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| **Agenda Item:** | **Plenary** |
| **Source:** | **Mitsubishi Electric (Trium-RD)** |
| **Title:** | **Discussion on maximum total number of transport blocks** |
| **Document for:** | **Discussion & Decission** |

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## 1. Introduction

It appeared that the UE capability parameter "maximum total number of transport blocks etc…" has different understandings within RAN WG1. The objective of this paper is to kindly ask the RAN WG1 group to decide what the correct interpretation is.

## 2. References

[1] R1#17-00-1456      Limitation on the downlink rate matching repetition, source Mitsubishi & Panasonic.
[2] R1#17-00-1364      Discussion paper on UE capabilities, source Ericsson
[3] R2-00-2317          CR 25.926-015r1, clarification on TTI simultaneousness in UE radio access capability,
(attached to R1#17-    source Mitsubishi
00-1416)
[4] R1#15-00-1053      CR 25.926-xxx: Correction of Transport Channel Parameter, source Ericsson
[5] R1#15-00-1122      CR 25.926-xxx : Correction of transport channel parameter (revision of R1-00-1053),
                        source Ericsson.

## 3. Discussion

In [3] we tried to clarify 25.926. Our intention was not to make any definition change but to make clear and unambiguous the current definitions.
Two of the parameters are currently named in 25.926 ver 3.2.0:
?? For DL : Maximum total number of transport blocks received within TTIs that end within the same 10 ms interval
?? For UL : Maximum total number of transport blocks transmitted within TTIs that start at the same time

In [4] and its revision in [5] Ericsson introduced the notion of an arbitrary time instant into 25.926 ver 3.1.0. However, this notion was only introduced for the "maximum sum of number of bits etc…" parameters, and not for the "maximumtotal number of transport blocks etc.." parameters.

Our feeling when introducing our CR [3] was that the parameter "maximum total number of transport blocks etc.." was forgotten to be modified by [5]. This feeling was all the more justified that :
?? For the downlink the wording " that end within the same 10 ms interval" used in 25.926 ver 3.1.0 for the "maximum total number of transport blocks etc…" parameter was already not aligned with the wording " that end within the same arbitrary interval of length T<10 ms" used for the "maximum sum of number of bits etc…" parameters. So, there was already some previous forgetting here.
?? The number of transport blocks *does* have an impact of the channel decoder memory as this is exemplified in paper [1] about benefits of limiting RM repetitions in DL. So, since this parameter has an impact on the memory there was no reason why it should not use also the arbitrary time instant wording.

In paper [2], Ericsson clarifies that in fact not using the arbitrary time instant wording for the "maximum total number of transport block etc…" was not a forgetting, but was intentional.
So, by keeping different wording for the "maximum sum of number of bits etc…" parameters and for the "maximum total number of transport blocks etc…" parameters, one is wondering whether the "Maximum total number of transport blocks that can be received from TTI's interseted by an arbitrary time instant" cannot be greater than the "Maximum total number of transport blocks received within TTIs that end within the same 10 ms interval" because of the case when all TTI's are not ending in the same T<10ms arbitrary time interval.

It is not said clearly in [2] that this thing can happen and we would like RAN WG1 to clarify this.

Therefore we have two possible interpretation for selection by RAN WG1:

## Interpretation 1

The two wordings are completely equivalent: "Maximum total number of transport blocks that can bereceived from TTI's intersected by an arbitrary time instant" means the same as "Maximum total number of transport blocks received within TTIs that end within the same 10 ms interval".

## Interpretation 2

The two wordings are not equivalent: "Maximum total number of transport blocks that can bereceived from TTI's intersected by an arbitrary time instant" can be greather than "Maximum total number of transport blocks received within TTIs that end within the same 10 ms interval".

If we use the following notation :

| M_MAX1 | Maximum total number of transport blocks received within TTIs that end within the same 10 ms interval |
| M_MAX2 | Maximum total number of transport blocks that can be received from TTI's interseted by an arbitrary time instant |
| I_MAX | Maximum number of simultaneous transport channels |

Then with interpetation 2 we have in fact :

$$M\_MAX2 \, ? \, ?min \, ?4, I\_MAX??? \, M\_MAX1$$

The 4 in the formula comes from this that there are 4 different TTI possible durations in the system.

## Comparison of the 2 interpretations

In fact, for the number of transport blocks received from TTI's intersected by an arbitrary time instant to be greater than M_MAX1;as possible in interpretation 2, you need that MAC makes some special *non transparent* scheduling.
Our underntading is that MAC selects a TFC in normal mode with the only constraint from L1 that the TF of transport channels with ongoing TTIs should not be changed. Taking into account other constraint from L1 in order to transiently increase the number of transport blocks is what we are call here *non transparent scheduling*.
The objective of CR [5] by Ericsson was, to our understanding, to clarify that that this non transparent scheduling is not allowed for the "sum of number of bits etc…" parameters.
So, we would like Ericsson to officially make clear whether or not the discussion paper [2] means that this non transparent scheduling is allowed for the "total number of transport blocks etc…" (during coffee break dicussion this was hinted, but there is no official statement yet). If allowed, i.e. if interpretation 2 is the correct one, then this way is a bit puzzling, and we think that 25.926 definitions should be made a bit more clear about this.

## Conclusion

We understand that, as stated in [2], we should limit change to 25.926 to correction of errors, and not only to beautifying. This is all the more true that 25.926 has already been often changed, and that it does not give a good feeling about stablity of R'99 to make changes again.
However, we think that this "maximum total number of transport blocks etc…" issue absolutely needs clarification. So, in the case that our CR [3] was rejected by RAN WG1, we propose that we would make a simplified CR on 25.926 were no parameter name is changed, and the problem of exact definition "maximum total number of transport blocks etc…" is solved.

If possible, we would like also that the definition of "convolutionally coded transport blocks" and " turbo coded transport blocks" would be also clarified in the simplified CR, as the current wording is so misleading, and many colleagues have complained about this.