TSG-RAN Working Group 3 meeting **TSGR3#7(99)B82**
September 20th – 24th 1999
Sophia Antipolis, France

Title: **TDD Synchronisation by a GPS receiver via the standardised Synchronisation Port**

Source: **Italtel / Siemens**

Agenda Item: 6.3

Document for: Approval

1.   Introduction

During the Synchronisation Ad Hoc meeting held in Sophia on August 23rd Italtel/Siemens have proposed (R3-99959) the definition of a standardised synchronisation port to synchronise TDD Nodes B to an external reference.
Some questions have been raised on the way the proposed synchronisation signal can be derived from the GPS signal.
This contribution provides an answer to those questions.

The synchronisation signal is a 100 Hz signal having positive pulses of width between 5 μs and 1 ms, except for frame 0 (every 72nd pulse), which has a pulse width between 2 ms and 5 ms. This signal establishes the 10 ms frame interval and the 720 ms multiframe interval.
The start of the multiframe is defined by the falling edge of the pulse corresponding to frame 0 (i.e. of width between 5 μs and 1 ms), while the start of each frame is defined by the falling edge of all other pulses.
In case a GPS receiver is used as external reference, the UMTS system can be frame and multiframe synchronised by relating the start of the first frame of a multiframe to the GPS time as descibed in section 2 of this contribution.

2.   Synchronisation by a GPS receiver

The signal transmitted by a global Positioning System (GPS) satellite indicates the GPS time that provides an absolute time reference. This makes the GPS receiver suitable for frame and multiframe synchronisation of UTRAN.
UTRAN is frame synchronised by relating the start of the first frame of a multiframe to the GPS time. Since the duration of a radio multiframe is 720 ms, this implies that every 18 seconds the start of a UTRAN multiframe coincides with an integer GPS second (see figure 1).
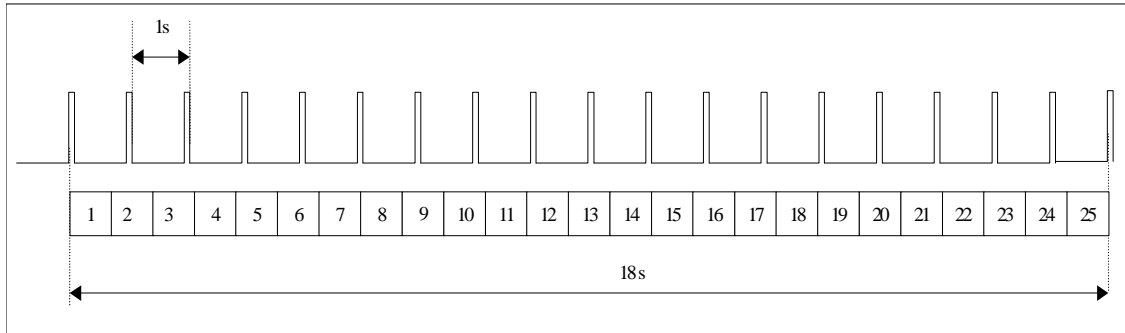
Figure 1: Relation between UTRAN and GPS timing

The start of a UTRAN multiframe coincides with the start of a GPS second each time $T_{GPS} \bmod 18 = 0$.

3.   Proposal

It is proposed to add section 2 of this contribution to the annex A of 25.401.