China Academy of Telecommunication Technology

3GPP TSG RAN Meeting #100
Taipei, June 12th – 14th , 2023

RP-231256

Views on peak data rate issue of Rel-18 RedCap

CATT

Background 1/2

- The following agreement was made in RAN#99

> Rel-18 eRedCap UE capable of 20MHz + PR1 and Rel-18 eRedCap UE capable of BW3/PR3 + PR1 are designed/targeted to same peak data rate, i.e., 10Mbps
>
> Note 1: Peak data rate of "Rel-18 eRedCap: UE capable of 20MHz + PR1" and "Rel-18 eRedCap: UE capable of BW3/PR3 + PR1" is same including unicast and broadcast respectively.
>
> Note 2: PRB processing capability of "Rel-18 eRedCap: UE capable of 20MHz + PR1" is not limited to "25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS" and it corresponds to PRB size corresponding to 20 MHz.
>
> Note 3: The only difference between "Rel-18 eRedCap: UE capable of 20MHz + PR1" and "Rel-18 eRedCap: UE capable of BW3/PR3 + PR1" is Note 2 and $v_{Layers}\ Q_m\ f$ in order to have the same peak rate.
>
> Note 4: The initial access procedure of Rel-18 eRedCap UE capable of 20MHz + PR1 is realized by following:
>
> Same as Rel-18 eRedCap UE capable of BW3/PR3 + PR1

- **Observation 1**: In RAN#99 agreement, the '20 MHz + PR1' and 'BW3/PR3 + PR1' UE are designed/targeted to the same peak data rate of 10 Mbps. It may be interpreted as a <u>fixed</u> peak data rate of 10 Mbps.

Background 2/2

- Tracking back to earlier meeting, the following agreement was made in RAN#98

Issue 4: Minimum target (downlink) peak data rate:
Proposal: Keep the minimum target peak rate as 10Mbps
conclusion: proposals for issue 3 and issue 4 are agreed

- **Observation 2**: In RAN#98 agreement, it was stated that the 10 Mbps is the minimum peak data rate.

- Therefore, two understandings appear as following:
  - **Understanding 1**: RAN#99 agreement takes precedence over RAN#98-e agreement, and hence 10 Mbps should be the 'fixed' peak data rate.
  - **Understanding 2**: RAN#99 and RAN#98 agreements do NOT conflict with each other, and hence 10 Mbps in RAN#99 means 'minimum' peak data rate by default.

On cost reduction of Rel-18 RedCap UE

- Compared to the simplest Rel-17 RedCap UE (1 Rx, 20 MHz, 64 QAM), cost/complexity reduction of BW3/PR3 or PR1-only Rel-18 RedCap UE (assuming same Rx and 64 QAM) is not significant
  - 7%~8% for BW3/PR3
  - 4% for PR1

- Naturally, adopting any optional feature will increase the cost/complexity
  - For example, based on TR 38.865, the cost/complexity of 2Rx BW3/PR3 Rel-18 RedCap UE is even higher than 1Rx Rel-17 RedCap UE
  - For another example, based on TR 38.865 and rough calculation, the cost/complexity of 2Rx BW3/PR3+PR1(10Mbps) is still higher than 1Rx Rel-17 RedCap UE, due to significant higher RF cost

- **Observation 3**: For notable cost reduction from Rel-18 RedCap UE compared to Rel-17 RedCap UE, the most proper way is to implement the simplest Rel-18 RedCap UE, i.e. (1 Rx, 64 QAM)
  - Further limiting the 'fixed' data rate seems meaningless, since the cost/complexity of Rel-18 RedCap UE of 2Rx (even limited to 10 Mbps) can still be higher than Rel-17 RedCap UE of 1Rx

Proposal

- **Proposal**: For Rel-18 RedCap UE, clarify that the targeting peak data rate of 10 Mbps is the minimum peak data rate
  - It is observed that limiting the 10 Mbps as the ‘fixed’ peak data rate may not prevent higher cost/complexity than the simplest Rel-17 RedCap UE, e.g. for Rel-18 RedCap UE equipped with 2Rx
  - It is understood that adopting optional features will increase the cost/complexity of UE, but it is up to UE vendor’s choice and should not be prohibited by specification

Conclusion

- **Observation 1**: In RAN#99 agreement, the '20 MHz + PR1' and 'BW3/PR3 + PR1' UE are designed/targeted to the same peak data rate of 10 Mbps. It may be interpreted as a fixed peak data rate of 10 Mbps.

- **Observation 2**: In RAN#98 agreement, it was stated that the 10 Mbps is the minimum peak data rate.

- **Observation 3**: For notable cost reduction from Rel-18 RedCap UE compared to Rel-17 RedCap UE, the most proper way is to implement the simplest Rel-18 RedCap UE, i.e. (1 Rx, 64 QAM)
  - Further limiting the 'fixed' data rate seems meaningless, since the cost/complexity of Rel-18 RedCap UE of 2Rx (even limited to 10 Mbps) can still be higher than Rel-17 RedCap UE of 1Rx

- **Proposal**: For Rel-18 RedCap UE, clarify that the targeting peak data rate of 10 Mbps is the minimum peak data rate
  - It is observed that limiting the 10 Mbps as the 'fixed' peak data rate may not prevent higher cost/complexity than the simplest Rel-17 RedCap UE, e.g. for Rel-18 RedCap UE equipped with 2Rx
  - It is understood that adopting optional features will increase the cost/complexity of UE, but it is up to UE vendor's choice and should not be prohibited by specification

THANK YOU