Email discussion summary for [RAN-R18-WS-non-eMBB-Rakuten] - Version 0.0.4
RAN

3GPP TSG RAN Rel-18 workshop RWS-210591

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.2

Source: Rakuten

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

1 Introduction

This email discussion summary covers the Q&A of the following Rakuten documents:

RWS-210198 AI in NG-RAN

RWS-210200 NTN Enhancements

RWS-210247 Reconfigurable Intelligent Surfaces

RWS-210248 IAB & Smart Repeaters Enhancements

2 AI in NG-RAN (RWS-210198)

2.1 New study Item to cover NR Air Inteface

A new study item is required in RAN1/RAN2 (potentially RAN3) over the entire duration of Rel-18 to evaluate possible benefits and feasibility of applying AI to Physical Layer (5G NR air interface).

Feedback Form 1: Comments on Proposal 2.1

2.2 AI Categorization

During the study, categorize Physical Layer AI into “Independent AI” and “Joint/Co-ordinated AI”

3GPP to mostly focus on Joint/Co-ordinated AI as it needs UE and gNB co-ordination.

3GPP to standardize aspects like AI capability Exchange, Model acquisition, Configuration method.

Feedback Form 2: Comments on Proposal 2.2

1 – Sony Corporation

Thanks for the contribution. We have a question.

- For proposal 2: "3GPP to mostly focus on Joint/Co-ordinated AI as it needs UE and gNB co ordination."
  - This comment intention is that the Joint/Co-ordinated AI should be prioritized?

2.3 AI Study Item Objectives

Study the AI Solution Category such as "Independent AI" and "Joint/Co-ordinated AI".

Study the model training & data sets, device capability, interoperability, AI Models performance evaluation method.

Study potential solutions which includes at least MIMO CSI Feedback, RS Overhead reduction, Mobility Management, Beam Management, Positioning enhancements, Receiver enhancements & MIMO beamforming.

Feedback Form 3: Comments on Proposal 2.3

1 – MediaTek Inc.

Thanks for the contribution. Some questions for clarification:

1) Mobility management involves not only physical layer, do you consider AI operations in other layers?

2) What are the prioritized use cases to be studed?

3) Does Rakuten think it is useful to establish the "test data set" (repository)?

References

[1] RP-210256 Motivation of study on radio enhancement based on AI OPPO

[2] RP-210293 Initial Views on Release 18 NR Samsung

[3] RP-210321 Study on AI based PHY layer enhancement in Rel-18vivo

[4] RP-210393 New SID on evaluation methodology for AI enabled RAN CMCC

[5] RP-210614 Support of Artificial Intelligence Applications for 5G Advanced ZTE, Sanechips

[6] RP-210672 On the Scope of Rel-18 PHY Layer Enhancements using AI-based Solutions InterDigital, Inc.

2.4 Summary

3 NTN Enhancements (RWS-210200)

We propose to work on the following NTN enhancements in Rel18.

3.1 Direct Access to smart Phone

Initiate RAN1 Study Item to improve the link budget to provide direct access from/to smartphone. 3GPP should ensure specification requirements to support NTN direct access to smartphone.

Feedback Form 4: Comments on 3.1

1 – Asia Pacific Telecom co. Ltd Share the same view. We wonder whether coverage enhancement or higher power UEs shall be supported in Rel-18.
2 – ESA We support that. It has been also proposed by QCOM (RWS-210011).
3 – Sony Corporation Thanks for the contribution. We have a question. - Following a R18 SI, do you expect there to be a follow-up work item? How about having a work item with an additional study phase on link budgets for the coverage objective?
4 – THALES Indeed we should take advantage of Rel-18 to work on features to improve performance for satellite access providing direct connectivity to smartphones

3.2 Co-Channel Interference Mitigation

Initiate RAN1 Study Item to investigate co-channel interference suppression and avoidance techniques between NTN and NTN, and between NTN and TN.

Feedback Form 5: Comments on 3.2

1 – Asia Pacific Telecom co. Ltd This may need some progress on RAN4 whether frequency bands are shared between TN and NTN. For Rel-17 NTN, the use of frequency shall be different per cell or per satellite beam. We are not sure about co-channel interference between NTN.
2 – Intelsat

We are not sure an NTN to NTN study is needed.

3 – HUAWEI TECHNOLOGIES Co. Ltd.

Q1: Regarding the statement ”Operators may provide NTN based NR services using the same spectrum as the one already allocated to terrestrial network.”, can you clarify a bit about exact spectrum you have in mind? How is the regulatory status? or for NTN, are you refer to satellite communicatoin or HAPS?

4 – Sony Corporation

Thanks for the contribution. We have a question.

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Could you clarify which regulations are applicable to spectrum sharing between NTN and TN?

5 – DOCOMO Communications Lab.

Regarding cochannel coex between NTN and TN, do you intend between HAPS and TN? Or LEO/GEO?

6 – Nokia France

In which regions does Rakuten see regulatory support for use of terrestrial spectrum for NTN such that co-channel interference avoidance would be relevant?

3.3 Support UE’s without GNSS Capability

Support UEs without GNSS capability

Feedback Form 6: Comments on 3.3

1 – Asia Pacific Telecom co. Ltd

We share the same view. However, we wonder whether NTN-based positioning shall be supported as an alternative of proving UE location to NW.

2 – THALES

This is indeed a good capability to introduce in Rel-18. However we should discuss whether to prioritise the definition of **Network based UE location service** (LCS) for NTN in order to provide accurate and reliable/trusted UE location to address some regulated service requirements (e.g. emergency calls)

3.4 Support Dual connectivity

Support EN-DC, MR-DC and CA for NTN

Feedback Form 7: Comments on 3.4

1 – Asia Pacific Telecom co. Ltd

We share the same need. However, we wonder how to synchronize different sources from satellites with

different propagation delay.

2 – Intelsat

We support EN-DC.

3 – ESA

Dual connectivity (EN-DC as a priority) is very relevant.

4 – THALES

We believe that the introduction of asynchronous DC combined with CA for NTN in Rel-18 should be prioritised. Do you consider asynchronous DC combined with CA between satellites to improve the performance or between TN and NTN to improve the service continuity ?

5 – Nokia France

Could you give more detail on the MR-DC and EN-DC scenarios you have in mind?

3.5 Summary

4 Reconfigurable Intelligent Surfaces (RWS-210247)

We propose a RAN1 Study Item to work on RIS with the following objectives:

4.1 Channel Model

Channel Modeling along with Interference suppression mechanisms

Feedback Form 8: Comments on Proposal 4.1

1 – ZTE Corporation

Thanks for your proposal. We also share strong interests on this topic as proposed in our contribution (RWS-210465 in AI 4.1). W.r.t the objective, we are aligned to start with the channel model including RIS type and other potential enhancement on Beam management/CSI. But for the "Interference suppression mechanisms", can you clarify more on the details and does it refer to interference mitigation between cells? And is there any specific consideration on the "demodulation" part.

2 – Sony Corporation

Thank you for your contribution on RIS. We share your interest in the topic (see our contribution RWS-210306) and have a couple of questions to help us better understand your proposal:

1. In the proposals for Rel-18, a bullet is "RIS components discussion (active, passive, reflective pattern)." What is it meant with reflective pattern as a RIS component?

2. Also, earlier a RIS is defined as having passive reflecting elements, but here active RIS components appear to be considered; could you please elaborate a bit on this?

3 – DOCOMO Communications Lab.

Thank you for contribution. We are also interested in RIS. Let me ask a couple of questions.

- From UE, RIS is transparent or seeable? If transparent, do you assume what is spec impact compared to the existing spec, e.g. multi-TRP? RIS might be able to be treated as pseudo-TRP.
- Which aspect is motivation that you assume? e.g. coverage enh., reliability enh., data rate improvement, etc.

4.2 Use Cases

Investigate Use case and deployment scenarios (Indoor , Urban)

Feedback Form 9: Comments on Proposal 4.2

1 – Intel Corporation (UK) Ltd

What kind of deployment scenarios of RIS you are considering (e.g. operator deployed or user deployed)?

Do you envision potentially negative impact due to deployment of RIS on other operator deployment?

What do you see as the benefits of RIS compared to conventional RRH deployment?

2 – China Unicom

Thanks for the contribution and we also regard RIS as an interesting and promising technique.

What's the important and desirable scenarios of RIS for 5G-advanced?

3 – KDDI Corporation

Thank you very much for your proposals. We are also interested in RIS, as mentioned in our contribution (RWS-210300). In order to understand your proposal more concretely, let us ask you a few questions below.

<Q1>

Since it is listed as an objective in the study item, it may be a future discussion, but what deployment scenarios do you think are most important at this point?

<Q2>

We understand that you have also proposed smart repeater. We believe that the features or characteristics of RIS and smart repeater are slightly different. Do you have any current plans for RIS and smart repeater in terms of how they can be utilized from the deployment point of views?

4.3 RIS Components

RIS Components discussion (Active, Passive, Reflective Pattern)

Feedback Form 10: Comments on Proposal 4.3

1 – China Unicom Thanks for the contribution and we also regard RIS as an interesting and promising technique (RWS-210390). Which kind of RIS component pattern (active, passive, reflective) would you prefer?

4.4 Beam Management

RIS Beam management, CSI-Feedback and demodulation

Feedback Form 11: Comments on Proposal 4.4

4.5 Performance and Conformance

Performance and Conformance aspect, if needed

Feedback Form 12: Comments on Proposal 4.5

4.6 Summary

5 IAB & Smart Repeaters Enhancements (RWS-210248)

Background & Motivation:

•There are a number of enhancements related to Topology, RLF handling, Performance requirements proposed in Release-17.

IAB feature is critical for operators, which 3GPP should continue to work on, and Release 18 should cover Mobile IAB enhancements as well.

5.1 IAB Enhancements

We propose to support the following objectives in Release 18.

1.Higher order modulation specific to IAB (1024QAM or higher)

2.Inter AMF node migration.

3.UE's handover improvements based on feedback from IAB about node mobility status.

4.Interference management for mobile nodes based on inter Node distance.

5.PCI and RACH change of Node cell through conflict avoidance mechanism.

6.Enhancements required for IAB to function as NTN node.

7.Enhancements for dual operation in licensed and unlicensed band.

Feedback Form 13: Comments on proposed IAB Enhanements

1 – Intel Corporation (UK) Ltd Q1 : What scenarios are included (one or both of the following)? – Access in unlicensed and backahual in licensed (MT in licensed and DU in unlicensed) – MT connected with licensed and unlicensed parent DUs Both scenarios need some further work/discussion from RAN1, and further clarification may be needed on whether full-duplex mode will be supported in Rel-18 IAB. Q2: For "UE's handover improvements based on feedback from IAB about node mobility status.", if mobile IAB node does not change IAB-donor CU, the handover of UE will not be impacted. What does the improvement refer to here?
2 – LG Electronics Inc. Regarding interference management for mobile IAB, what kind of interference management, e.g., CLI enhancement, do you expect?
3 – Fraunhofer HHI Thanks for the contribution. Fraunhofer supports some of the identified topics, specifically UE's HO improvements based on feedback from the IAB node, interference management and support of the operation in the unlicensed spectrum (RWS-210320). Could the following also be clarified: #1) Similar to LGs question, does the considered interference management refer to CLI or?

5.1.1 Summary

5.2 Smart Repeaters

NR Repeaters in Release-17 mostly focus on Repeater's RF requirements

We propose to support Multi-beam aware/adaptive Repeater

In Release 18, Repeater performance can be improved if following control information is provided/exchanged.

1.Slot transmission status (ON/OFF).

2.TDD Slot configuration (symbol level)

3.Tx/RX Beam Information

4.Adaptive repeater bandwidth

5.Revise NR repeater's RF and EMC requirements for Smart repeater.

Feedback Form 14: Comments on Proposed Smart Repeater enhancements

1 – Intel Corporation (UK) Ltd

Q1 - For smart repeaters, what is the use case for adaptive repeater bandwidth? Is it related to multi-carrier or single carrier operation? Is it expected to tune the actual RF bandwidth or retune the center frequency?

Q2 - In the figure on page 3 showing the smart repeater as a 'relay' node between IAB-DU and UE? Is the smart repeater an independent node or considered part of IAB-DU? If it's integrated, seems it's unnecessary as gNB DU has the full functionality.

2 – Sony Corporation

Thank you for your proposals on smart repeaters. Here is a question:

1. In slide 3, could you please elaborate a bit on how the proposed additional information provided/exchanged to/by smart repeaters (i.e., ON/OFF information, TDD UL/DL split, Tx/Rx beam information, adaptive repeater bandwidth) would be obtained? For example, are currently existing mechanisms in Rel-16/17 sufficient, or do you think enhancements are needed?

3 – NTT DOCOMO INC.

Thanks for the contribution.

Q1: We would like to understand how smart repeater will use and benefit from the information of TDD Slot configuration?

Q2: what kind of signaling or interface is expected to be used to transmit the control information between gNB and smart repeater?

4 – KDDI Corporation

Thank you very much for your proposals. We are also interested in smart repeater, as mentioned in our contribution (RWS-210300). In order to understand your proposal more concretely, let us ask you a few questions below.

<Q1>

In your contribution, you mention "adaptive repeater bandwidth" as an example of control information. What is the intended use case of this control information?

<Q2>

In Slide 3, it is written that it is possible to deploy IAB and smart repeater at the same time. We also think that in the standard such a thing will be possible. Are there any assumptions about how IAB and smart repeater will be used in actual area deployment?

6 Answers

6.1 AI in NG-RAN

Table 1:

Question from **Sony**,For proposal 2: "3GPP to mostly focus on Joint/Co-ordinated AI as it needs UE and gNB co ordination." This comment intention is that the Joint/Co-ordinated AI should be prioritized?	That is correct, our intention is 3GPP to focus on Joint/coordinated AI.
Questions from **MediaTek;** 1) Mobility management involves not only physical layer, do you consider AI operations in other layers? 2) What are the prioritized use cases to be studied? 3) Does Rakuten think it is useful to establish the "test data set" (repository)?	1) Our proposal mostly focus on AI enhancements in PHY layer, however other layer enhancements are not precluded. Mobility management focus on areas like high speed mobility enhancements, Predictive mobility including neighbor search optimization. 2)We have provided list of key use cases to prioritize such as MIMO CSI Feedback, Beam Managements, Channel prediction, Positioning enhancements 3) Right, we mentioned that 3GPP should investigate potential data sets for different scenarios.

6.2 NTN Enhancements

Table 2:

Direct access to smartphone	**Sony** Following a R18 SI, do you expect there to be a follow-up work item? How about having a work item with an additional study phase on link budgets for the coverage objective?	Few link budget studies were conducted during Rel-15, however they don't focus on providing direct access to smart phone. We would like to propose a Study item focusing on Mobile phone Access (at least from LEO 600)
Direct access to smartphone	**Asia Pacific Telecom co. LTD**	Thank you for the comment. We believe that link budget improvements can come from Satellite Antenna/Tx power enhancements, L2/L1 Coverage enhancements or as you mentioned UE Tx power enhancements.
Co-Channel Interference Mitigation	**Asia Pacific Telecom co. LTD** This may need some progress on RAN4 whether frequency bands are shared between TN and NTN. For Rel-17 NTN, the use of frequency shall be different per cell or per satellite beam. We are not sure about co-channel interference between NTN.	We agree that this will be decided based on RAN4 progress on NTN band usage and frequency band sharing.

Co-Channel Interference Mitigation	**Huawei Technologies** **Sony Corporation** **Docomo Communications Labs** **Nokia France**	Question on Frequency Co-Sharing between terrestrial and Non-terrestrial. There are applications made to FCC and in multiple other countries on usage of same spectrum for Terrestrial and Satellite. Rakuten would provide further details on these. We propose interference mitigation not only for HAPS but also for Satellite Scenarios.
Support UE's without GNSS Capability	**Asia Pacific Telecom co. Ltd** **THALES** About LCS support for NTN	Thank you for the comments. We are fine to support Network based UE location Service to acquire Co-ordinates.
Dual Connectivity	**Asia Pacific Telecom co. Ltd** **Intelsat** **ESA** **THALES** **Nokia France**	**Q1 (APT)** .We share the same need. However, we wonder how to synchronize different sources from satellites with different propagation delay . **Reply:** The source can be synchronized based on Propagation delay or Ephemeris information exchange through X2. RAN3 can provide recommendations on this. **Q2 (Thales)** We believe that the introduction of asynchronous DC combined with CA for NTN in Rel-18 should be prioritised. Do you consider asynchronous DC combined with CA between satellites to improve the performance or between TN and NTN to improve the service continuity ? **Reply:** Our first priortiy is service continuity and second priority is performance improvement. Different scenarios for various use cases defined in RWS-210200 **Q3 (Nokia France):** Could you give more detail on the MR-DC and EN-DC scenarios you have in mind? **Reply:** Multiple scenarios with use cases defined in RWS-210200

6.3 RIS

6.3.1 Channel Model

Table 3:

ZTE corporation	Can you clarify more on the details and does it refer to interference mitigation between cells? And is there any specific consideration on the "demodulation" part.	Mostly interference mitigation between gNB RU and RIS. For Demodulation its mostly uplink detection from UE's. To study If any enhancement can be considered.
Sony Corporation	1. In the proposals for Rel-18, a bullet is "RIS components discussion (active, passive, reflective pattern)." What is it meant with reflective pattern as a RIS component? 2. Also, earlier a RIS is defined as having passive reflecting elements, but here active RIS components appear to be considered; could you please elaborate a bit on this?	Both Active and Passive RIS are proposed for study. Active RIS is also an area of interest, Active RIS surface have its own Tx power and Act as an intelligent active repeater.
Docomo Communications Lab	From UE, RIS is transparent or seeable? If transparent, do you assume what is spec impact compared to the existing spec, e.g. multi-TRP? RIS might be able to be treated as pseudo-TRP. Which aspect is motivation that you assume? e.g. coverage enh., reliability enh., data rate improvement, etc.	At this point, we can not exclude the possibility of RIS being non-transparent to UE. However, for the priority use case of RIS in Rel-18; it will most likely be transparent to UE. We agree that RIS may be treated as Multi-TRP or just as a smart repeater. Main motivation for us is FR2 coverage, however we would like companies to further explore the possibilities of RIS such as for reliability and data rate improvements.

6.3.2 Use Cases

Table 4:

Intel **China Unicom** **KDDI Corporation**	Q1)What kind of deployment scenarios of RIS you are considering (e.g. operator deployed or user deployed)? Q2.Do you envision potentially negative impact due to deployment of RIS on other operator deployment? What do you see as the benefits of RIS compared to conventional RRH deployment? Do you have any current plans for RIS and smart repeater in terms of how they can be utilized from the deployment point of views?	Q1) Operator deployed. Q2) This is possible and need to be further explored by RAN1/RAN4 to limit the impact on other operators, frequencies. We would like to support such study. Q3. Multiple reasons such as deployment objective (Coverage only), Cost and Backhauling requirements. Q4. For RIS we expect to cover mostly indoor. For Repeaters mostly outdoor low user density areas.

6.3.3 RIS Components

China Unicom: Which kind of RIS component pattern (active, passive, reflective) would you prefer?

RAKUTEN: We would like 3GPP to study Active components with priority.

6.4 IAB & Smart Repeaters

Table 5:

Intel UK	Q1:What scenarios are included (one or both of the following)? Q2: For "UE's handover improvements based on feedback from IAB about node mobility status.", if mobile IAB node does not change IAB-donor CU, the handover of UE will not be impacted. What does the improvement refer to here?	Q1. (Ans): We agree with your comments, further work/discussion from RAN1 or even RAN4 is required. We prefer to not exclude any scenario at this point. Q2. (Ans): This is for a case to improve mobility when UE's served by a IAB Node are moving from one CU to another. (Group mobility)
LG Electronics	Regarding interference #1) management for mobile IAB, what kind of interference management, e.g., CLI enhancement, do you expect?	CLI is one topic to be further studies for Mobile IAB. We believe certain other interference mitigation/avoidance/coordination schemes are possible when Mobile IAB's location information is shared (within CU, or among CU's). We expect RAN1 to explore this for Mobile IAB.

Fraunhofer HHI	#1) Similar to LGs question, does the considered interference management refer to CLI or?	Same as above.

6.5 Smart Repeaters

Table 6:

Intel UK	Q1 - For smart repeaters, what is the use case for adaptive repeater bandwidth? Q2.Is the smart repeater an independent node or considered part of IAB-DU? If it's integrated, seems it's unnecessary as gNB DU has the full functionality.	Ans1: Adaptive bandwidth would help to reduce interference and transmission power. In our proposal its a separate node; without full gNB DU Stack.
Sony Corporation	Could you please elaborate a bit on how the proposed additional information provided/exchanged to/by smart repeaters (i.e., ON/OFF information, TDD UL/DL split, Tx/Rx beam information, adaptive repeater bandwidth) would be obtained? For example, are currently existing mechanisms in Rel-16/17 sufficient, or do you think enhancements are needed?	We propose small side control information protocol: This can also be used for RIS. We believe the current Rel16/17 doesn't provide enough coverage for required information.
NTT DOCOMO	Q1: We would like to understand how smart repeater will use and benefit from the information of TDD Slot configuration? Q2: what kind of signaling or interface is expected to be used to transmit the control information between gNB and smart repeater?	Ans1.TDD slot information (symbol level) can assist Smart repeater to function as TDD half duplex device, without the information exchange repeater working would depend upon vendor implementation Ans2. Control information can be provided by gNB through PHY or even upper layers. RAN4/3 can study the feasibility.

KDDI Corporation	Q1.In your contribution, you mention ”adaptive repeater bandwidth” as an example of control information. What is the intended use case of this control information? Q2.In Slide 3, it is written that it is possible to deploy IAB and smart repeater at the same time. We also think that in the standard such a thing will be possible. Are there any assumptions about how IAB and smart repeater will be used in actual area deployment?	Ans 1)The intended use case is to limit the power and interference. Ans 2) Repeaters for us is a low cost PHY based device. IAB deployment Use case: Lack of Backhaul transmission, requires resources such as CU-DU. Smart Repeaters: To quickly provide coverage to remote area’s. (No capacity requirements).

7 ROUND 2

This email discussion summary covers the Q&A of the following Rakuten documents:

7.1 AI in NG-RAN (RWS-210198)

7.1.1 New study Item to cover NR Air Interface

A new study item is required in RAN1/RAN2 (potentially RAN3) over the entire duration of Rel-18 to evaluate possible benefits and feasibility of applying AI to Physical Layer (5G NR air interface).

Feedback Form 15:

1 – MediaTek Inc. 1) AI traffic includes data collection & model transfer, the former may be done with existing procedure, how about the latter?
2 – Rakuten Mobile Thank you for the question. Our contribution exactly talk about it; There are several ways to do model Transfer or update like controlled via PDCP layer in RAN or via 5GC. We are not suggesting a particular way but we want 3GPP to standardized this during AI in Phy (SI/WI)

7.1.2 AI Categorization

Feedback Form 16:

7.1.3 AI Study Item Objectives

Feedback Form 17:

1 – MediaTek Inc.

1) Could you elaborate the mobility management? We are also interested in the predictive mobility topic (you could refer to RWS-210103)

7.1.4 Summary for Round 2:

7.2 NTN Enhancements (RWS-210200)

7.2.1 Direct Access to smart Phone

Feedback Form 18:

1 – Sony Europe B.V.

Thank you for answering our questions in the first round. It seems you missed one of our questions:

Please clarify which regulations are applicable to spectrum sharing between NTN and TN. Are new ITU-R regulations needed?

2 – Rakuten Mobile

RR-2020-00013-Vol.I-EA5 (RR-5 69) (RR-5 55) (RR-5 80) are few examples.. Also, few companies are working with regulatory bodies to bring such regulations in ITU-R.

7.2.2 Co-Channel Interference Mitigation

Initiate RAN1 Study Item to investigate co-channel interference suppression and avoidance techniques between NTN and NTN, and between NTN and TN.

Based on received feedback, we will Deprioritize NTN to NTN study and will also provide reference to NTN and TN band sharing.

Feedback Form 19:

7.2.3 Support UE's without GNSS Capability

Feedback Form 20:

7.2.4 Support Dual connectivity

Feedback Form 21:

7.2.5 NTN Enhancements Summary :

7.3 Reconfigurable Intelligent Surfaces (RWS-210247)

7.3.1 Channel Model

Feedback Form 22:

1 – ZTE Corporation

Thanks for your replies and it's really useful for us to identify the essential work for future based on common interests.

W.r.t the interference issue, does it (interference between gNB RU and RIS) refers to interference cross gNB-RIS links or just between the gNB-RU and gNB-RIS link? If it's for the latter one, do you also assume the wireless connected RU for gNB? Any views on the specific scenario?

Moreover, according to the 1st round discussion, it seems that the active RIS (*Active RIS is also an area of interest, Active RIS surface have its own Tx power and Act as an intelligent active repeater.*) is prioritized for the SI from your side? It seems that we have different definition w.r.t the terminology as "active RIS". In our view, it mainly refer to the case that RIS can be controlled by gNB on the response but still without PA. This type of RIS is more flexible and energy-efficient comparing to the one with PA. Any views on it?

In addition, it seems that there will be potential overlapping on the discussion between RIS and an intelligent active repeater (or smart repeater), So, I just wonder from your perspective, any views on how to organize the corresponding study for these two topics? Is it possible to start with the SI phase first to identify the issue and specify the necessary aspect later in one item?

2 – Sony Corporation

Thank you very much for your answers to the first Q&A round. Here are some follow-up questions, for further clarification:

- You mention that you support active RIS, which are RIS "acting as intelligent active repeaters." Then, in your view, is active RIS = smart repeater? If not, which major differences do you see?
- Do you also see some deployment scenarios for RIS in FR1?

7.3.2 Use Cases

Feedback Form 23:

7.3.3 RIS Components

Feedback Form 24:

1 – Huawei Technologies France Thanks for the contribution. Could you clarify what do you mean about the active RIS component?
2 – Rakuten Mobile @Huawei, Thank you for the question. Active RIS components like Microcontroller, Reflective Surface itself, PA (for Active RIS)

7.3.4 Beam Management

Feedback Form 25:

7.3.5 Performance and Conformance

Feedback Form 26:

7.3.6 Summary of RIS

7.4 IAB & Smart Repeaters Enhancements (RWS-210248)

7.4.1 IAB Enhancements

Feedback Form 27:

7.4.2 IAB Enhancements Summary

7.4.3 Smart Repeaters

We propose to support Multi-beam aware/adaptive Repeater In Release 18,

Repeater performance can be improved if following control information is provided/exchanged.

1.Slot transmission status (ON/OFF).

2.TDD Slot configuration (symbol level)

3.Tx/RX Beam Information

4.Adaptive repeater bandwidth

5.Revise NR repeater's RF and EMC requirements for Smart repeater.

Feedback Form 28:

1 – Sony Corporation Thank you very much for your answers to the first Q&A round. Here is a question for further clarification: For Rel-18, you support to study RIS, smart repeaters and IAB, for different use cases. In case TUs are limited and there is not enough time to study all of them, what would your priority be?
2 – Rakuten Mobile Thank you for further question: We want to prioritize RIS for RAN1/RAN4 and Smart repeaters for RAN2. IAB itself will continue from Rel-17 remaining topics. In general RIS and Smart repeaters are highest priority for us.

7.4.4 Summary Repeaters:

8 Summary (after round 2)

8.1 AI in NG-RAN (RWS-210198) Summary

Few companies asked for further clarification on AI model's and AI Types, Rakuten replied to the questions. We think no further modification is required in orignal proposal.

8.2 NTN Enhancements (RWS-210200)

Companies generally agree with Rakuten's proposal on Direct Access to Smart Phone, Support for UE's without GNSS capabilities and Dual connectivity.

Based on feedback from companies rakuten would exclude following from original proposal.

Exclusion: 1)Study NTN to NTN interference mechanisms.

8.3 Reconfigurable Intelligent Surfaces (RWS-210247)

Companies asked for further details on RIS, Rakuten provided clarifications in round 1&2.

It seems few companies are concerned about overlap between RIS and Smart repeater.

Rakuten's opinion is that RIS is a broad topic, it includes a number of RAN1 and RAN4 topics related to Channel model, Surface types and RIS components.

Smart repeater on the other hand is a topic that can be mostly handled by RAN2/3.

Hence we think that, although some RIS part can be studied together with Smart repeater ,it should be a separate vertical in Rel-18.

8.4 IAB & Smart Repeaters Enhancements (RWS-210248)

Companies asked for further clarifications on both IAB and Smart repeaters.

Rakuten tried to answer all queries, as no major object raised from other companies.

We would like to keep the original proposal in RWS-210198