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ARP Capability Indication Options

1. INTRODUCTION

It has been agreed that an ARP-capable MS should inform the network about its enhanced reception capability in order to optimise network behaviour. Various methods of doing this, most recently in [1], have been proposed and a considerable amount of discussion has taken place. It has been agreed that ARP will be a Release-Independent feature, and proposals for signalling details are at a developed stage.

In light of the complexity of ARP and market considerations, this paper proposes that *two* different variants of ARP be defined for the first phase of ARP to allow quicker Time-To-Market (TTM) for legacy platforms and easier incorporation into low-cost MSs.

2. ANALYSIS

With the introduction of ARP, a significant complexity increase is given to one of the core DSP components of a GSM MS. Reasons for this include extra processing required for interference cancellation (IC) and possible training/estimation of IC parameters, and possible reduced scope for optimisation compared to highly implementation-friendly conventional designs. The degree of the increase will obviously depend to some extent on algorithm choice and performance requirements – nonetheless, it is widely acknowledged that significant increases are unavoidable.

While this may not be a major concern for next-generation MSs and ICs, this complexity increase may severely constrain upgrade possibilities for some existing MSs and IC architectures. It may also slow the adoption of ARP in low-cost MSs due to cost considerations. Since ARP TTM is clearly an important factor from the operator viewpoint, these issues are very important.

The complexity increase of ARP is usually only a limiting factor in the highest multi-slot equalisation modes, which of course depend on an MS's multislot capability. However, a very significant benefit to operators of the quick introduction of ARP is likely to be increased network capacity for single-slot voice calls.

Since it was anyway proposed, e.g. in [1], to have multiple phases of SAIC defined via signalling, we therefore propose that two variants of SAIC be defined for SAIC phase 1. The first we suggest should be SAIC for single slot-voice only, in which case any SAIC performance requirements relating to multi-slot performance do not apply. The second we suggest should be SAIC for all logical channel situations, in which case all requirements apply.

We note clearly here that if it turns out that all performance requirements relate solely to the single-slot voice case, our proposal is redundant. We also note that to implement it would use up two signalling bit combinations in SAIC phase I and so reduce the number of possible future SAIC phases by one. (Release-independence would not be affected though.)

There has been the suggestion that the first variant need not be limited to voice – why not allow all single-slot logical channel situations? However in GPRS this would probably require either forcing the Node B to take special care to only give single-slot assignments (hardly desirable!) or a new level of signalling. We also believe it would force significant increases in architectural complexity on some MSs for little benefit.

3. CONCLUSION

In order to aid market availability of a wide range of ARP terminals, a proposal for a two-variant ARP Phase I has been presented. As an alternative, the concerns mentioned could equally be taken care of by ensuring all ARP-specific tests impact MS reception of single-slot voice channels only.

4. REFERENCES

[1] 3GPP Tdoc GP-041320 (GERAN1 #20), Nortel, Nokia, "ARP Signalling," June 2004