TSG-RAN Working Group 1(Radio) meeting #7 ***TSGR1#7(99)c58***
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Agenda Item: Adhoc 9
Source: **Mitsubishi Electric Corporation**
Title: Simulation results for compressed mode impacts on non-compressed voice data
Document for: Discussion

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1. Introduction

In [1], we showed the impact of the data terminal, which enters in compressed mode, on non-compressed voice user. This document provides additional results using TPC step size with 2dB after transmission gaps. Required Eb/Io is evaluated both for compressed data user and non-compressed voice terminal.

2. Simulations

2.1. Required Eb/Io of a compressed data user

At first, we evaluated the effect of recovery length where TPC step size is set to be 2dB. Figure 1 shows the duration of evaluating required Eb/Io @ BER=1e-3. Table 1 shows simulation assumptions. Figure 2 shows simulation results for TGL=7/11/15 cases. X-axis depicts recovery length whereas y-axis depicts required Eb/Io of a compressed data user. From this figure, using 2dB TPC step size after transmission gap, performance of a compressed data user is improved with 7 slots recovery length. With 4slots length, we also can obtain proper improvement.

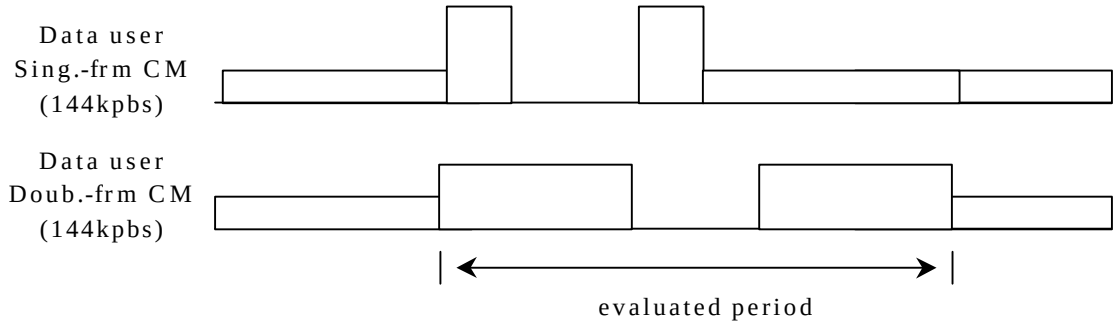

Figure 1 Evaluated period for a Eb/Io of a compressed data user

Service	LCD (144kbps) for data user
Slots/frame	16
SIR measurement	Perfect estimation
fD Tslot	0.025 (Vehicular A)
TGL	7(single frame) / 11(double frame) / 15(double frame)
TPC step size	1dB in normal transmission 1dB / 2dB(4slots) / 2dB(7slots) after resuming tx

Table 1 Simulation assumptions for evaluating required Eb/Io of a compressed data user

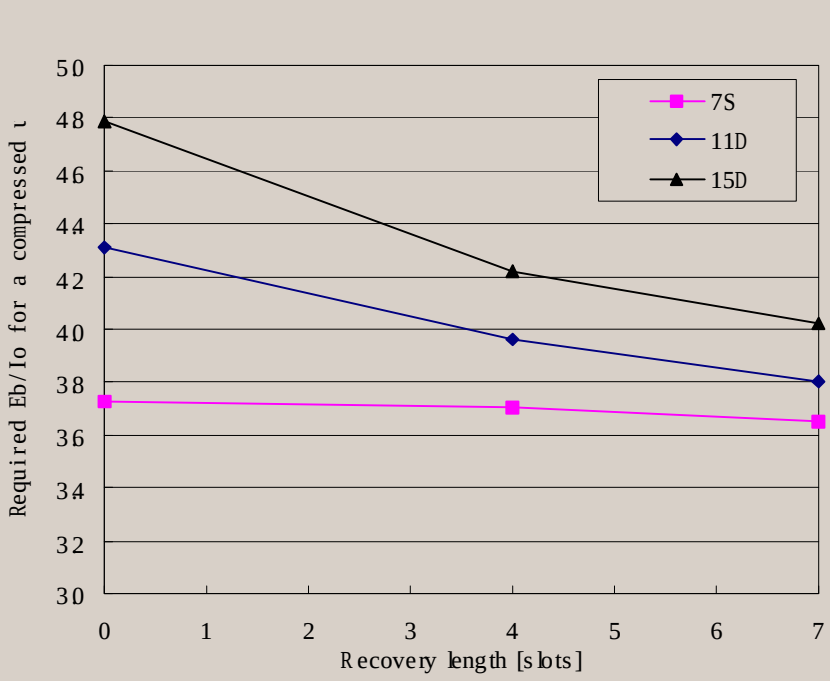

Figure 2. Recovery period vs required Eb/Io for a compressed data user

2.2. The impact on a non-compressed voice user

Secondly, we evaluated the impact of a compressed data user on a non-compressed voice user. Figure 3 shows the duration of evaluating required Eb/Io @ BER=1e-3. Table 2 shows simulation assumptions. Figure 4 shows simulation results. From this results, performance of non-compressed voice user degrades seriously between 4 and 7 slots recovery length. Our understanding of this reason is that voice user can not keep proper SIR by 1dB step size when high power compressed mode signal changes by 2dB step size during recovery period.

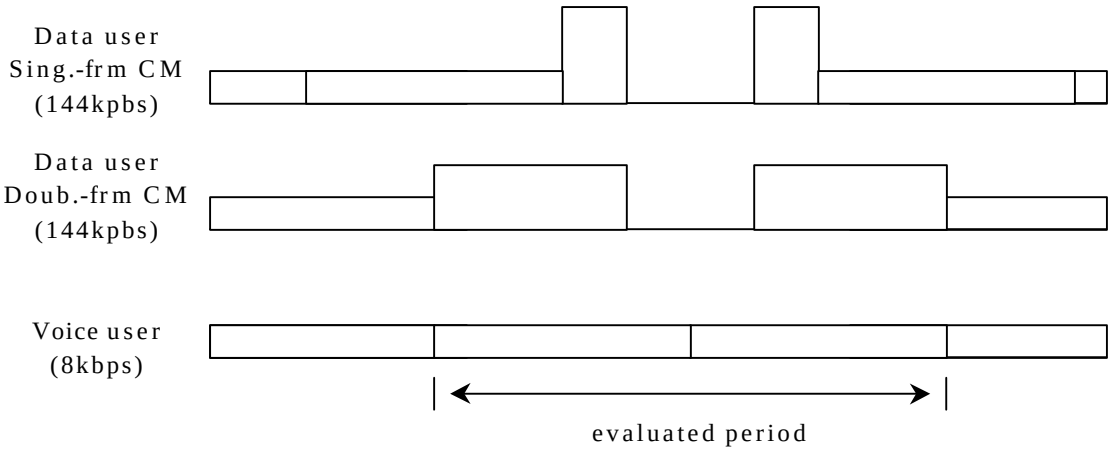

Figure 3 Evaluated period for a Eb/Io of a non-compressed voice user

Service	Voice (8kbps) for non-compressed voice user / LCD (144kbs) for compressed data user
Slots/frame	16

SIR measurement	perfect estimation
fD Tslot	0.025 (Vehicular A)
TGL	7(single frame) / 11(double frame) / 15(double frame)
TPC step size	1dB in normal transmission 1dB / 2dB(4slots) / 2dB(7slots) after resuming tx

Table 2 Simulation assumptions for evaluating required Eb/Io of a non-compressed voice user

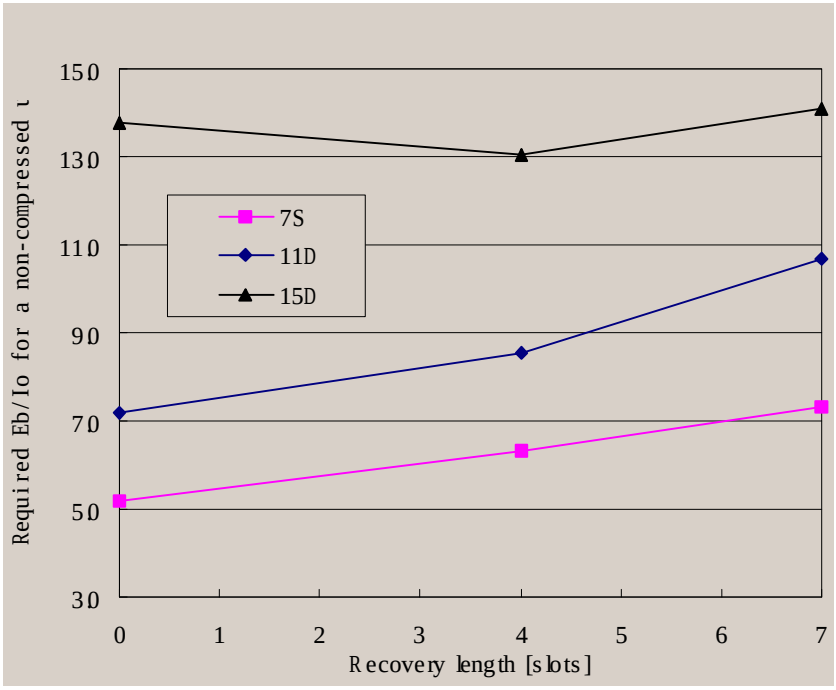

Figure 4. Recovery period vs required Eb/Io for a non-compressed voice user

2.3 The impact of TPC step size on other user

We evaluate the impact of the recovery period of a compressed data user on a non-compressed voice user. Table 3 shows mean and standard deviation of TPC error from target SIR measured during the period shown in figure 5. We also evaluated those for each slot after resuming transmission (Figure 2 and 3). Our results show that both mean and standard deviation value become bigger, as TPC step size is bigger.

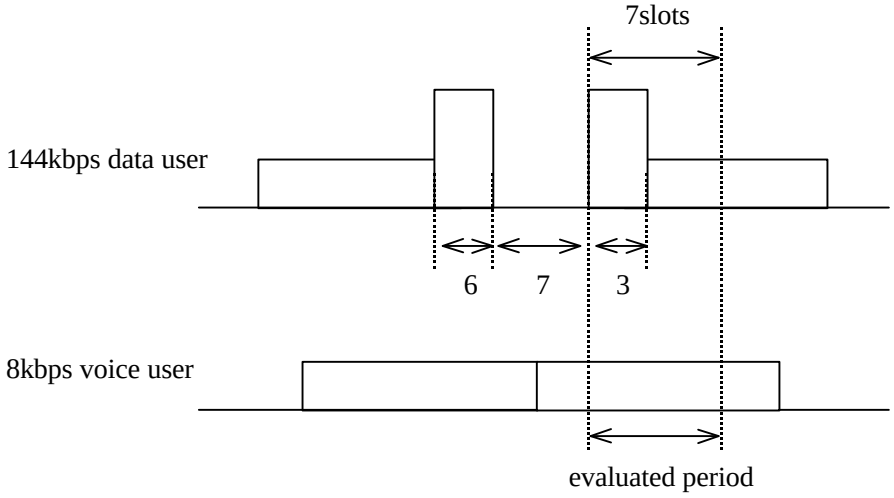

Figure 5 evaluated period

TPC after TG	Mean (dB)	SD (dB)
1dB	-1.984	4.292
2dB(4slots)	-2.132	4.665
2dB(7slots)	-2.390	4.966

Table 3. TPC error for non-compressed voice user

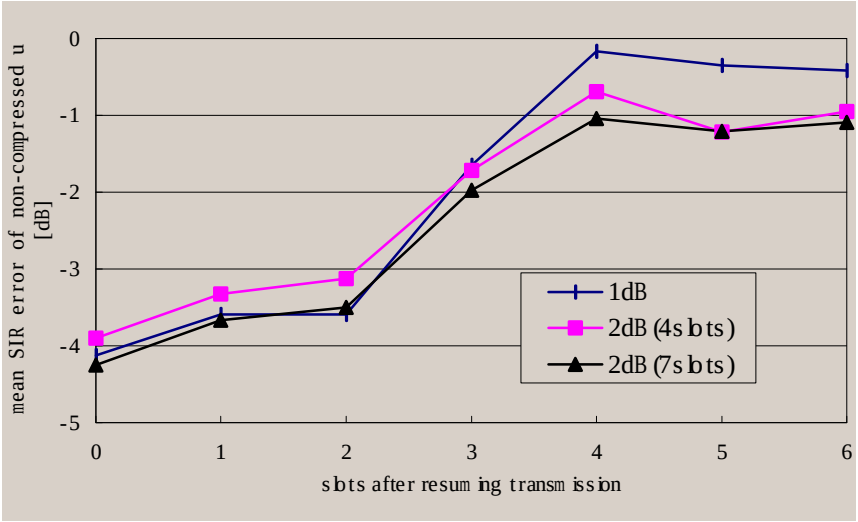

Figure 2. mean error of each slots after resuming transmission

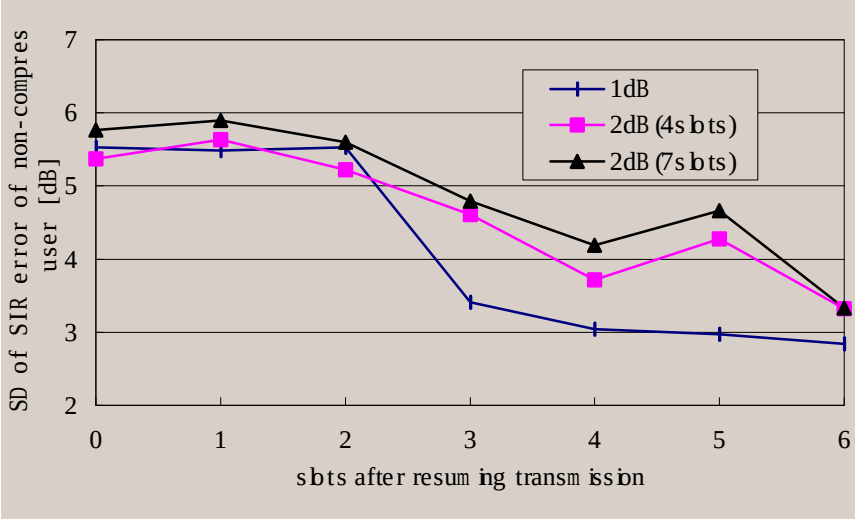

Figure 3. standard deviation of each slots after resuming transmission

3. Conclusion

In this document, from informational point of view, we showed required Eb/Io of both compressed data user and non-compressed voice user. As a result, for a compressed data user itself, using 2dB step size in the recovery period gives better performance than 1dB step size. On the other hand, the impact on the other non-compressed user becomes significant. Note that the simulation condition is not general case, because there are only one compressed mode data user and only one non-compressed voice user. If load of a

cell becomes higher, results may be a little different. However, TPC step size and recovery period should be decided considering impact on both compressed and non-compressed user.

[1] TSGR#4(99)443 "Impact of compressed users on non compressed users" Mitsubishi, ITE
[2] TSGR#6(99)a50 "Adhoc8 meeting report" Adhoc 8 chair