Technical Specification Group Services and System Aspects
Meeting #3, Yokohama, Japan, 26-28 April 1999

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TSG-RAN meeting #3
Yokohama, Japan , 21-23, April,1999

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TSG-RAN Working Group 4 meeting #3 **TSGW4#3(99) 163**
Tokyo 29-31, March 1999

Agenda item :

Source : 3GPP RAN WG4

Title : Liaison statement on carrier frequency raster

To : TSG-SA, (ARIB, , ERC, T1P1) via RAN

3GPP RAN WG4 is responsible for the definition of the carrier raster for UTRA. Consequently WG4 has developed a proposed carrier raster definition formula as follows:

The carrier center frequency is designated by the UTRA absolute radio frequency channel number (UARFCN) which is an integer assumed to start at 0 for each individual band. The exact signalling procedure is ffs. The carrier center frequency Fc can then be calculated from the UARFCN as follows:

n = UARFCN div 5

k = (UARFCN mod 5) - 2

$Fc = F_0 + Fs * n + 200\ kHz * k$

The first nominal center frequency F_0 and the nominal carrier spacing Fs depend on the used chiprate and the frequency band:

Frequency Band	***Chip Rate***	***first nominal center frequency F_0***	***Nominal carrier spacing Fs***
Paired IMT2000 band	*4. 096 Mcps*	*1922.4 MHz*	*5 MHz*
unpaired IMT2000 band	*4.096 Mcps*	*1902.4 MHz*	*5 MHz*

Here is an example for the paired IMT2000 band: The UARFCN would run from 0 to 59, and the following table shows the relationship between UARFCN and the carrier center frequency. It can be seen, that in this way a 5MHz carrier raster is implemented with the ability to apply fine tuning steps of –400kHz, –200kHz, 0kHz, +200kHz, +400kHz,

UARFCN	Carrier center frequency in MHz
0	1922.0
1	1922.2
2	1922.4
3	1922.6
4	1922.8
5	1927.0
6	1927.2
7	1927.4
8	1927.6
9	1927.8
10	1932.0
11	1932.2
12	1932.4
13	1932.6
14	1932.8
...	...
55	1977.0
56	1977.2
57	1977.4
58	1977.6
59	1977.8

This formula has the following advantages when compared to other possible allocations:

- Only 1/5 of the potential carrier frequencies (of a continuos 200kHz raster) are needed.
- There is sufficient flexibility to optimise ACP protection on different cell layers by allowing carrier spacings from 4.2 to 5.8 MHz which should be sufficient for all deployment scenarios.
- The scanning time for mobiles scanning for carriers can reduced by 80% allowing a corresponding saving of standby current in out of coverage and roaming scenarios.

- There is less overhead for coding channels for assignment, handover and neighbour lists.
- Better compatibility with 2nd generation systems due to less capacity requirements on their broadcast channels (for neighbour-list) and dedicated channels (for non-segmented handover command messages).
- Fastest synthesiser settling times and optimum GSM compatibility by sharing a synthesiser with 200kHz reference frequency.

3GPP RAN WG4 believes that the proposed formula will not place any practical constraints on optimising the center frequency of RF channels in cases where the whole IMT 2000 bands are allocated. 3GPP WG4 requests guidance on whether this proposal would constrain the allocation of RF channels in cases where the whole IMT 2000 Band is not allocated It should be noted, that this question is relevant for the initially allocated frequency bands only, as the formula could anyhow be later adapted once new frequency bands become available. It should be emphasised, that the most urgent decision concerns the positioning of the underlying 200kHz raster because this has serious implications on the implementation. The selection of integer multiples of 200kHz for F0 allows the most efficient synthesiser implementation. Therefore 3GPP RAN WG4 would like to bring this new channel formula to the attention of the addressed expert groups and welcomes corresponding advice in case it should pose a problem for the frequency allocation envisaged for the IMT 2000 frequency band in the geographic area for which the addressed expert groups are responsible.

3GPP RAN WG4 would like to thank in advance the addressed expert groups for consideration of this subject and supplying an answer, if necessary, by it's next meeting May 10-12 in Sweden.