RAN-R18-WS-non-eMBB-China_Unicom - Version 0.0.6
RAN

3GPP TSG RAN Rel-18 workshop **RWS-210561**

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: **4.2**

Source: **China Unicom**

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

Document for: Information

1 Introduction

This email discussion summary covers the following documents:

RWS-210391 ”Motivation of 5G system with High Altitude Platform Station (HAPS)”

Questions and comments followed responses from China Unicom will be collected in this document as per the deadlines provided by the RAN chair. Feedback forms will be opened and closed according to those deadlines.

Round 1 Q&A: Questions: June 14 08:00 UTC – June 17 8:00 UTC; Answers: June 17 8:00 UTC – June 18 23:59 UTC.

Round 2 Q&A: Questions: June 21 08:00 UTC – June 23 8:00 UTC; Answers: June 23 8:00 UTC – June 24 18:00 UTC.

2 Discussion

2.1 General comments and questions

2.1.1 1st Round Comments/Questions

Feedback Form 1: General comments/questions for 1st round

1 – Beijing Xiaomi Mobile Software One general question we have is that, in Rel-17 we have NTN WI which includes the HAPS. Do you intend to have a separate WI/SI for HAPS.
2 – China Mobile International Ltd Is the main focus on RAN4 aspects?

3 – ZTE Corporation HAPS is also one interest topic, which has been discussed in R17 with NTN for technical related part. For your proposal, 1. Is it mainly for RAN4 or is there new impacts on other WGs. For example, w.r.t the mobility and Beam management part, any specific issue for HAPS-self comparing to other topic? 2. W.r.t the co-channel interference evaluation, any specific assumption on the deployment of HAPS, e.g., static or moving HAPS? Also, any frequency band?
4 – CATT HAPS is an interesting topic. It seems that there are many aspects need study, e.g. Co-channel interference, mobility issues, cell relationship, beam management and RF requirements etc. Could we study/evaluate/identify the gaps between HAPS and existing TN/NTN system first?

2.1.2 1st Round Answers

To Xiaomi's question.

Thanks for your question. HAPS is included in the R17 NTN WI, but HAPS related issue were not studied well. There are still serveral issues are not covered in R17, i.e., co-channel interference with TN, mobility, beam management, RF requirements for HAPS gNB, etc. Considering the difference from satellite in NTN, we propose to an individual SI/WI for HAPS.

To CMCC's question.

Thanks for your question. There are RAN4 related work to study the RF requirements of HAPS gNB. At the meantime, the co-channel interference, beam management, mobility issues are related with RAN1/RAN2. RF requirements of HAPS gNB could be considered as an individual work in RAN4 as part of HAPS work in R18.

To ZTE's question.

Thanks for your questions.For Q1: The co-channel interference with TN, the inaccurate beam coverage issue caused by the instability of the antenna surface onboard, mobility issue due to a small range movement of HAPS gNB, new neighbor cell identification issues are potential related with RAN1/RAN2/RAN3. Further discussion on the potential impact on RAN WGs are welcome.For Q2: HAPS may be deployed in a semi-static manner, as it may move with the air in the stratosphere in a certain area. It also may be remote control to move by operators deployment requirements. From our side, it is preferred to utilize the IMT frequency band for HAPS, i.e, 900MHz, 1.8/2.1GHz or TDD frequency bands at the premise of good interference management with ourself TN.

To CATT's question.

Thanks for your constructive suggestions. It is a good suggestion to start with a study phase to identify the gaps between HAPS and existing TN/NTN system first, and then move to the normative work phase. Companies are welcome to work on HAPS during the discuss on the scope in R18.

2.1.3 2nd Round Comments/Questions

Feedback Form 2: 2nd Round Comments/Questions

1 – ZTE Corporation

Thanks for your feedback. We share the views that co-channel interference is important and unique topic for HAPS comparing to NTN in R17. The corresponding study can be triggered at least for this aspect.

As the following up question (also applied for co-channel interference issue below), in order to evaluate the performance, any specific consideration on the configuration for HAPS including height, beam configuration and the instability? Can we just reuse the simulation assumption (i.e., R4-2108646), which is agreed in R17 RAN4 for HAPS co-existence evaluation for adjacent channels.

2 – CATT

Thanks for your response. I am wondering if there is SA2 or CT impact for HAPS. Could you clarify? Thanks.

2.1.4 2nd Round Answers

To ZTE's question.

Thanks for your question. As the antenna of HAPS gNB may jerk up and down in the trail, as a consequence, the adjacent channel interference and co-channel interference occurs with the TN. The simulation assumptions are not as same as R4-2108646. Further discussions on simulation assumptions are needed to discuss first during the study phase.

To CATT's question.

Thanks for your comments. There would be no SA2 or CT impact for HAPS. Perhaps further discussion on SA2 or CT impact shall be triggered in the corresponding WGs if needed.

2.2 Scenarios for HAPS

2.2.1 1st Round Comments/Questions

Feedback Form 3: Comments and questions on scenarios for HAPS

1 – Asia Pacific Telecom co. Ltd

We found most of proposals related to RAN4, e.g., Evaluate Co-channel interference, RF requirements for coexistence, and Specify RF requirements HAPS network. We wonder whether it is a new WI led by RAN4.

2 – Beijing Xiaomi Mobile Software

It is stated in your document that "It is needed to define HAPS gNB to provide accessibility of both legacy UE and possible new types of UE for airplane and airship if necessary." what is the target use case to have new UE type here.

3 – Intel Technology India Pvt Ltd (1) On page 2 right figure, does the BS on the airplane/airship directly connect with 5GC without a TN? (2) Do you consider HAPS deployments with different cells for different beams or multiple beams are supported in one cell?
4 – CATT Would HAPS serve normal UEs? Is there any further requirements for UEs connecting to HAPS?

2.2.2 1st Round Answers

To Asia Pacific Telecom's question.

Thank you for your question.There are RAN4 related work to study the RF requirements of HAPS gNB. At the meantime, the co-channel interference, beam management, mobility issues are related with RAN1/RAN2. RF requirements of HAPS gNB could be considered as an individual work in RAN4 as part of HAPS work in R18.

To Xiaomi's question.

Thank you for your question. Legacy TN UEs should be supported by HAPS. New type UE refers to CPE for HAPS.

To Intel's question.

Thanks for your questions. (1)On page 2 right figure, BS on the airplane/airship connects to 5GC via a Gateway, which is the same architecture as NTN in TR 38.821. (2) The deployments of HAPS with different cells for different beams or multiple beams could be supported in one cell.

To CATT's question.

Thanks for your questions.HAPS can provide service to normal UEs. Further requirements for UEs connecting to HAPS maybe study the requirement on UL link budget, etc.

2.2.3 2nd Round Comments/Questions

Feedback Form 4: 2nd Round Comments/Questions

2.2.4 2nd Round Answers

There is no 2nd round comments.

2.3 Co-channel interference issue for HAPS

2.3.1 1st Round Comments/Questions

Feedback Form 5: Comments and questions on co-channel interference issue for HAPS

1 – HUAWEI TECHNOLOGIES Co. Ltd. Q: For ”Evaluate Co-channel interference issue btw HAPS and TN and study the potential solution”, are you aiming for scenario that HAPS coverage and TN coverage are fully overlapped, partially overlapped or not overlapped. What is the main deployment scenario?
2 – DOCOMO Communications Lab. Thank you for contribution. We also have interests on HAPS. Let me ask a question. - In your kind evaluation for co-channel interference, it seems that TN and HAPS NW provides same area/coverage. Is it correct understanding? If correct, do you have view why they cover same area? I feel to use same frequency, they should operate for different area.
3 – China Telecommunications From the operator point of view, HAPS has its specific useful scenario. In HAPS, should the high power gNB be considered to increase the cell coverage? If yes, should the interference co-existence between normal gNB and high power gNB of HAPS be studied?

2.3.2 1st Round Answers

To HW’s question.

Thanks for your questions.The HAPS and TN may consider partially overlapped in the geographical area first, i.e. partial overlapped scenario due to the cell-edge area.Besides, the co-existence of HAPS and TN in co-channel scenarios can be studied.

To DOCOMO ’s question.

Thank you for your questions.TN and HAPS NW may partially overlapped or cover different area.

To CT’s question.

We share the same view that it is needed to study the RF requirements for HAPS gNB, i.e. high power, co-existence requirements.

2.3.3 2nd Round Comments/Questions

Feedback Form 6: 2nd Round Comments/Questions

2.3.4 2nd Round Answers

There is no 2nd round comments.

2.4 Mobility issue for HAPS

2.4.1 1st Round Comments/Questions

Feedback Form 7: Comments and questions on mobility issue for HAPS

1 – Beijing Xiaomi Mobile Software

More clarification on the neighboring cell issue is appreciated. Does it motivate the enhancement on the TN side.

For the feeder link switch, we think the NR-NRN solutions can be reused, could you please provide more information on the feeder link switch which is special for HAPS.

2.4.2 1st Round Answers

To Xiaomi's question.

What is "NR-NRN solutions" (or NR-NTN solutions)? If so, the feeder link switch in existing NR-NTN is for the transparent mode, where the procedures btw gNB and 5GC are not involved. However, as for the feeder link switch here, the HAPS gNB may also need to switch to other 5GC.

2.4.3 2nd Round Comments/Questions

Feedback Form 8: 2nd Round Comments/Questions

1 – ZTE Corporation

According to the discussion in 1st round, it seems that the assumption for HAPS here is mainly for regenerative payload case. Do you intent to suppor the full-gNB on board only or any other architecture□ Any specific preference on earth moving cell or earth fixed cell?

2.4.4 2nd Round Answers

To ZTE's question.

Thanks for your question. We support to study the use case that the full-gNB is on board. Both earth fixed cell and earth moving cell are needed to be studied.

2.5 RF requirement issue for HAPS

2.5.1 1st Round Comments/Questions

Feedback Form 9: Comments and questions on RF requirement issue for HAPS

1 – Beijing Xiaomi Mobile Software

We think the idenfication of HAPS example band is already within the Rel-17 NTN WI. what's more you want to have in Rel-18.

Is the target band for HAPS is FR1 only.

2.5.2 1st Round Answers

To Xiaomi's question.

At current stage, FR1 band is perfer to study first.

2.5.3 2nd Round Comments/Questions

Feedback Form 10: 2nd Round Comments/Questions

2.5.4 2nd Round Answers

There is no 2nd round comments.

3 Summary

9 companies raised comments on this contribution and most of them showed interest on HAPS for Rel-18. According to the email discussion, companies show interest in HAPS deployment scenario and share the same view that the co-channel interference, mobility and neighboring cell issues should be studied to support HAPS.

1. The deployment scenarios for HAPS should be identified. To achieve this, potential solutions on co-channel interference, RF requirements for coexistence, and RF requirements for HAPS network are necessary.

2. The co-existence issue of HAPS and TN in co-channel scenarios should be studied, e.g. interference co-existence between normal gNB and high power gNB, TN and HAPS NW may partially overlap or cover different areas.

3. The movement and instability of HAPS gNB will bring new mobility issue, including the HAPS gNB handover via NG interface between 5GCs and the new neighboring cell issues. Both earth fixed cell and earth moving cell are needed to be studied.

4. Related with RF issues, FR1 band is prefer to study first at current stage.

4 Reference

[1] RWS-210391 Motivation of 5G system with High Altitude Platform Station (HAPS)