TSG-RAN Working Group 1 meeting #10 **TSGR1#10(00)0126**

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Source : LGIC

Title : Dynamic OVSF code assignment for PCPCH message part

Document for : Discussion & Decision

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1. Introduction

In channel assignment method, AP signature is basically associated with specific data rate [1],[2],[3]. Therefore Node B can acquire the data rate of which access-attempting UE requests PCPCH message part. In fig 1, if AP signature #2 specifies the data rate which a UE requests, Node B can allocate node #3, #4, #5 or #6 to the UE. Then if Node B allocates node #4 to the UE with CA-AICH, the channelisation code of PCPCH message data part for the UE is chosen from the node #9 or #10 below node #4. If the code is chosen like RACH case, node #9 will be designated as the code of data part and a node corresponding to spreading factor 256 on the lowest branch of the sub tree below node #10 will be designated as the code of control part. Though the way above is general, a particular method for that purpose is yet to be determined. Hence this document tries to present an efficient and dynamic method.

2. Proposal

The proposal consists of two parts. One is the method that Node B allocates channelisation code of PCPCH message data part to requesting UE. The other is that the channelisation code of PCPCH message control part is determined from the place of the allocated OVSF code of PCPCH message data part.

In our proposal, 16 CA-AICH signatures in table 1 notes 16 nodes of a specific spreading factor. Fig 1 shows an example of mapping among AP signature, CA-AICH signature and OVSF code. In fig 1 CA-AICH signature #0~#15 denote node #15~#30 respectively. Each CA-AICH signature mapped onto nodes of a specific spreading factor indicates nodes of lower spreading factor and nodes on the uppermost branch of the sub tree of the specific spreading factor. For example, in order for Node B to allocate node #5 to a UE, Node B can transmit CA-AICH signature #8, #9, #10, #11. In the other hand, in order for Node B to allocate node 39 to a UE, Node B can transmit CA-AICH signature #4. Table 2 describes the method to select OVSF code of PCPCH message data part according to CA-AICH signature and AP signature. Although in order for Node B to allocate node #3, #4, #5, #6 to a UE Node B can randomly transmit one of corresponding 4 CA-AICH signatures below the allocated node, it is beneficial for Node B to transmit CA-AICH signature #0, #4, #8, #12 as shown in table 2. It is because it reduces the complexity of UE by Fast Hadamard Transform [1]. The present mapping gets CA-AICH signatures to be always mapped onto 16 nodes of a specific spreading factor that is different in conformity with the amount of OVSF code resource (e.g. the number of uplink scrambling codes)

The OVSF code of PCPCH message control part is chosen as the node of spreading factor 256 on the lowest branch of the sub tree of another node below the higher node contiguous to the designated OVSF code of PCPCH message data part. Figure 2 describes examples of the method. As shown in fig 2(a), if a node of spreading factor 64 is assigned to data part, then the OVSF code of spreading factor 256 for control part is chosen on the lowest branch of the sub tree of another node of spreading factor 64 below the node of spreading factor 32 contiguous to the node for PCPCH message data part. Fig 2(b) shows the merit. In fig 2(b), user 1 uses a node of spreading factor 8 for data part with a node of spreading factor 256 for control part. Since OVSF code for control part varies with OVSF code for data part, Node B can allocate another

code to a UE requesting an OVSF code of spreading factor 64 for data part with an OVSF code of spreading factor 256 for control part. The method simply increases the utility of OVSF code resource that Node B maintains for CPCH.

3. Recommendation

We can find the merit regarding the efficient management of OVSF code resource for CPCH with flexible channel assignment method as described above. Consequently we recommend the present scheme as the OVSF code assignment method for PCPCH message part.

Reference

[1] TSGR1#7(99)B13, “Enhanced CPCH with Channel Assignment”, SAMSUNG & Philips

[2] TSGR1#10(00)0106, “CPCH access methods comparison”, SAMSUNG

[3] TSGR1#10(00)0107, “CPCH channel allocation example”, SAMSUNG

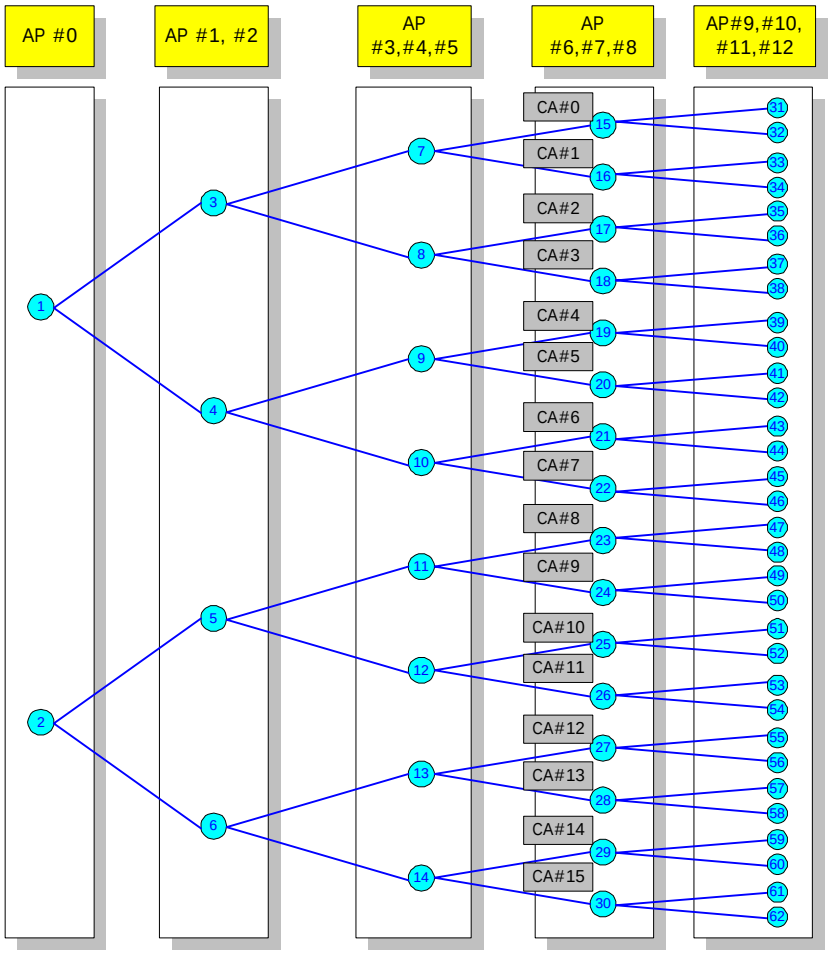
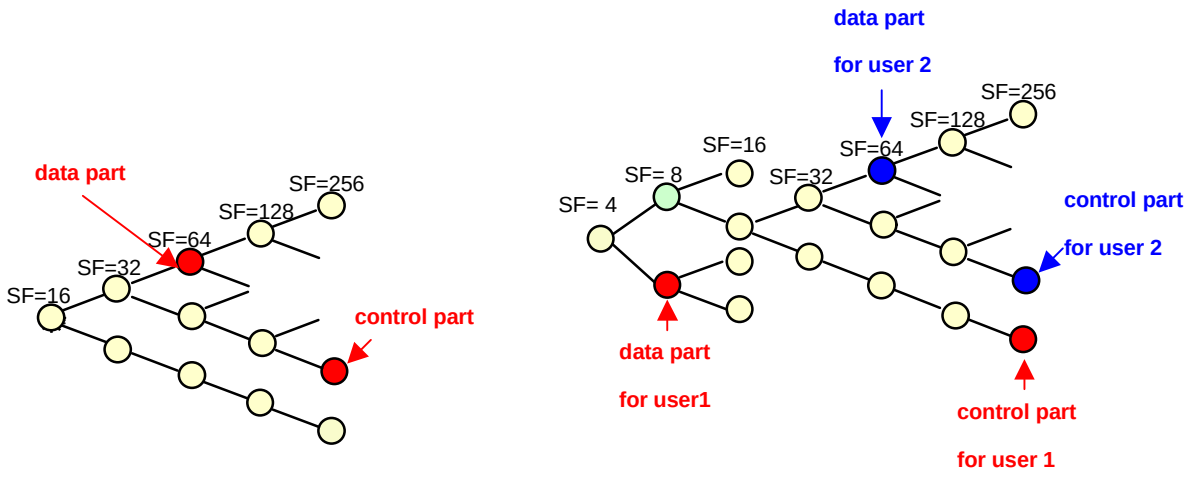


Figure 1. OVSF code trees (Each AP signature notes specific spreading factor)



(a) (b)

Figure 2. The method to select the OVSF code of PCPCH message control part from designated OVSF code of PCPCH message data part

s	AICH signatures																													
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1
2	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1
3	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1
4	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1
5	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1
6	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1
7	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
9	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1
10	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1
11	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1
12	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1
13	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1
14	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1
15	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1

Table 1. Current AICH signatures

OVSF tree node	CA-AICH signature number, s															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

AP signature number																	
	0	1								2							
	1,2	3				4				5				6			
	3,4,5	7		8		9		10		11		12		13		14	
	6,7,8	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	9,10,11,12	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61

Table 2. The selected OVSF code of PCPCH message data part according to CA-AICH signature and AP signature (12 AP signatures are assumed. Numbers of OVSF tree nodes are shown in figure 1)