

Field Description

ul-PresenceIndicator

Indicates whether or not the UL resources are configured. When this parameter is set to 'false', the UE ignores any UL resource configurations of the secondary cell.

When *ul-PresenceIndicator* is set to 'false', UL resources will not be configured by UE, or the UE deletes any existing UL resource configurations of this cell. If *ul-PresenceIndicator* is set to 'true', UL resources are configured as normal. Note that when a secondary cell's *ul-PresenceIndicator* is set to 'false', eNB can choose to transmit or not to transmit its UL resources configurations to the UE. UE can ignore these configurations because of UL absence.

In conclusion, UE treats UL deletion and UL addition as cell modification, and no cell release procedures are needed. In comparison with Opt 1 and Opt 2, Opt 3 has clear function and keeps accordance with current behaviors. Hence, the following proposal is given:

Proposal: RAN2 defines a new IE *ul-PresenceIndicator* to indicate UL presence/absence for secondary cells.

3 Conclusions

Proposal: RAN2 defines a new IE *ul-PresenceIndicator* to indicate UL presence/absence for secondary cells.

4 References

[1] 36.331 CR after RAN2#70bis.

[2] R2-104514 Further Study on Common Information RAN2#71