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Title: Simulation results for Emergency stop of CPCH transmission

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1. Introduction

In the current CPCH procedures, if the UE PHY detects loss of the DPCCH on the DL during CPCH data transmission, it aborts CPCH transmission on the UL and reports the error to high layer. In [1], Node B can use this feature as a mechanism to implement an "Emergency Stop".

In our point of view, as for emergency stop, the current scheme is not reliable, because the UE detecting loss of the DL DPCCH for CPCH cannot realize the reason of the disconnection whether by Emergency Stop or by radio link failure.

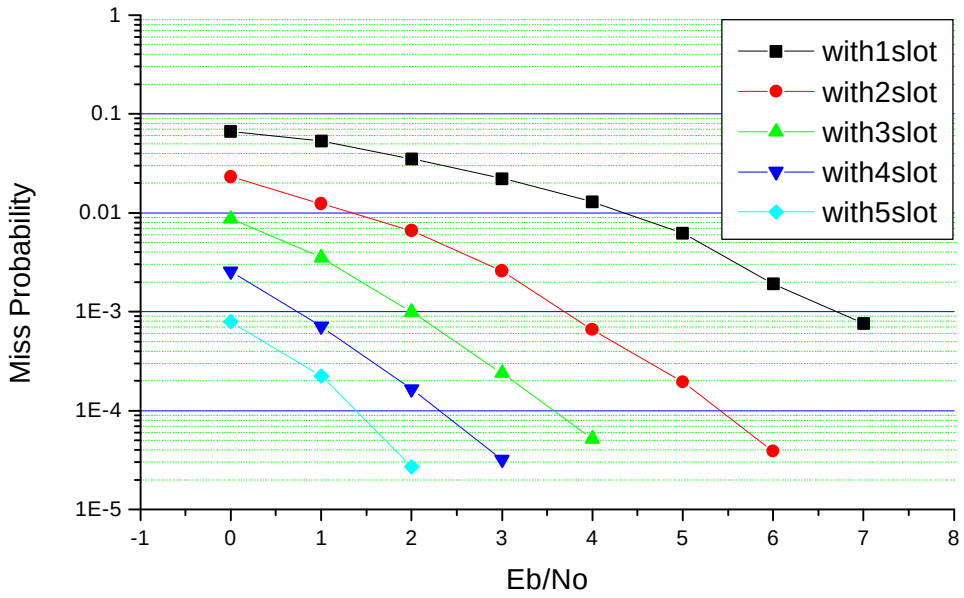
To solve this problem, Emergency Stop method that transmits a specific pattern on downlink DPDCH was suggested by LGIC [2]. In this method, N_{Data2} field is used for Emergency Stop command transmission. On Emergency Stop request from higher layer, [1111] pattern is mapped onto N_{Data2} field, otherwise nothing is transmitted in N_{Data2} field. This means On-Off-Keying. This document shows some simulation results for our Emergency Stop method.

2. Simulation Results

2.1 AWGN channel

In our proposal, a UE continuously observes bits in DPDCH field during N_{slot} slots to detect Emergency Stop command. Here, we defined the miss probability as the probability that the UE does not detect Emergency Stop command when Emergency Stop command is being transmitted. Meanwhile, we defined the false alarm probability as the probability that the UE determines to be in Emergency Stop situation when Emergency Stop command is not transmitted. In AWGN channel environment, the miss probability and the false alarm probability are same. The miss probability for Emergency Stop command was shown in figure 1 and figure 2.

Figure 1 shows several curves of the miss probability according to Eb/No and figure 2 shows some performance curves according to the observation time, N_{slot}. In figure 1, each curve represents the miss probability versus EbNo when the observation time, N_{slot}, is fixed to 1, 2, 3, 4 and 5 slots respectively. In figure 2, each curve shows the miss probability for Emegency Stop command versus N_{slot} when Eb/No is set to 3, 5 and 7dB respectively.



Fg 1. Performance curves according to Eb/No(N_{slot} = 1, 2, 3, 4 and 5 slots, AWGN)

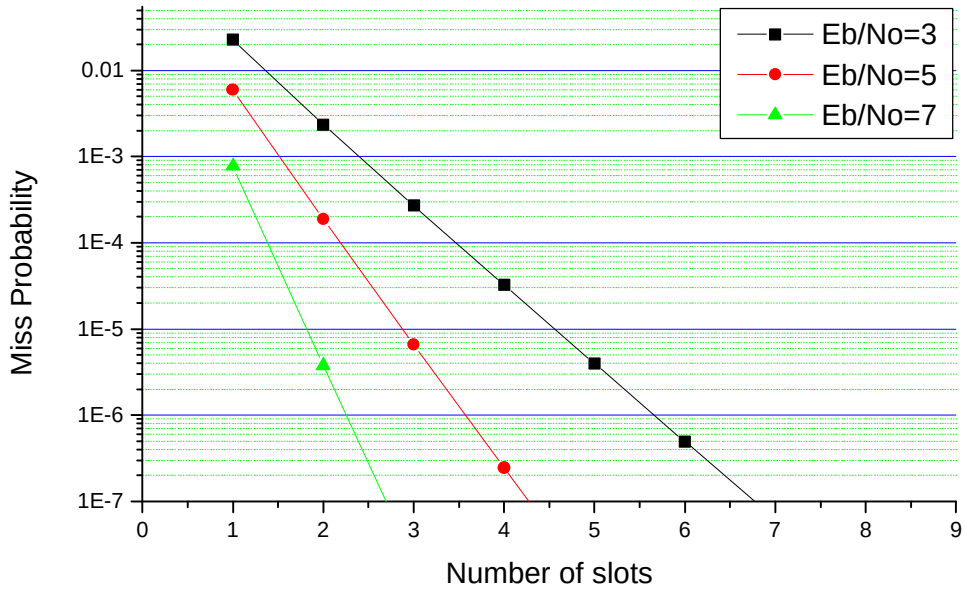


Fig 2. Performance curves according to N_{slot} (Eb/No=3, 5 and 7dB, AWGN)

2.2 Fading channel

Several simulations are performed under 1 path Rayleigh fading channel. Figure 3 and figure 4 show the simulation results when power control is not applied. Simulation environments are as follows.

- 1 path Rayleigh Fading channel.
- The SF of DL DPCH is 512.
- Optimum estimation.
- With/without power control.
- Vehicular speeds of 30 and 100km/h.
- Observation times of 1, 5, 7 and 15 slots.
- 4 bits (2symbols) are transmitted the data field of DL DPCH in the case of Emergency Stop.

Figure 3 shows the performance curves versus Eb/No when the speed of mobile is assumed as 30km/h, and figure 4 is the case when the speed of UE is assumed as 100km/h.

Figure 5 shows the performance curves versus Eb/No when power control is applied and the speed of mobile is 30km/h.

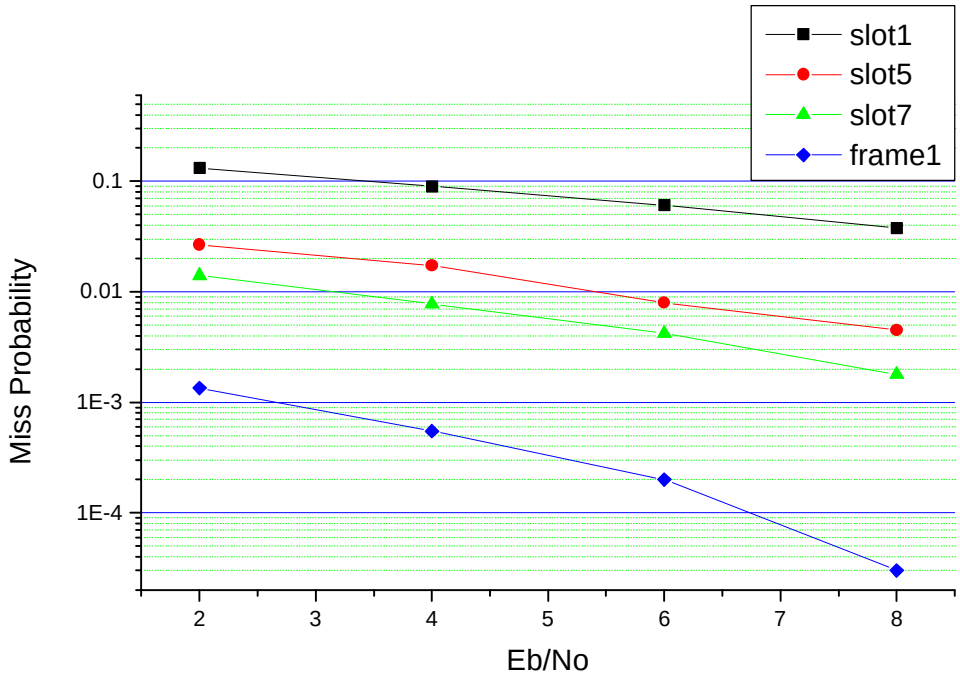


Fig 3. Performance curves according to Eb/No (N_{slot}=1, 5, 7 and 15 slots, 30km/h, without Power Control)

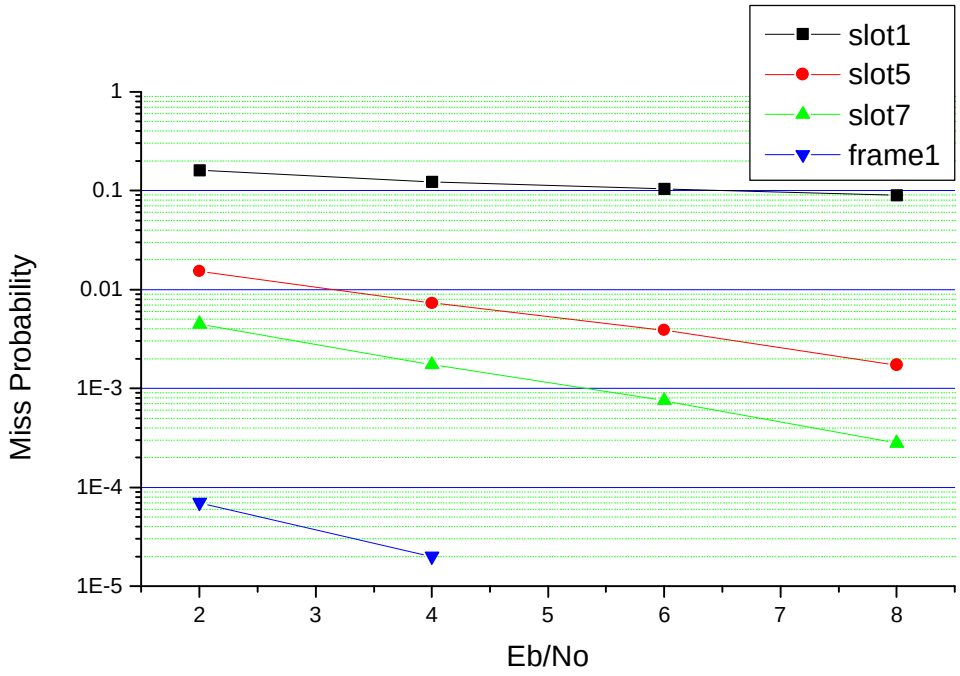


Fig 4. Performance curves according to Eb/No (N_{slot}=1, 5, 7 and15 slots, 100km/h, without Power Control)

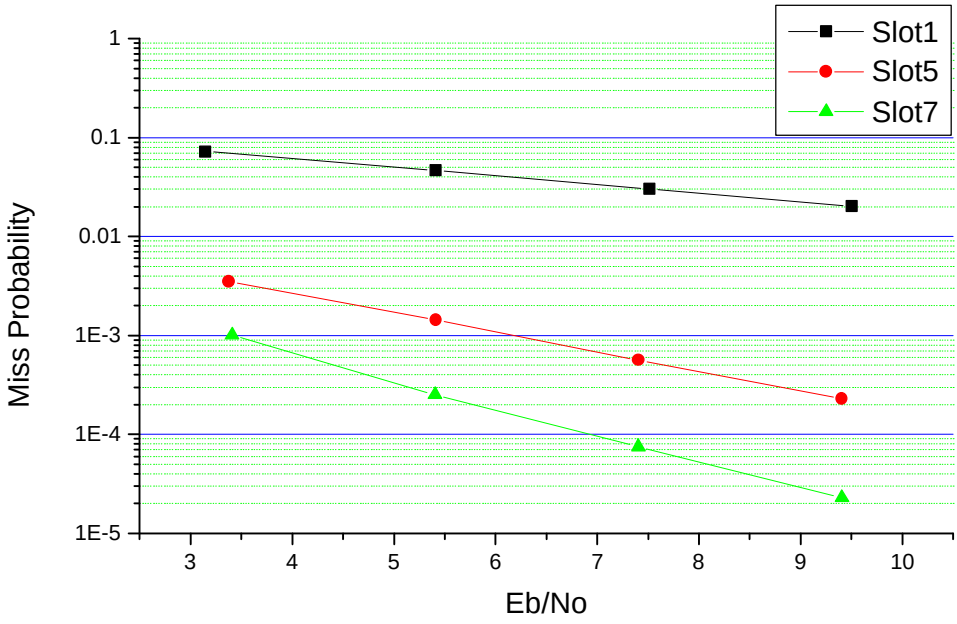


Fig 5. Performance curves according to Eb/No (N_{slot}=1, 5, 7 and 15 slots, 30 km/h, with Power Control)

As can be observed in the above simulation results, the miss probabilities for emergency stop command are different depending on the environments. But we could conclude that the enough level of reliability can be obtained with observation time of 1 frame.

3. Conclusion

LGIC proposed a new scheme for the emergency stop. Several simulations are performed to evaluate the performance of the proposed scheme. It was observed that Emergency Stop command could be reliably conveyed using the proposed scheme. Therefore LGIC recommends that the scheme be adopted as a specification for CPCH Emergency Stop.

Reference

[1] 3GPP TSG RAN WG1 Physical layer procedures (FDD) TS 25.214 V3.0.0.

[2] R1-00-0125, “CPCH controlling method for abnormal situation handling”, LGIC.