RAN-R18-WS-non-eMBB-Spreadtrum - Version 0.0.4
RAN

3GPP TSG RAN Rel-18 workshop **RWS-210597**

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.2

Source: Spreadtrum Communications

Title: Email discussion summary for [RAN-R18-WS non-eMBB-Spreadtrum]

Document for: Discussion and decision

1 Introduction

According to Chair's guidance [1], this email discussion summary is to collect questions/comments for RAN-R18-WS-non-eMBB, together with answers to classified and summarized questions/comments that are provided by moderator (Spreadtrum) in an organized manner.

This summary covers the following documents:

- RWS-210057 RedCap enhancements for R18

- RWS-210058 R18 XR considerations

- RWS-210059 Sidelink relay enhancement for R18

- RWS-210060 R18 Personal IoT network considerations

- RWS-210061 R18 Tactile and multi modality considerations

- RWS-210062 NTN&NTN-IoT enhancements for R18

2 Comments/Questions/Answers to the Tdocs

2.1 General comments

2.1.1 <1st Round> Comments

Following RAN chair suggestion on RAN reflector, the Table 2.1.1.1 is to collect general comments/view on Non-eMBB-driven Functional Evolution from companies.

Feedback Form 1: Table 2.1.1.1 General comments

1 – Spreadtrum Communications
From Spreadtrum's view, the non-eMBB enhancements and some new areas that we believe are important for R18 non-eMBB evolution and revolution include the following topics: RedCap, XR, Sidelink relay, Personal IoT network, Tactile and multi-modality, and NTN/NTN-IoT

2.1.2 <1st Round> Summary by moderator

No comments from companies.

2.2 RedCap

2.2.1 <1st Round> Comments/Questions

In the contribution **RWS-210057**, we share some considerations on Rel-18 Redcap with the following proposals:

Proposal 1: In addition to R17 usecases, new use cases and corresponding requirements can be studied for RedCap in R18.

- Industrial controller.

- Patrol robot.

- Smart grid.

- Etc.

Proposal 2: The maximum bandwidth of R18 RedCap UE shall be further reduced to 10MHz and/or 5MHz for FR1.

- Reuse R15 SSB as a start point for initial access.

- Other specification impacts need to be further studied, e.g. similar aspects as R17 RedCap, and new aspects related to bandwidth reduction.

- FFS for FR2.

Proposal 3: FFS for maximum bandwidth larger than 20MHz for higher data use case in FR1.

Proposal 4: UE processing time relaxation should be considered for R18 RedCap UE.

Proposal 5: TBS restriction should be considered for R18 RedCap UE.

Proposal 6: UL enhancement should be considered for R18 RedCap UE.

- R18 eMBB related Uplink enhancement items and/or solutions from other items shall be assumed to be

available to R18 RedCap UEs by default, with additional improvement or with small modifications for R18 RedCap UEs if found necessary.

Proposal 7: RedCap UE shall be allowed to access to unlicensed band and industrial IoT/vertical/private band in R18.

- For unlicensed band, FFS whether and how to support bandwidth smaller than 20MHz.

- For industrial IoT/vertical/private band, it highly depends on regional industries input. Additional modifications/solutions to apply RedCap usage may be needed.

Proposal 8: Encryption and Slicing enhancement should be considered from RedCap application perspective in R18, especially related to security part.

Proposal 9: Power saving enhancements for R18 RedCap:

- Evaluating R16/17 eMBB power saving techniques for different R18 RedCap scenarios or use cases, additional improvement or tailoring may be needed, such as for stationary RedCaps (e.g., sensors or video surveillances).

- Define new power classes for R18 RedCap.

- Lower RedCap power class, such as for sensors.

- Higher power class should also be considered for specific scenarios, such as Line Current Differential Protection CPE for smart grid.

Proposal 10: Enhancements coming from cross-Functionalities for both eMBB and Non-eMBB Evolution.

- Positioning for R18 RedCap: high accuracy and/or low power for industrial RedCap; XR usage for helmets; etc.

- FFS for other cross-Functionalities (e.g., access to NTN, SL-RedCap).

- If the related enhancement is specified in other R18 WIs/SIs, it shall be assumed to be available to R18 RedCap UEs by default.

Regarding the above proposals for R18 RedCap and RWS-210057, the Table 2.2.1.1 is to collect questions/comments from companies.

Feedback Form 2: Table 2.2.1.1 [RedCap] Questions/comments

1 – Classon Consulting

[for FUTUREWEI]

Thank you for the well-written paper, we will think more about your proposals. The use case of the ”patrol robot” is interesting ... My first thought on seeing the term was a robot from the ”Terminator” movie. :-) Note that FUTUREWEI supports studying redcap positioning, but should be in positioning not redcap.

2 – Xiaomi Communications

[Xiaomi]:

Thanks for the good contribution. The following are some comments from Xiaomi

(1) In this contribution, you list many intresting use cases for RedCap. We share the same view that in Release 18, RedCap should strive to expand the new use cases or applications to enrich the market.

(2) For the BW reduction, we think it is one effective solution to further compress the cost. But on the other hand, it is better to strive to use the same cell-defined SSB for both RedCap and non-RedCap

(3) For the RedCaps working on the unlicensed band, we think it is helpful to promote the use of RedCap in the industrial scenario. Compared with the wide -bandwidth non-RedCap devices, the RedCap devices may have lower possibility to access the channel. In this case, how to keep the fairness between RedCap and Non-Redcap should be carefully considered.

3 – Guangdong OPPO Mobile Telecom.

[OPPO]

1) For the supporting of 10MHz and 5MHz UE, we think it is needed. Can we outline the method how to reusing the existing SSB of Rel-15□

2) For the UL enhancement for Rel-18, if it is assumed to be default for RedCap UE, would it be commonly support for all the RedCap UEs?

4 – China Mobile Com. Corporation

Thanks for your good contribution! We are interesting on the use cases of " Industrial controller ,and Smart grid". As we know, such two use cases are extensively studied in the Indutrial IOT/URLLC, which always require high reliablility, high accuracy time synchronization and low latency. How the redcap feature can meet the high requirement of such use cases?

5 – Huawei Tech.(UK) Co.. Ltd

1. For proposal 4 UE processing time relaxation, is this intended to go together with reduced bandwidth UE from R17?

2. For proposal 8 encryption and slicing enhancement, please clarify what are the issues specific for Red-Cap.

3. For proposal 9 related to high power class, it seems to be a CPE using RedCap. What are the reasons a CPE would need to have reduced complexity?

4. For lower UE bandwidth, is your intention to support both 5 MHz and 10 MHz, or choose one of them?

6 – China Telecommunications

[China Telecom] Thanks for the contribution. We share the same view that more interesting use cases should be studied and identified in Rel-18 to enlarge RedCap market.

1) For BW reduction, we agree to reuse Rel-15 SSB as a starting point and study further for both RedCap UEs and non-RedCap UEs, aiming to bring minimum impact on current network. It should be prudential to find balance between data rate and cost to achieve requirements of Rel-18 use cases. No matter larger or smaller maximum BW, the key point is to find the matched use cases and expand the market. More discussions are needed for BW reduction.

2) For TBS restriction, it means restricting the maximum number of PRBs or other aspects? If there is a need to identify TBS restriction during initial access or not?

3) We also think UL enhancement is an important issue in Rel-18, especially for video surveillance. It would be better to study UL enhancement in another coverage enhancement WI, not in RedCap WI.

4) Security enhancement is a new topic. We think it is important for further network especially rapid development in the information age. How to promote security needs more assistance from higher layer like RAN2 or RAN3.

5) For power saving, it should be based on Rel-17 RedCap outcome. Take compatibility and coexistence into consideration, when deciding the scope for RedCap WI in Rel-18.

7 – Ericsson LM

Regarding further reduced UE bandwidth (RWS-210057), we would like to ask what potential UE cost reduction you expect from reduction from 20 MHz to 5-10 MHz? The estimates from CATT (RWS-210409) and Ericsson (RWS-210313) indicate that according to the established cost evaluation methodology (TR 38.875), there may not be a very significant further cost reduction compared to 20 MHz.

Also, regarding the potential UE power saving from further UE bandwidth reduction, we would like to ask what potential gain there might be from hardcoded UE bandwidth reduction to 5-10 MHz compared to what can be achieved from simply configuring the UE-specific bandwidth part to 5-10 MHz?

8 – CAICT

Considering the industrial transformation and digitalization, the potential market size of RedCap will be very large in near future. For the production of products and ecological development, the cost of RedCap is the most important part. Therefore, continued cost reduction needs to be considered in Rel.18. That's the main reason why we cosign this contribution.

9 – vivo Communication Technology

Regarding cost reduction, do you think reducing UE RF BW to 10MHz is a must for cost reduction, or we can potentially keep 20MHz RF BW but reduce the baseband capability by TBS/RB restriction, etc for cost reduction. By this way, we would not suffer from many performance degradation issues(frequency diversity, scheduling flexibility, resource fragment) ?

10 – Qualcomm Incorporated

1) What are the expected cell coverage and data rate expection for lower power classes ?
2) What are the potential impacts on initial access, before UE can report its lower power class to NW ?

11 – LG Electronics Inc.

Thanks for the contribution. We have the following questions.

Q1) Lower UE power class means smaller coverage. Is the proposed lower UE power class intended for smaller coverage? If yes, can you explain the use case scenarios you have in mind for the lower UE power class? Do you also propose to consider the coverage enhancement techniques as in LTE MTC and NB-IoT?

Q2) Regarding the objective on positioning, high accuracy and/or low power for industrial RedCap is proposed. The high accuracy and low power seem to be somehow contradictory to each other. Do you think each of them are useful for RedCaps and therefore both should be supported?

12 – Samsung Electronics Co.

1. For BW reduction, UE processing time reduction and TBS restriction, which one is more important for further cost reduction for RedCap

2. why high power class shall be considered by RedCap UE, why not for eMBB if cost is important for RedCap?

3. What kind of necessary spec change had been identified to support Pos for Redcap?

4. what kind of RedCap specific power saving scheme is in your mind, which cannot be used for eMBB UEs?

2.2.2 <1st Round> Answers by moderator

Many thanks to **FUTUREWEI, Xiaomi, OPPO, CMCC, Huawei, China Telecom, Ericsson, CAICT, vivo, Qualcomm, LGE and Samsung** for your valuable questions and comments on R18 RedCap topic.

To sum up, there are three main kinds of question areas asked by companies focused on use cases, cost/complexity reduction and other enhancements. The answers by moderator are listed below:

o For the RedCap use cases, **Xiaomi, China Telecom, CMCC, LGE and Futurewei** provide their comments or questions.

- First of all, we think we should strive to expand the new use cases or applications in Rel.18 to enrich the RedCap market, and **Xiaomi and China Telecom** share the similar views. As far as we know, there are lots of demand for low-cost communications in vertical industries, which is also observed by CAICT.

- Secondly, for industrial controller and smart grid use cases, **CMCC** mentioned that these two cases are highly correlated with IIOT/URLLC. To support IIOT/URLLC for RedCap, we think Rel.17 URLLC related capabilities can be baseline. If it is not enough, further enhancement can be considered in Rel.18, e.g. multiple-UE Backup in *RWS-210344*.

- Thirdly, for low power scenarios for RedCap mentioned by **LGE**, from our perspective, the main use cases may include industrial services for limited distance (e.g. indoor) and for small data transmission.

- Last, we are open for other potential use cases and scenarios for Rel.18 RedCap, e.g. patrol robots for smart grid and smart city, etc.

o For the cost/complexity reduction part, **CAICT, Xiaomi, OPPO, China Telecom, Huawei, Ericsson, vivo and Samsung** provide their comments or questions. Those comments can be further divided into three parts: BW reduction, TBS restriction and processing time relaxation.

- Generally, we fully agree on **CAICT**'s comments that the potential market size of RedCap will be very large in near future, and the cost of RedCap is the most important part for the production of products and ecological development. We also think continued cost reduction needs to be considered in Rel.18.

- For the BW reduction, a lot of companies (**Xiaomi, OPPO, China telecom, Huawei, vivo, Samsung**) are interested in BW reduction for Rel.18 RedCap and also mentioned some potential issues. **Ericsson** doubt the benefit of further BW reduction.

> Regarding the SSB related issues, the principle is to reuse the current SSB, which is also proposed by **China Telecom** and **Xiaomi**. For the question asked by **OPPO** that how to reusing the existing SSB, we think for 5MHz BW, the current SSB can be used with 15 KHz SCS, and for 10MHz BW, the current SSB can be used with 15KHz and 30KHz SCS. If we think about it from the cost perspective, we prefer to support 5 MHz, while considering the spec impacts and flexibility, we are open for 10MHz.

> **Vivo** provide another possibility that keep 20MHz RF BW but reduce the baseband capability by TBS/RB restriction. From our observation, compared to TBS/RB restriction, BW reduction can bring additional cost reduction on some components (e.g. ADC/DAC, FFT/IFFT, DL control processing & decoder, etc). Besides, reducing UE RF BW to a smaller one, the power consumption can be reduced significantly.

> **Ericsson** doubt the benefit of further hardcoded BW reduction and indicate that according to the established cost evaluation methodology (TR 38.875), there may not be a very significant further cost reduction compared to 20 MHz. But we have different views. First, the cost reduction in Rel.17 is related to RF and BB, however, RF and BB are only a portion of the whole chipset. For example, when the BW is further reduced, the peak data rate can be reduced, which means lower memory requirement, then the cost of memory can be reduced significantly. In addition, the peak data rate of RedCap sensors is only few Mbps or even smaller, the current 20MHz BW are overdesigned. **Ericsson** provide another power saving possibility by configuring the UE-specific BWP to 5-10 MHz instead of reducing the maximum BW. We think that whether the UE can operate on a smaller BWP is up to gNB's configuration, but it is hard to guarantee that the UE will be in smaller BWP all the time, e.g. switch to initial BWP when fall back to idle mode.

> In short, from our perspective, BW reduction can be the most direct and effective way to save Rel.18 RedCap cost.

- For processing time relaxation, it also brings respectable cost reduction and benefit to power saving. Regarding **Huawei**'s question, our intention is to specify the processing time relaxation as an optional feature from Rel.18.

- For TBS restriction asked by **China Telecom**, TBS restriction may include restricting the maximum number of PRBs for PDSCH/PUSCH, or equivalently restricting TBS in the specification for the use cases with very small data rate, and we don't expect any impacts on initial access.

o For the enhancements part, **FUTUREWEI, LGE, Samsung, Huawei, QC, LGE, Samsung, OPPO, China Telecom, Ericsson and Xiaomi** provide their comments and questions. Those comments can be further divided into six parts: RedCap positioning, power classes, power saving, UL enhancements, security/slicing and access to unlicensed band.

- For RedCap positioning, we think it is the cross-Function for both eMBB and Non-eMBB. We are open to discuss which Rel.18 item it belongs to. For the possible spec impacts and the relationship between high accuracy and low power can be discussed further.

- For power classes, **Qualcomm** and **LGE** care about the coverage issue when define a lower power class, and **Huawei** and **Samsung** care about the cost when define a higher power class.

> For lower power class, we agree that it will lead to smaller coverage or lower data rate at cell edge. In our understanding, it is actually how to balance the requirements of coverage, UL data rate at cell edge, power saving and cost. Firstly, lower power class will be benefit to power saving and cost. Secondly, the coverage can be quite well for indoor scenarios. As observed by vivo in *RWS-210171*, "Indoor devices normally transmits at low power level, e.g. 0 15dBm". Thirdly, in industrial scenario, there are diverse UL data rate (e.g. video surveillance for high UL date rate, and sensors and controller for small UL date rate). Consider the balance of coverage and UL data rate at cell edge, we hold the opinion that different UL data rates at cell edge can be achieved with different power classes to satisfy varied demands under the same coverage. Due to the same reason, we are also open for defining a higher power class for RedCap UE.

> For higher power class, we also understand Huawei and Samsung's concern on the cost. Actually the cost should be compared with high power NR UE/CPE. According to our discussion with some industrial customers, a lot of industrial scenarios require high reliability (99.999% or 99.9999%) but not high data rate.

To achieve this, the industrial customers have to use high power NR UE/CPE. They also care about the cost and are willing to replace high power NR UE/CPE with low cost UE/CPE without coverage loss and also guarantee the high reliability. Thus, we think defining a higher power class for RedCap UEs can meet their needs. They also mentioned that power saving is not so important for some industrial use cases, e.g. differential protection, as the power supply is not a problem.

- For power saving schemes, we are interested in the topic of improving UE energy efficiency proposed by Ericsson at Guiyang workshop, and more information can be found in Ericsson's contribution (*RWS-210313, Motivation for Rel-18 WI on Enhanced RedCap*).

- For UL enhancements, from our perspective, we mainly care about the UL data rate improvement in Rel.18. For UL coverage enhancement, we share the same view with **China Telecom** that it can be in another WI.

- For security/slicing, we share the similar view with the **China Telecom** that the security related issues need more assistance from higher layer like RAN2/3 or SA3. And for **Huawei**'s concern, the security aspect of Redcap is really related to the scenarios where Redcap serves. Redcap mainly focus on industries scenarios or is used for specialized service, those scenarios or service usually have their own dedicated encryption algorithms or security requirement. Therefore, to guarantee the security aspect of Redcap, the enhancement to encryption and combination with slice could be the candidate solutions. Actually, the requirements of security and slicing are coming from some industrial customers, and we are open for further discussion.

- For access to unlicensed band, as commented by **Xiaomi**, we also think it is helpful to promote the use of RedCap in the industrial scenario. Regarding the fairness issue, if the maximum BW of RedCap is 20MHz, and the current LBT mechanism (same LBT BW and ED threshold) in NR-U/LAA can be reused for RedCap, the fairness can be guaranteed. When the BW is further reduced from 20Mhz, maybe we can specify a smaller ED threshold for the RedCap to maintain the fairness. Besides, it's worth noting that in some dedicated frequency band or scenarios, LBT is not needed, the fairness issue may not exist.

2.2.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.2.2 and further clarifications on **RWS-210057** together.

In addition, based on the first round discussion, moderator has noticed that use cases, cost/complexity reduction, and especially bandwidth reduction are three main interested topics for R18 RedCap.

Thus, the following four survey forms is to collection further comments/views from companies.

Q1: Clarifications to answers by moderator and further clarifications on RWS-210057

Q2: What's the target or potential use cases for R18 RedCap (w/ and w/o KPIs)?

Q3: What's the potential areas for cost/complexity reduction?

Q4: What's your view on bandwidth reduction? A: 10M; B: 5M; C: Other smaller values; D: No Reduction.

Feedback Form 3: Table 2.2.3.1 [RedCap][Second round] Questions/comments/views for Q1: Clarifications to answers by moderator and further clarifications on RWS-210057

1 – vivo Communication Technology

What is your view on the following additional areas for Rel-18 eRedcap

1) power saving: serving cell RRM relaxation

2) coverage recovery

2 – China Telecommunications

[China Telecom] Thanks for the moderator's clarification. We generally support moderator's views on Rel-18 RedCap and are looking forward to further discussion in details.

3 – Ericsson LM

In our cost analysis for further reduced UE bandwidth from 20 MHz to 5 MHz (RWS-210313), we followed the established cost evaluation methodology (TR 38.875), and according to our result there was a very small further cost reduction: <10% if the baseline is Rel-17 RedCap (equivalent to <4% if the baseline is the Rel-15 NR reference UE). This result is in line with CATT (RWS-210409) and several companies have agreed with this result in their replies in NWM (DoCoMo, Intel, Lenovo, Sharp). Do you get different results using the same methodology?

4 – Apple Poland Sp. z.o.o.

<Apple> Thanks for the detailed answers for the 1st round. We have one more question on other aspect:

-

One of interesting topics for Real-18 Redcap enhancement is to study the low-power wake up radio to improve the power efficiency of RedCap UEs .e.g. low-mobility sensor or fixed video surveillance. What's your views on it including feasibility? What's your view on target use case? to all UEs or Redcap UE?

5 – ZTE Corporation

Thanks for the proposals and discussions in the 1st round.

For UL enhancements, since Redcap WI is for complexity reduction, we are confusing for the target of UL data rate improvement. If UL enhancement for RedCap is UL data rate improvement, we think eMBB related Uplink enhancement items can cover this objective.

6 – Samsung Electronics Polska

Q1: comparing with 20MHz and 5Mhz RF BW, how much power saving do you expect? In SI phase, there is on clear conclusion on the impact of BW reduction and power consumption.

Feedback Form 4: Table 2.2.3.2 [RedCap][Second round] Questions/comments/views for Q2: What's the target or potential use cases for R18 RedCap (w/ and w/o KPIs)?

1 – vivo Communication Technology

In general we think the same set of use cases as in Rel-17 are to be considered in Rel-18 eRedCap, i.e. industrial sensors, wearables, video surveillance

2 – China Telecommunications

[China Telecom] We think it maybe too early to discuss the target w/ or w/o KPIs. The use cases in Rel-17 can also be considered in Rel-18 for further enhancement. Any new use cases are welcome to enlarge RedCap market.

3 – CEPRI

As an electrical power company, we cosign contribution RWS-210057. In R18, there is an SI "Study on 5G Smart Energy and Infrastructure" in SA1. And the related TR 22. 867 has defined a lots of important use cases for smart grid, such as advanced metering, line current differential protection, etc. We prefer R18 RedCap can take the use cases in 22.867 into consideration, especially from RAN side. Thanks.

4 – Spreadtrum Communications

R17 use cases (with in mind that R17 RedCap is overdesigned for some use cases)

New use cases:

1) Industrial controller: very small date transmission (Message size 1k byte), very low latency (<10ms), high availability (99.999 9% to 99.999 999%) , UE speed (stationary); could be potentially high value industrial services.

2) Smart grid with diverse services and KPIs (TR 22.867, SP-200574):

- Control services such as remote control and differential protection with multiple KPIs, e.g. 2Mbps throughput, latency<10ms, clock sync<10us, latency jitter<50us/40km, reliability (>99.999%), connection density is times of 10/km2, and high isolation and security requirement.
- Data collection services such as advanced metering: user experienced data rate (UL<2M; DL<1M), latency<3s, reliability>99.99%, connection density (<50000-100000/km2).
- …...

3) etc.

5 – Ericsson LM

Our understanding is that this discussion should concern questions to Spreadtrum, not questions from Spreadtrum.

6 – Spreadtrum Communications

Note from moderator: This survey form (**also to Q3/Q4 survey form**) is to collect further comments/views from companies based on the first round discussion, as mentioned in the 2nd round openings. Companies feel free to give views or not. Thanks.

Feedback Form 5: Table 2.2.3.3 [RedCap][Second round] Questions/comments/views for Q3: What's the potential areas for cost/complexity reduction?

1 – vivo Communication Technology

We consider the following cost reduction features, woudl be good to know the views from spreadtrum?

1) reduced peak data rate (by RF BD reduction, or TBS/RB restriction)
2) lower UE power class
3) reduced number of HARQ processes
4) relaxed UE processing time for data/CSI

2 – China Telecommunications

[China Telecom] We think the potential areas for cost/complexity reduction mentioned by vivo can be further studied.

3 – Spreadtrum Communications

We prefer to consider the following features:

- BW reduction
- UE processing time relaxation
- TBS restriction
- Lower RedCap power class
- Potential leftovers from R17 RedCap SID/WID

4 – Ericsson LM

Our understanding is that this discussion should concern questions to Spreadtrum, not questions from Spreadtrum.

Feedback Form 6: Table 2.2.3.4 [RedCap][Second round] Questions/comments/views for Q4: What's your view on bandwidth reduction? A: 10M; B: 5M; C: Other smaller values; D: No Reduction.

1 – vivo Communication Technology We think A, B, or D (meaning no RF BW reduction but baseband TBS/RB restrictions) can be further studied and compared.
2 – China Telecommunications [China Telecom] No matter larger or smaller maximum BW, the key point is to find the matched use cases and expand the market. More discussions are needed for BW reduction. Hence, we are open to A, B, C, D.
3 – Spreadtrum Communications B (high priority); Open to A and C.
4 – Ericsson LM Our understanding is that this discussion should concern questions to Spreadtrum, not questions from Spreadtrum.

2.2.4 <2nd Round> Answers by moderator

Many thanks to **vivo, Ericsson, Apple, ZTE and Samsung** for your further questions in the 2nd round, and also appreciate **China telecom** and **CEPRI** for your general comments on Rel.18 RedCap. The answers from moderator are listed below:

Table 1: <2nd Round> Answers by moderator

Questions from companies	**Answers by moderator**
vivo: What is your view on the following additional areas for Rel-18 eRedcap: 1) power saving: serving cell RRM relaxation. 2) coverage recovery	For the questions from **vivo**, we think at least for those stationary use cases (e.g. sensors), RRM relaxation for serving cell is reasonable and considerable. Regarding the coverage recovery, we do not have very strong view on this part. For UL, we share the same view with **China Telecom** in the 1st round that it can be specified in another WI. Basically, we are open to discuss it if found necessity.

Ericsson: In our cost analysis for further reduced UE bandwidth from 20 MHz to 5 MHz (RWS-210313), we followed the established cost evaluation methodology (TR 38.875), and according to our result there was a very small further cost reduction: <10% if the baseline is Rel-17 RedCap (equivalent to <4% if the baseline is the Rel-15 NR reference UE). This result is in line with CATT (RWS-210409) and several companies have agreed with this result in their replies in NWM (DoCoMo, Intel, Lenovo, Sharp). Do you get different results using the same methodology?	For the questions from **Ericsson,** we also analyzed the cost reduction for further reduced BW from 20 MHz to 5 MHz based on the established cost evaluation methodology (TR 38.875), the result is around 13% (for TDD) if the baseline is Rel-17 RedCap, CATT's result is also higher than 10% (i.e. 11.26% for TDD). It is worth noticing that the mid/low-tier IOT scenarios are very sensitive to the cost, a cost reduction of more than 10% is very attractive and meaningful. Besides, as we mentioned in the 1st round, the cost/complexity reduction for Rel.18 RedCap should consider the whole picture of the chipset and terminals, not merely on RF and BB. It is observed that the evaluation methodology in Rel.17 is only related to RF and BB, which is not enough for Rel.18 RedCap cost/complexity evaluation.
Apple: Thanks for the detailed answers for the 1st round. We have one more question on other aspect: One of interesting topics for Real-18 Redcap enhancement is to study the low-power wake up radio to improve the power efficiency of RedCap UEs .e.g. low-mobility sensor or fixed video surveillance. What's your views on it including feasibility? What's your view on target use case? to all UEs or Redcap UE?	For the questions from **Apple,** we think low-power wake up radio is deserved to be studied since there are already some reality use cases in the vertical market, and for the target use cases, we think it can be used for the stationary use cases without a power supply, such as sensors and some other industrial scenarios. Further, we also think it can be utilized for various UE types and scenarios (not limited to the RedCap).
ZTE: Thanks for the proposals and discussions in the 1st round. For UL enhancements, since Redcap WI is for complexity reduction, we are confusing for the target of UL data rate improvement. If UL enhancement for RedCap is UL data rate improvement, we think eMBB related Uplink enhancement items can cover this objective.	For the questions from **ZTE,** generally, we think UL data rate improvement is the cross-Function for both eMBB and Non-eMBB, we are open to discuss which Rel.18 item it belongs to. In addition, we think UL data rate improvement should be considered especially for TDD and HD-FDD, since the UL data rate is limited for these two modes.
Samsung: comparing with 20MHz and 5Mhz RF BW, how much power saving do you expect? In SI phase, there is on clear conclusion on the impact of BW reduction and power consumption.	For the questions from **Samsung,** it is true that there is no clear conclusion on the impact of BW reduction and power consumption. However, according to the power saving evaluation methodology in TR 38.840 (e.g. scaling of X MHz = 0.4 + 0.6 * (X - 20)/80), if the UE is operating in 5MHz BW, the power consumption can be reduced 28% compared to that of 20MHz operating bandwidth.

For the survey forms, as only three/four companies give their views, we think it is not necessary to summarize at this stage. Finally, we would like to highlight that **CEPRI**, an electrical power company from China, expressed their eager requirements on smart grid use cases for Rel.18 RedCap.

2.3 XR

2.3.1 <1st Round> Comments/Questions

In the contribution **RWS-210058**, we give the following objectives for Rel-18 XR:

- Study and evaluate XR enhancement

o ***Application based data transmission [RAN2/3].***

- Generation of application related assistance information.

- Deliver the application related assistance information to gNB.

- Apply the application related assistance information in scheduling.

- Additional procedure in User plane and Control plane.

- AI to assistant scheduling in gNB.

o ***Enhancements on the smoothing XR traffic [RAN2/3]***

- Adjust the XR burst of multiple users in order to smooth the traffic for Uuinterface.

- Measure and report the QoSof application based data transmission, including the measurement of: [RAN1/2]

o ***Multiple packets based delay, e.g. MPDB.***

o ***Multiple packets based jitter.***

o ***Multiple packets based error rate, e.g. MPER.***

Regarding the above objectives for R18 XR and RWS-210058, the Table 2.3.1.1 is to collect questions/comments from companies.

Feedback Form 7: Table 2.3.1.1 [XR] Questions/comments

1 – CATT Thanks for sharing the idea of NR enhancement for XR. The proposed area of enhancement in data transmission with XR application awareness and its associated measurement and reports for optimization resources are quite interesting. However, we believe the aspects of NR enhancements should be discussed and concluded in the working groups first during the XR study before further discussion of the scope of XR work item.
2 – Classon Consulting FUTUREWEI also thinks enhancements are needed in Rel-18 for application-oriented QoS control to support low/bounded latency high throughput transmission of XR data bursts. Please see RWS-210040 page 8 and NWM https://nwm-trial.etsi.org/#/documents/4751 .

3 – HuaWei Technologies Co.

Q1: We share the similar view that application related assistance information may be helpful for RAN scheduling. In terms of application related assistance information, do you think procedure wise CN needs to be invovled, and SA2/SA4 should be invovled to determine which information is helpful as in our understanding this is rather an E2E mechanism?

Q2: Regarding to additional QoS from application layer, do you think there can be multiple data streams with different QoS requirements and there is a need to have associatation with these streams? And we also understans this aspect requires SA2 involvement as QoS management is E2E.

Q3: For ”measure and report the QoS of application based data transmission” , do you understrand ”multiple packets” are multiple correlated packets for one XR video frame? We also think that the that measure and report the frame level QoS may be helpful for XR services.

4 – DOCOMO Communications Lab.

Thanks for sharing the ideas on enhancements for XR. Regarding ”measure and report the QoS of application based data transmission,” we would like to understand more your ideas and motivations. For example, it seems MPDB is the delay budget for the multiple packets, which constitutes one video frame. Is it correct understanding? If so, what spec impact or new feature is expected at RAN1/2 level? Besides, it would be appreciated that if you could share the motivation or expected benefits of the proposal for our better understanding.

5 – Guangdong OPPO Mobile Telecom.

Q1: How does AI assistant scheduling in gNB? Is there AI information exchange? Q2: Is MPDB, MPER or Jitter measured and specified in RAN1 or RAN2?

6 – Guangdong OPPO Mobile Telecom.

Q1: How does AI assistant scheduling in gNB? Is there AI information exchange?

Q2: Is MPDB, MPER or Jitter measured and specified in RAN1 or RAN2?

7 – Intel Corporation (UK) Ltd

Thank you for the contribution.

1. For ”Smoothing XR traffic (in Uu) by adjusting XR traffic of multiple users ”, could you please clarify what ”smoothing” refers to to better understand the proposed enhancement?

8 – ZTE Corporation

1)It seems that ‘smooth the traffic data’ is a method of scheduling. Does ’smooth the traffic data’ have impact on the latency or capacity?

2)How to synchronize the packets in multiple streams, would this have an impact on latency of some stream?

9 – LG Electronics Inc.

Thanks for the contribution.

Q1) You have proposed to study and evaluate the application based data transmission as an XR enhancement with RAN2 and RAN3 involvement. From RAN perspective, for the application related assistance

information in your proposal, information on the traffic characteristics may be considered as the application related assistance information. In addition to that, is there any other aspects that you think are useful?

2.3.2 <1st Round> Answers by moderator

Many thanks to **CATT/FUTUREWEI/Huawei/DOCOMO/OPPO/Intel/ZTE/LG** for your valuable questions and comments on R18 XR topic.

Overall, there are five main question areas asked by companies focused on application based transmission related issue, the application based transmission measure and report related issue, AI assistant scheduling, the smoothing traffic data, and the synchronize packets in multiple streams. The answers by moderator are listed below:

- For the application based transmission related issue asked by **CATT, Huawei and LG**, we consider this assistance information shall be divided into 2 types:

> Type 1: assistance information generated by the CN node, and be transmitted to gNB, so SA2 shall be involved. From CN node point of view, some SA4 information may be helpful in this generation procedure, for example, H.265/266.

> Type 2: assistance information generated by application server. For this type 2, application server shall be involved in this procedure.

- For the application based transmission measure and report related issue asked by **CATT, Huawei, OPPO and DOCOMO**, we consider it is the frame level QoS measurement and report. For this frame based MPDB, UE shall acquire the information at least which packet is the first one in the frame, and which packet is the last one in this frame. All these extra information shall be indicated to the AS layer of UE, which leads modification to RAN1/2. If application assistance information is applied by gNB for scheduling, the frame based information is visible for AS layer, so it is reasonable to report the MPDB/MPER or jitter measurement via the AS layer of UE. Otherwise, MPDB/MPER or jitter measurement shall be reported by the upper layer.

- For the AI assistant scheduling asked by **OPPO**, we considers the AI information is generated by gNB itself, so the exchange is not needed. For example, AI in gNB recognize the first packet and the last packet in frame, and determines the proper scheduling scheme. Another example is that AI in gNB determines the importance of one packet, and transmit the important packet with higher priority.

- For the smoothing traffic data asked by **Intel and ZTE**, we considers the smoothing means to avoid the collision of two burst data from multiple users. If this collision is predicted by RAN, gNB shall indicate this collision to application server, and request the application server to adjust the traffic pattern of one user, for example, the burst of this user is postponed 8ms. Because the XR traffic is periodic, all the following burst of this user shall be postponed, and the collision is avoided. This postpone is processed by application server, it is no impact on latency.

- For the synchronize packets in multiple streams asked by **ZTE**, some impact on latency shall be introduced for some streams, but within the scope of PDB.

- For the application-oriented QoS control issue asked by **FUTUREWEI**, we consider the object of solution in *RWS-210040* page 8 is guaranteeing the QoS of a flow via multiple DRBs, and this is not related to application-oriented QoS control.

2.3.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.3.2 and further clarifications on **RWS-210058** together. Please share your further questions/comments/views in the following form.

Feedback Form 8: Table 2.3.3.1 [XR][Second round] Questions/comments/views

1 – Fujitsu Limited Thank you for the contributions. We have interested in the smoothing traffic data burst. I somewhat got the point according to the response above based on which I have further questions. Could you more elaborate on the RAN2/3 impact about standardization? In addition, it you consider some indication to application layer, do you see any SA group related impact?
2 – HuaWei Technologies Co. We also see some value on the frame level QoS measurement and report, can you please clarify the relationship between the jitter measurement and this frame based MPDB?

2.3.4 <2nd Round> Answers by moderator

Many thanks to **Fujitsu/Huawei** for your further valuable questions and comments on R18 XR topic.

For the smoothing traffic data burst issue asked by **Fujitsu**, the smoothing is triggered by 5G GAN. There are two basic ways for indicating this smoothing request to application server. The first way is indicating from 5G RAN to application server directly, in which some impact to SA is necessary. The second way is indicating this request via 5G RAN -> UE AS layer –> UE application layer -> application server, in which no impact to SA.

For the relationship between the jitter measurement and this frame based MPDB issue asked by **Huawei**, we consider both the jitter and the MPDB are based on frame, in which multiple packets are included. If the jitter happens, 5G RAN could adjust the MPDB of this frame and enhance the scheduling of this frame.

2.4 Sidelink relay

2.4.1 <1st Round> Comments/Questions

In the contribution **RWS-210059**, we share some considerations on Rel-18 SDL Relay with the following proposals:

Proposa 1: Support of U2U relaying.

- Specify Relay discovery/Relay (re)selection/CP and UP procedure for both statefuland stateless U2U relay.

Proposa 2: Support of relay served by ng-eNB.

Proposa 3: Support of multiple hops (U2N and U2U).

Proposa 4: Support of multiple paths (U2N and U2U).

Proposa 5: Support of MBS service relaying (U2N).

Proposa 6: The following mobility enhancements (U2N) can be considered:

- Support of group-mobility.

- Support of inter-gNBmobility.

- Support of indirect/indirect path switching.

- Support of DAPS and CHO.

Regarding the above proposals for R18 SDL Relay and RWS-210059, the Table 2.4.1.1 is to collect questions/comments from companies.

Feedback Form 9: Table 2.4.1.1 [SDL Relay] Questions/comments

1 – CATT [CATT] Thanks for the contribution. We generally agree that relay work should continue in Rel-18, as stated in our paper RWS-210407. Then we have a few questions for clarification. 1) what is the main benefit/motivation for the stateful/stateless concept, and do they base on unified or different protocal framework? 2) for P2 it says 'ng-eNB', is that for SA or EN-DC? Then one comment on P6 is that all these scenarios might not be equally urgent. Maybe some more discussions are needed here.
2 – HuaWei Technologies Co. 1. We have similiar understanding on having multi-path support, and in our understanding for UL this mainly requires the gNB to aggregate the data from multi-path (including direct and indirect path), is it consistent with your proposal? 2. In Rel-17 we have not yet supported U2U and we think it may be possible to have a fundamental U2U function for Rel-18, and do you think we can start from single hop on U2U?
3 – Sony Europe B.V. We generally agree that SL work should continue in Rel-18. One question for clarification on mobility enhancement and support of DAPS, is DAPS proposed only for handover, or can be extended to other cases other than handover e.g. load balancing etc.?

2.4.2 <1st Round> Answers by moderator

Thanks to **CATT/Huawei/Sony** for your valuable questions and comments on R18 sidelink relay topic. The answers from moderator are listed below:

For the questions from **CATT**:

1. Regarding the stateful/stateless concept, our intention is to not only support transmission with static or semi-static relay relationship but also the transmission with changed source UE/target UE, e.g. groupcast transmission to surrounding target UEs based on location/distance. Naturally and for simplicity, we would like to strive for unified protocol design for both relay types.

2. For the ng-eNB case, it is for SA for now.

For the questions from **Huawei**:

1. Yes, your understanding is consistent with our proposal.

2. On this point, we are open to narrow down the scope of Rel-18 sidelink relay. But as mentioned by CATT, this may need further discussion, considering the priority and urgency of each topic.

For the question from **Sony**:

1. Our original motivation is to reduce/minimize interruption during HO. Although two active link exist during DAPS procedure, but they are created temporarily. For load-balancing, multi-path or DC might be better choices.

2.4.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.4.2 and further clarifications on **RWS-210059** together. Please share your further questions/comments/views in the following form.

Feedback Form 10: Table 2.4.3.1 [SDL Relay][Second round] Questions/comments/views

2.4.4 <2nd Round> Answers by moderator

No further comments from companies in the 2nd round.

2.5 Personal IoT network

2.5.1 <1st Round> Comments/Questions

In the contribution **RWS-210060**, we give the following objectives for Rel-18 Personal IoT network.

Specify device discovery procedure. [RAN2]

Specify negotiation procedure between the devices for service sharing. [RAN2]

Study CP procedure for service sharing [RAN2,RAN3]

- Specify the paging, UAC and RRC setup procedure, including some potential enhancements considering the assistance information acquired in discovery or negotiation procedures.

Specify service release procedure for source device.

Study UP procedure for service sharing [RAN2, RAN3]

- Lossless switching mechanism for service switching among multiple devices.

- NGU UP tunnel sharing for multiple UEs locate in a same gNB.

Regarding the above objectives for R18 Personal IoT network and RWS-210060, the Table 2.5.1.1 is to collect questions/comments from companies.

Feedback Form 11: Table 2.5.1.1 [Personal IoT network] Questions/comments

1 – Beijing Xiaomi Mobile Software Thanks for the contribution. We are interested in this use case of negotiation/coordination procedures between multiple UE devices. Some questions to ask: 1) The slices talked about 2 cases: The User can switch the PIN Element to display the media without interruption and the media may be shared by different PIN Elements simultaneously. For the whole part, it seems this contribution talks more about the switching case. I want to ask, is that mean the second case can be done by the current spec? Is there some RAN impact□ 2□The slices said□"The target PIN device (watch) needs to be discovered by the old device (phone)."We want to ask is it possible that gNB choose the target PIN device?
2 – Qualcomm Technologies Int 1. Are the PIN elements assumed to have a direct connection to gNB always or can they be connected via PIN GW? 2. What type of local link (PC5 or WiFi or BT) is considered between the PIN elements?
3 – vivo Mobile Communication Co. Thanks for your contribution. We are quite interesting about this use case. It is similar with our case1.1 and case1.2 in our Tdoc RWS-210172(PIOT). How to connect two UEs in your mind?

2.5.2 <1st Round> Answers by moderator

Thanks to **Xiaomi** for your valuable questions and comments on R18 personal IoT network topic. The answers from moderator are listed below:

- For Q1, almost all of the objectives are applicable for the two cases except the loss switching issue. E.g. the

discovery and negotiation are needed for the two cases.

- For Q2, we think it is possible for RAN to perform this discovery procedure, however, the extra latency will be introduced. And for the idle UE, the paging from CN is needed. So we think the discovery via the device is direct way.To be added

2.5.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.5.2 and further clarifications on **RWS-210060** together. Please share your further questions/comments/views in the following form.

Feedback Form 12: Table 2.5.3.1 [Personal IoT network][Second round] Questions/comments/views

1 – Beijing Xiaomi Mobile Software
Thanks for the response! One question: For the UE discovery procedure, you want to use side link discovery or WIFI/BT discovery?

2.5.4 <2nd Round> Answers by moderator

Many thanks to Xiaomi/ Qualcomm/vivo for your valuable questions and comments. Sorry for omitting questions from Qualcomm and vivo in 1st round, something wrong happened. The answers from moderator are listed below:

For **Qualcomm**'s question 1, the PIN elements can have a direct connection to gNB and they can be connected via PIN GW also. In our view, we should study the direct connection case first.

For **Qualcomm**'s question 2 and **vivo**'s question, we are open to the type of local link, and we think it depends on the device type (e.g. its communication capability). For 3GPP, we should focus on the PC5.

For **Xiaomi**'s question, we are open to the interface type for discovery. From 3GPP point of view, we think the sidelink discovery procedure can be as baseline.

2.6 Tactile and multi-modality

2.6.1 <1st Round> Comments/Questions

In the contribution **RWS-210061**, we give the following objectives for Rel-18 Tactile and multi-modality study item.

Study synchronous transmission mechanism [RAN2,RAN3]

- Identify QoSflows belong to one multi-modality service.

- Identify synchronous packets of same block in multi-modality service.

- Specify synchronous transmission mechanism formulti-modality service.

Differential handling for service flows in multi-modality service, e.g. in limit resource scenario. [RAN2,RAN3]

- Identify important packets/QoSflows.

- Differential handling for QoSflows/packets with different importance levels.

Study mobility enhancement for multi-modality service. [RAN2,RAN3]

- Specify multi-modality communication service level mobility where the QoSflows of one multi-modality service are switched to target cell together.

Regarding the above objectives for R18 Tactile and multi-modality and RWS-210061, the Table 2.6.1.1 is to collect questions/comments from companies.

Feedback Form 13: Table 2.6.1.1 [Tactile and multi-modality] Questions/comments

1 – Beijing Xiaomi Mobile Software Thanks for the contribution. We are interested in this use case of negotiation/coordination procedures between multiple UE devices. For the objectives: O1: Study synchronous transmission mechanism [RAN2,RAN3] We agree. That is very important. O2: Differential handling for service flows in multi modality service, e.g. in limit resource scenario [RAN2,RAN3] We agree we need to do some special handling. But we are not sure whether we need to do it at granularity of packet. Maybe at QoS flow level is enough. O3: We agree.
2 – HuaWei Technologies Co. Q1: We share the similar view that it is necessary to identify QoS flows and the importance of packets/QoS flows, since do you think this can be discussed within XR jointly?

2.6.2 <1st Round> Answers by moderator

Thanks to **Xiaomi** and **Huawei** for your valuable questions and comments on R18 tactile and multi-modality topic. The answers from moderator are listed below:

- For **Xiaomi**'s question 2, our answer is yes, we think the Qos flow level is baseline, the packet level may be an enhancement if necessary. E.g. the different type frames within one QoS flow may have different important levels.

- For **Huawei**'s question 1, our answer is yes, we think that there are similar issues need to be considered in both XR and multi-modality topics together. It can be discussed jointly and it should depend on the final scope

of SI. Furthermore, we think the multiple UEs scenario in multi-modality also needs to be considered compared with XR.

2.6.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.6.2 and further clarifications on **RWS-210061** together. Please share your further questions/comments/views in the following form.

Feedback Form 14: Table 2.6.3.1 [Tactile and multi-modality][Second round] Questions/comments/views

1 – Beijing Xiaomi Mobile Software Thanks for the response! We share the same view that multiple UEs scenario in multi-modality should be discussed separately from XR. XR is mainly focus on audio-video synchronization within on UE.
2 – Fujitsu Limited Thank you for the contribution. We are interested in synchronous transmission and similar topic is proposed in RWS-210288. One comment from our side is that RAN needs to be informed by NAS that which QoS flows belongs to multi-modality service. Do you see any other useful information to be informed to RAN from NAS?

2.6.4 <2nd Round> Answers by moderator

Many thanks to **Xiaomi/ Fujitsu** for your valuable questions and comments. The answers from moderator are listed below:

For **Xiaomi**'s views, we agree.

For **Fujitsu**'s question, we think all possible solutions need to be studied for the synchronous transmission. We agree that the information which QoS flows belongs to one multi-modality service is needed in RAN. The other useful information from NAS may depend on the candidate solutions, e.g. new QoS parameters.

2.7 NTN/NTN-IoT

2.7.1 <1st Round> Comments/Questions

In the contribution **RWS-210062**, we share some considerations on Rel-18 NTN/NTN-IoT with the following proposals.

Proposals for R18 NR NTN

- Proposal 1: The scenario where the smartphone is connected via satellite needs to be supported in R18 NR NTN.

- Proposal 2: Enhancement on GNSS-equipped UEs cannot perform timing and frequency pre-compensation for uplink synchronization should be considered in R18 NR NTN.

- Proposal 3: Regenerative payload needs to be supported in R18 NR NTN.

Proposals for R18 IOT NTN

- Proposal 4: Multiple satellite beams in one IOT NTN cell should be supported in R18.

- Proposal 5: Potential enhancement to enable the beam management for IOT NTN should be considered in R18.

Regarding the above proposals for R18 NTN/NTN-IoT and RWS-210062, the Table 2.7.1.1 is to collect questions/comments from companies.

Feedback Form 15: Table 2.7.1.1 [NTN/NTN-IoT] Questions/-comments

1 – Asia Pacific Telecom co. Ltd We share the same view on support of Regenerative payload. we wonder what is the spec impact considering Transparent payload is well supported.
2 – Lenovo (Beijing) Ltd We share similar view on coverage enhancement for smart phone. Regarding power saving for smart phone in NTN, there is already power saving defined for NR UE in R16 and R17, do you expect that there are some specific mechanisms only applicable for NTN UE?
3 – CATT We also support Regenerative Architecture and Positioning enhancement. It's not hurry to discuss the Rel-18 scope for IoT NTN, let's focus on Rel-17 WID first.
4 – Sony Corporation Thanks for the contribution. We have two questions.
- Does proposal 2 also include non-GNSS capability UEs?
- What other spec impact apart from delay difference is there in supporting regenerative payload?

2.7.2 <1st Round> Answers by moderator

Many thanks to **Asia Pacific Telecom/CATT/Lenovo/Sony** for your valuable questions and comments on R18 NTN/NTN-IoT enhancement in 1st round. The answers from moderator are listed below:

For the questions from **Asia Pacific Telecom:**

- For regenerative payload, our view is that the spec impact is mainly in the network architecture aspects. Enhancements on timing relationship and uplink time/frequency synchronization in R17 NR NTN for transparent payload can be reused with minor modification.

For the questions from **CATT:**

- Thank you for your nice comments. We agree that we should focus on the scope of Rel-17 IOT NTN WI firstly. To alleviate the frequent cell handover problem, our view is that multiple satellite beams in one IOT NTN cell should be supported.

For the questions from **Lenovo:**

- The battery capacity of smart phone is much less than handheld terminal assumed in R17 NTN. For smart phone in NTN, some potential solutions to improve the coverage performance, such as repetition/aggregated transmission and high power UE, will be considered. These solutions will bring additional power consumption to UE. In order to maintain the battery life of smart phone as much as possible, the following aspects can be considered for NTN UE.

> Mobility enhancements between NTN and TN in connection mode

> Enhancements on cell selection/reselection in idle/inactive mode

> Beam management enhancement, e.g., predictable beam switching

For the questions from **Sony:**

- For the first question, yes, non-GNSS capability UEs is also within our consideration. For the second question, our view is that the spec impact of supporting regenerative payload is mainly in the network architecture aspects.To be added

2.7.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.7.2 and further clarifications on **RWS-210062** together. Please share your further questions/comments/views in the following form.

Feedback Form 16: Table 2.7.3.1 [NTN/NTN-IoT][Second round] Questions/comments/views

1 – NOVAMINT We are very supportive of your proposal 3 'regenerative payload" as we believe it will help to deploy even more cost effective solutions and to democratize 3GPP "IoT NTN" while allowing supporting better KPIs and critical/near real time use cases. On UE without GNSS we believe it is important as well to consider this in release 18 and to detail the changes foreseen in this context compared to Release 17.

2.7.4 <2nd Round> Answers by moderator

For the second round question/comment collection, only **NOVAMINT** expressed their views on regenerative payload and UE without GNSS, thanks for the views.

For regenerative payload, we share the same view with **NOVAMINT** and thank NOVAMINT for the support. For UE without GNSS, we also think it is an important scenario that R18 needs to consider in NR NTN and IOT NTN, since it can expand the application scenarios of NTN.

3 Summary

Based on the collected comments/views/questions from all companies in the last two rounds Q&A, we have the following summarized observations for each topic.

RedCap:

- Many companies are interested in the use cases for RedCap, either the Rel.17 use cases and/or new use cases (e.g. industrial controller, smart grid, etc.).

- Many companies are care about the further BW reduction (i.e. 5MHz, 10MHz, other values or no reduction), together with the cost reduction and SSB for initial access.

- Different companies propose different enhancement or views in cross areas for RedCap, including positioning, power efficiency, UL enhancements, security, unlicensed band and so on.

- Some companies consider other cost/complexity reduction features, such as processing time relaxation, TBS restriction, reduced number of HARQ processes and so on.

XR:

- Many companies are interested in the application based transmission, together with the measurement and report related issues (especially for the jitter and MPDB) and application-oriented QoS control issue.

- Some companies are care about the smoothing traffic data burst, AI assistant scheduling and synchronize packets of multiple streams.

Sidelink relay:

- Company's interests on sidelink relay are quite diverse, and the following topics had been interactively Q&Aed on NWM: U2U relay, stateful/stateless concept, relay served by ng-eNB, multi-path data aggregation by gNB and DAPS for load balancing.

Personal IoT network:

- Most companies care about the type of local link (PC5 or WiFi or BT) between the PIN elements and the discovery procedure.

Tactile and multi-modality:

- Most companies are interested in synchronous transmission and differential handling within one service.

NTN:

- Most companies think that R18 needs to support regenerative payload, and some companies are consider the issue of coverage enhancement of smart phone and UE without GNSS

- One company thinks that it is not hurry to discuss the Rel-18 scope for IoT NTN.

4 Reference

RWS-210002 Some details for RAN Rel-18 Workshop□RAN Chair

RWS-210057 RedCap enhancements for R18□Spreadtrum Communications, CAICT, CEPRI, China Unicom, Fibrlink Communications

RWS-210058 R18 XR considerations□Spreadtrum Communications

RWS-210059 Sidelink relay enhancement for R18□Spreadtrum Communications

RWS-210060 R18 Personal IoT network considerations□Spreadtrum Communications

RWS-210061 R18 Tactile and multi-modality considerations□Spreadtrum Communications

RWS-210062 NTN/NTN-IoT enhancements for R18□Spreadtrum Communications