

**Agenda Item: Ad-Hoc-17**

**Source: Ericsson**

**Title: Proposal for downlink positioning**

**Document for: Discussion & Action**

**1 Summary**

Lately several downlink positioning methods have been proposed. In [1] Ericsson proposed the IPDL method in which pseudo-random idle periods are included in the BS DL signal in order to overcome the hearability problems. In [2] Nortel suggests that by using long enough integration times it is possible in many cases to get a position without idle periods. In [3] Motorola proposes to time align the idle periods in IPDL. Instead the idling is pseudo-random. Also Nokia has given their support for downlink positioning methods.

Each of the above versions of DL positioning offers its own advantages in form of performance, implementation complexity and system capacity. They do however have many similarities and in this paper we utilize this fact and propose a common method, which supports all three proposed methods by having different options.

**2 Proposed method**

The following table lists the parameters that are necessary to merge the different proposals

Parameter	Possible values (draft)	Comment
Idle period frequency	0, 5, (2, 10)	The figures in parenthesis are applicable for pseudo-random idle periods (see below)
Idle period length	5 or 10 256 chip intervals	
Pseudo or time aligned (TA)	0,1	0 means pseudo-random idle periods and 1 means time aligned
Probability to transmit pilot when TA is used	0.3 or 1	
Extra idle period frequencies when pseudo-random is used	2, 10	Since the TA transmit probability bit is redundant in this case it can be used to get extra IP frequencies
Correlation length and coherence time when no idle periods	FFS	When the IP frequency is zero all other fields are redundant and hence they can be used for this instead.

By setting the idle period frequency to zero the method proposed in [2] is accommodated for. In this case the other parameters can instead indicate the correlation time and the coherence time (FFS).

The Methods in [1]and [3] are covered by specifying a non-zero idle period frequency and whether the idle periods should be pseudo-random or time-aligned.

**3 References**

- [1] TSGR1#4(99)346, Recapitulation of the IPDL positioning method, Ericsson
- [2] TSGR1#7(99)c36, Pilot signal coverage for Location Services (LCS), Nortel
- [3] TSGR1#4(99)b79, Time aligned IP-DL positioning technique