

Agenda Item:

Source: Ericsson
Title: Text proposal for new downlink scrambling code grouping scheme for UTRA/FDD
Document for: Decision

1. Introduction

In [1], a new downlink scrambling code grouping scheme was proposed. The proposed scheme was shown to reduce the complexity and hardware requirements for cell search by increasing the number of scrambling code groups to 64, 128 or 256.

In the discussion on the reflector it seems there is a broad support for increasing the number of code groups to 64. This gives an acceptable trade off between performance and terminal complexity.

2. Proposal

To increase the number of scrambling code groups from 32 to 64.

References

- [1]. Ericsson, "New downlink scrambling code grouping scheme for UTRA/FDD, revised", 3GPP TSGR1-884/99, July, 1999

3. Text Proposal in 25.213 (Based on 2.1.02)

5.2.3.2 Code Allocation

The 6432 sequences are constructed such that their cyclic-shifts are unique, i.e., a non-zero cyclic shift less than 15 of any of the 6432 sequences is not equivalent to some cyclic shift of any other of the 6432 sequences. Also, a non-zero cyclic shift less than 15 of any of the sequences is not equivalent to itself with any other cyclic shift less than 15. The following sequences are used to encode the 6432 different scrambling code groups (note that c_i indicates the i 'th Secondary Short code of the 16 codes). Note that a Secondary Short code can be different from one time slot to another and that the sequence pattern can be different from one cell to another, depending on Scrambling Code Group the cell uses

Scrambling Code Groups	Slot-Number														
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15
Group1	c_1	c_1	c_2	c_8	c_9	c_{10}	c_{15}	c_6	c_{10}	c_{16}	c_2	c_7	c_{15}	c_7	c_{16}
Group2	c_1	c_2	c_5	c_2	c_3	c_7	c_7	c_1	c_3	c_4	c_6	c_5	c_8	c_6	c_2

Group-3	C_1	C_3	C_{12}	C_{12}	C_{16}	C_5	C_{14}	C_{10}	C_7	C_5	C_{10}	C_3	C_{16}	C_1	C_7
Group-4	C_1	C_5	C_7	C_{13}	C_7	C_1	C_9	C_9	C_5	C_{11}	C_2	C_{15}	C_{13}	C_{11}	C_{15}
Group-5	C_1	C_9	C_{16}	C_3	C_8	C_9	C_3	C_{11}	C_1	C_6	C_8	C_6	C_{11}	C_{14}	C_{14}
Group-6	C_1	C_4	C_{15}	C_{14}	C_6	C_{12}	C_6	C_{15}	C_9	C_9	C_{14}	C_1	C_7	C_4	C_{12}
Group-7	C_1	C_7	C_{13}	C_1	C_2	C_{14}	C_{12}	C_7	C_{12}	C_2	C_{11}	C_{11}	C_{14}	C_{13}	C_8
Group-8	C_1	C_{13}	C_9	C_{10}	C_{10}	C_2	C_5	C_6	C_{14}	C_1	C_5	C_{14}	C_9	C_2	C_{13}
Group-9	C_1	C_{12}	C_1	C_9	C_{11}	C_{11}	C_{10}	C_1	C_2	C_3	C_{12}	C_1	C_3	C_9	C_{10}
Group-10	C_1	C_6	C_4	C_{11}	C_{13}	C_{16}	C_1	C_{16}	C_{11}	C_7	C_7	C_{13}	C_6	C_{10}	C_4
Group-11	C_1	C_{11}	C_6	C_{15}	C_1	C_6	C_2	C_5	C_{16}	C_{15}	C_{16}	C_2	C_{12}	C_{12}	C_5
Group-12	C_1	C_8	C_{10}	C_7	C_{12}	C_3	C_4	C_2	C_6	C_{14}	C_{15}	C_9	C_5	C_{16}	C_{11}
Group-13	C_1	C_{15}	C_3	C_6	C_{15}	C_{13}	C_8	C_{12}	C_3	C_{12}	C_{13}	C_{10}	C_{10}	C_8	C_6
Group-14	C_1	C_{16}	C_8	C_4	C_5	C_4	C_{16}	C_{13}	C_{13}	C_8	C_9	C_{12}	C_1	C_5	C_9
Group-15	C_1	C_{14}	C_{14}	C_{16}	C_1	C_{15}	C_{13}	C_2	C_1	C_{13}	C_1	C_{16}	C_2	C_3	C_2
Group-16	C_1	C_{10}	C_{11}	C_5	C_{14}	C_8	C_{11}	C_{14}	C_{15}	C_{10}	C_4	C_8	C_4	C_{15}	C_1
Group-17	C_2	C_6	C_8	C_{14}	C_8	C_2	C_{10}	C_{10}	C_6	C_{12}	C_4	C_{16}	C_{14}	C_{12}	C_{16}
Group-18	C_2	C_5	C_3	C_{12}	C_{14}	C_{15}	C_2	C_{15}	C_{12}	C_8	C_8	C_{14}	C_5	C_9	C_3
Group-19	C_2	C_3	C_{14}	C_2	C_1	C_{13}	C_{11}	C_8	C_{11}	C_1	C_{12}	C_{12}	C_{13}	C_{14}	C_7
Group-20	C_2	C_2	C_1	C_7	C_{10}	C_9	C_{16}	C_7	C_9	C_{15}	C_1	C_8	C_{16}	C_8	C_{15}
Group-21	C_2	C_{14}	C_{10}	C_9	C_9	C_1	C_6	C_5	C_{13}	C_2	C_6	C_{13}	C_{10}	C_7	C_{14}
Group-22	C_2	C_7	C_9	C_8	C_{11}	C_1	C_3	C_1	C_5	C_{13}	C_{16}	C_{10}	C_6	C_{15}	C_{12}
Group-23	C_2	C_1	C_{11}	C_{11}	C_{15}	C_6	C_{13}	C_9	C_8	C_6	C_9	C_4	C_{15}	C_2	C_8
Group-24	C_2	C_{10}	C_{15}	C_1	C_7	C_{10}	C_4	C_{12}	C_2	C_5	C_7	C_5	C_{12}	C_{13}	C_{13}
Group-25	C_2	C_{15}	C_7	C_2	C_6	C_3	C_{15}	C_{14}	C_{14}	C_7	C_{10}	C_{11}	C_2	C_6	C_{10}
Group-26	C_2	C_1	C_6	C_1	C_4	C_8	C_8	C_2	C_1	C_3	C_5	C_6	C_7	C_5	C_4
Group-27	C_2	C_{16}	C_1	C_5	C_{16}	C_{14}	C_7	C_{11}	C_1	C_{11}	C_{14}	C_9	C_9	C_7	C_5
Group-28	C_2	C_3	C_{16}	C_{13}	C_5	C_{11}	C_5	C_{16}	C_{10}	C_{10}	C_{13}	C_2	C_8	C_3	C_{11}
Group-29	C_2	C_{12}	C_5	C_{16}	C_2	C_5	C_1	C_6	C_{15}	C_{16}	C_{15}	C_1	C_{11}	C_{11}	C_6
Group-30	C_2	C_{11}	C_2	C_{10}	C_{12}	C_{12}	C_9	C_2	C_1	C_4	C_{11}	C_3	C_4	C_{10}	C_9
Group-31	C_2	C_9	C_{12}	C_6	C_{13}	C_7	C_{12}	C_{13}	C_{16}	C_9	C_3	C_7	C_3	C_{16}	C_2
Group-32	C_2	C_{13}	C_{13}	C_{15}	C_3	C_{16}	C_{14}	C_4	C_3	C_{14}	C_2	C_{15}	C_1	C_4	C_1
{SyneBTS}	C_2	C_{11}	C_{14}	C_1	C_6	C_{11}	C_1	C_9	C_3	C_8	C_6	C_8	C_9	C_{16}	C_{16}

Table 9 – Spreading Code allocation for Secondary SCH Code

Table 9 Spreading Code allocation for Secondary SCH Code, the index “i” of the code C_i

Scrambling Code Group	slot number														
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15
Group 1	1	1	2	8	2	10	15	8	10	16	2	7	15	7	16
Group 2	1	1	5	16	7	3	14	16	3	10	5	12	14	12	10
Group 3	1	2	1	15	5	5	12	16	6	11	2	16	11	15	12
Group 4	1	2	3	1	8	6	5	2	5	8	4	4	6	3	7
Group 5	1	2	16	6	6	11	15	5	12	1	15	12	16	11	2
Group 6	1	3	4	7	4	1	5	5	3	6	2	8	7	6	8
Group 7	1	4	11	3	4	10	9	2	11	2	10	12	12	9	3
Group 8	1	5	6	6	14	9	10	2	13	2	2	5	14	1	13

Group 9	1	6	10	10	4	11	7	13	16	11	13	6	4	1	16
Group 10	1	6	13	2	14	2	6	5	5	13	10	9	1	14	10
Group 11	1	7	8	5	7	2	4	3	8	3	2	6	6	4	5
Group 12	1	7	10	9	16	7	9	15	1	8	16	8	15	2	2
Group 13	1	8	12	9	9	4	13	16	5	1	13	5	12	4	8
Group 14	1	8	14	10	14	1	15	15	8	5	11	4	10	5	4
Group 15	1	9	2	15	15	16	10	7	8	1	10	8	2	16	9
Group 16	1	9	15	6	16	2	13	14	10	11	7	4	5	12	3
Group 17	1	10	9	11	15	7	6	4	16	5	2	12	13	3	14
Group 18	1	11	14	4	13	2	9	10	12	16	8	5	3	15	6
Group 19	1	12	12	13	14	7	2	8	14	2	1	13	11	8	11
Group 20	1	12	15	5	4	14	3	16	7	8	6	2	10	11	13
Group 21	1	15	4	3	7	6	10	13	12	5	14	16	8	2	11
Group 22	1	16	3	12	11	9	13	5	8	2	14	7	4	10	15
Group 23	2	2	5	10	16	11	3	10	11	8	5	13	3	13	8
Group 24	2	2	12	3	15	5	8	3	5	14	12	9	8	9	14
Group 25	2	3	6	16	12	16	3	13	13	6	7	9	2	12	7
Group 26	2	3	8	2	9	15	14	3	14	9	5	5	15	8	12
Group 27	2	4	7	9	5	4	9	11	2	14	5	14	11	16	16
Group 28	2	4	13	12	12	7	15	10	5	2	15	5	13	7	4
Group 29	2	5	9	9	3	12	8	14	15	12	14	5	3	2	15
Group 30	2	5	11	7	2	11	9	4	16	7	16	9	14	14	4
Group 31	2	6	2	13	3	3	12	9	7	16	6	9	16	13	12
Group 32	2	6	9	7	7	16	13	3	12	2	13	12	9	16	6
Group 33	2	7	12	15	2	12	4	10	13	15	13	4	5	5	10
Group 34	2	7	14	16	5	9	2	9	16	11	11	5	7	4	14
Group 35	2	8	5	12	5	2	14	14	8	15	3	9	12	15	9
Group 36	2	9	13	4	2	13	8	11	6	4	6	8	15	15	11
Group 37	2	10	3	2	13	16	8	10	8	13	11	11	16	3	5
Group 38	2	11	15	3	11	6	14	10	15	10	6	7	7	14	3
Group 39	2	16	4	5	16	14	7	11	4	11	14	9	9	7	5
Group 40	3	3	4	6	11	12	13	6	12	14	4	5	13	5	14
Group 41	3	3	6	5	16	9	15	5	9	10	6	4	15	4	10
Group 42	3	4	5	14	4	6	12	13	5	13	6	11	11	12	14
Group 43	3	4	9	16	10	4	16	15	3	5	10	5	15	6	6
Group 44	3	4	16	10	5	10	4	9	9	16	15	6	3	5	15
Group 45	3	5	12	11	14	5	11	13	3	6	14	6	13	4	4
Group 46	3	6	4	10	6	5	9	15	4	15	5	16	16	9	10
Group 47	3	7	8	8	16	11	12	4	15	11	4	7	16	3	15
Group 48	3	7	16	11	4	15	3	15	11	12	12	4	7	8	16
Group 49	3	8	7	15	4	8	15	12	3	16	4	16	12	11	11
Group 50	3	8	15	4	16	4	8	7	7	15	12	11	3	16	12
Group 51	3	10	10	15	16	5	4	6	16	4	3	15	9	6	9
Group 52	3	13	11	5	4	12	4	11	6	6	5	3	14	13	12
Group 53	3	14	7	9	14	10	13	8	7	8	10	4	4	13	9
Group 54	5	5	8	14	16	13	6	14	13	7	8	15	6	15	7
Group 55	5	6	11	7	10	8	5	8	7	12	12	10	6	9	11
Group 56	5	6	13	8	13	5	7	7	6	16	14	15	8	16	15
Group 57	5	7	9	10	7	11	6	12	9	12	11	8	8	6	10
Group 58	5	9	6	8	10	9	8	12	5	11	10	11	12	7	7

Group 59	5	10	10	12	8	11	9	7	8	9	5	12	6	7	6
Group 60	5	10	12	6	5	12	8	9	7	6	7	8	11	11	9
Group 61	5	13	15	15	14	8	6	7	16	8	7	13	14	5	16
Group 62	9	10	13	10	11	15	15	9	16	12	14	13	16	14	11
Group 63	9	11	12	15	12	9	13	13	11	14	10	16	15	14	16
Group 64	9	12	10	15	13	14	9	14	15	11	11	13	12	16	10
Sync BTS	9	12	16	16	10	15	11	13	14	15	13	12	10	9	14