TSG-RAN Working Group1 meeting #2
Yokohama 22-25, February 1999

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Agenda Item: 7.3

Source: **Fujitsu, LSI Logic, Panasonic, NEC, Nokia Mobile Communications, NTT DoCoMo, Texas Instruments**

Title: **Comments and Questions on FAUSCH from ARIB members**

Document for:

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1. Introduction

FAUSCH was proposed and approved in ETSI. It has not been discussed in ARIB so far and it is not included in ARIB Volume 3. For the merging process, ARIB members should study FAUSCH. Mr. Moulsley of Philips gave information and ETSI SMG2 L1 Tdoc on FAUSCH to ARIB members. Comments and questions on FAUSCH have been raised from ARIB members listed above after studying them. This document includes those comments and questions after arrangement. Finally, this document proposes how to deal with FAUSCH in WG1 as a current common opinion among ARIB members listed above.

2. ARIB members' position on FAUSCH so far

There is no opinion to support FAUSCH.
There are objections to adopting FAUSCH from several members.

3. Comments and questions

3.1. Collision free

It is mentioned that one of the significant advantage of FAUSCH over RACH is collision free. However, we can realize near collision free system using muti-time offset and signatures, as stated Tdoc L1 675/98. Therefore, it seems this advantage is hardly effective.

On the other hand, if hardware resources for RACH and FAUSCH are limited (i.e. the number of multi-time offset and signature to be used is very lower than maximal number.), we have to consider collision problem. In this case, connections which applied FAUSCH are happy because of collision free environment. However, services which applied RACH are not happy, because hardware resources for RACH decreases and collision probability increases. As a results, it is estimated that total collision probability might increase because of lack of statistical multiplexing effect.

3.2 Eb/No point of view

It is mentioned that FAUSCH has an significant advantage from Eb/Io point of view.
In Tdoc L1 001/99, FAUSCH which "access sequence be correctly detected" and RACH which "Preamble and data payload is correctly detected" are compared. In this situation, RACH can carry 100 to several hundred information bits, while FAUSCH seems to need extra procedure, such as "granted by FACH", "DCH sync. establishment" and so on. Taking account these overhead for FAUSCH, I suppose that the difference in resultant of Tdoc L1 001/99 becomes smaller.

Considering these overhead, FAUSCH seems to have advantages in transmitting relatively longer messages, even though, there is a description in your mail on February 8 that says "the most beneficial application appears ....'up to a few hundred bits'".

3.3 Initial transmission power of downlink DPCH

For decision of initial transmission power of downlink DPCH, it is beneficial to use path loss which is calculated using P-CCPCH received power. RACH can transmit the latest measurement value of P-CCPCH received power just before initial transmission of DPCH.

On the other hand, FAUSCH cannot transmit any higher layer information. It is difficult to set suitable initial transmission power of DPCH. Therefore, It seems that employing FAUSCH cause longer synchronization establishment time of DPCH or excess initial transmission power, compared with using RACH .

3.4 Hardware and testing complexity
It is mentioned that additional complexity caused by employing FAUSCH is very small. However, it is clear that hardware complexity with FAUSCH will not be equal or less than that without FAUSCH.
We should recognize that the numbers of testing items will increase and configuration of test tool will be complicated, also.

3.5 Delay of power ramping process
If some of the access slots are FAUSCH slots, it means that power ramping process of RACH will be delayed, since idle period between two consecutive RACH preambles will be longer, if it has to jump sometimes over some FAUSCH slots.

3.6 Delay of standardization process
There are many issues related to FAUSCH in L1 and L23. It seems the discussion for these issue will consume very long time in each WG. We worry about delay of standardization process.

3.7 Time offset management
When and how, UE will release its uniquely allocated "time offset"?
Is it the only case when handover or registration to another NodeB is successfully accomplished?

I wonder there should be some schemes that can detect "disappeared UE" even when no available "release" message has come to RRC. According to these consideration, FAUSCH seems to need some extra-complexed scheme to manage "time offset" effectively, doesn't it?

3.8 Timing of the time offset assignment
By what message, UE requires to NodeB to allocate new "time offset" when it arrives at new NodeB area? Is it always done with L3 registration message, or can be done alone itself?
In case, "time offset allocation req." can be send it alone, it will lead extra traffic to do it, even when newly arrived NodeB is suffering "heavy load".

3.9 Confirmation of the time offset assignment
Are there any "CONFIRMATION RESPONSE message for TIME OFFSET ALLOC" from UE to RNC when UE receives "TIME OFFSET ALLOC" message? If so, which is used for the CONFIRMATION RESPONSE message transmission, RACH or DPCH after FAUSCH?

3.10 Performance of FAUSCH
In doc.[1], "signature number 8" is applied to FAUSCH, while in doc.[2], "RACH preamble exhibits large sidelobes" is pointed out. There seems to be some inconsistency between them. Why "signature" can become applicable to FAUSCH?

With latest condition of FAUSCH, which is merged with RACH scheme, how's the advantage of FAUSCH looks like? How many UE can be served and how's the overhead?

References:
[1] "Background to FAUSCH...": Attached doc. for e-mail from Mr.Moulsley on Feb.10.
[2] "Simplified FAUSCH realization....":Tdoc SMG2 UMTS-L1 626/98
[3] "Further results on RACH ....": Tdoc SMG2 UMTS L1 001/99

3.11 Support members
In ETSI L1EG and L23EG, are there any member who support FAUSCH except for Philips?

4. Conclusion
Considering above, we cannot see advantage of FAUSCH which can overcome anxiety about employing FAUSCH so far. We propose to exclude FAUSCH in the S document. If it is difficult to exclude FAUSCH considering the approval in ETSI, priority of FAUSCH discussion should be lowered in WG1, considering efficient progress of WG1 meeting.