

3GPP TSG RAN Rel-18 workshop RWS-210523

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.1 eMBB-driven Functional Evolution

Source: Fraunhofer IIS, Fraunhofer HHI

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

1 Introduction

This NWM document captures comments and questions from companies on the proposals from Fraunhofer on eMBB.

2 Related documents

This discussion summary covers the following documents:

RWS-210319 MIMO Enhancements for Rel-18

RWS-210320 Mobile IAB in Rel-18

2 2.1 MIMO Enhancements for Rel-18 [RWS-210319]

2.1.1 Details and proposals

Observation 1: For the Rel. 15/16 type-II CSI feedback schemes a performance loss is observed when UEs move already at moderate speeds of 30 km/h.

Observation 2: For the current Rel. 15/16 type-II codebooks, the following is observed in UE mobility scenarios:

- Large performance loss is obtained when channel variations are fast and CSI measurement and update rate is not sufficient high,
- A high CSI update rate is needed to handle fast channel variations even for UEs with low mobility,
- Increased use of UL/DL resources due to frequent PMI measurements and CSI feedback, and

- Increased UE battery consumption.

Observation 3: The CSI update rate depends on the fast-fading channel variations and a high CSI update rate is required in UE-mobility scenarios where the channel variations are fast, and the channel coherence time is small.

Observation 4: To drastically reduce the CSI feedback rate, the CSI report should contain Doppler or Doppler-delay spectrum-related information of the channel.

Observation 5: When the CSI report contains Doppler or Doppler-delay spectrum-related information, the gNB can perform precoding in the time-domain to compensate for the fast-fading variations of the channel, less UL/DL resources are required for CSI measurements and reporting, UE complexity and battery consumption are reduced, and improved performance is expected in fast-fading channels.

Observation 6: A significant performance gain is observed by Doppler-delay-based CSI reporting over the Rel. 15/Rel. 16 type-II CSI reporting with significantly lower CSI update rates.

Observation 7: Doppler-delay precoder needs significantly lower feedback overhead compared to the Rel. 15 precoder.

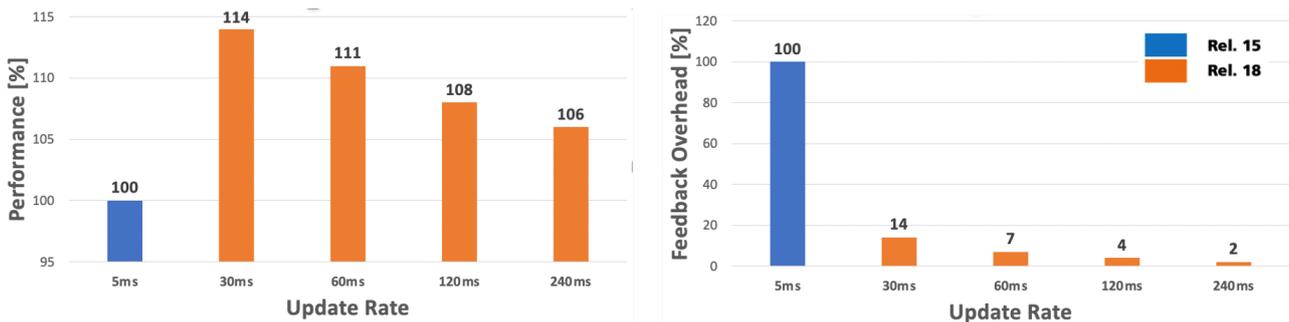


Figure 1: Performance and feedback overhead of the Doppler-delay precoder over the Rel. 15 precoder for CSI update rates 30ms, 60ms, 120ms and 240ms. Reference is the Rel. 15 precoder with CSI update rate of 5ms

Proposal: Evaluate and specify enhancements on Type-II codebook based on Doppler-information for time-domain CSI compression for Rel.-18 MIMO.

The detailed objective is as follows: Consider reporting mechanism(s) including Doppler-information for CSI overhead reduction and for tackling CSI aging assuming moderate to high speed UEs, mainly targeting FR1.

2.1.2 Questions&Answers

Feedback Form 1: MIMO Enhancements for Rel-18 [RWS-210319]

1 – Continental Automotive GmbH

Reliable support of mobility is key to realize many use cases and applications of the automotive industry. Based on results provided here, we consider important evaluate and specify enhancements for Type-II codebook in Rel. 18 MIMO. In particular, schemes reducing the feedback overhead, providing good enough (accurate) CSI information in mobility, with an logical extension of Rel. 16 in the time domain would be desired.

2 – Samsung Research America

Other than CSI codebook enhancement based on Doppler-domain compression, do you also foresee other areas of enhancement, e.g. CSI-RS and DM-RS design?

3 – ROBERT BOSCH GmbH

[Bosch] CSI compression based on Doppler-domain information is needed for mobility scenarios. Having the Doppler domain in the loop makes it possible to predict (at least short term) the channel conditions. Therefore, we have the following questions:

-
Do you see any chance to learn/predict from these enhanced CSI framework, i.e., based on AI/ML-based, to enhancing mobility? How can this be achieved?

4 – Volkswagen AG

For V2X and railway applications UEs at high speeds need to be considered. Specific speeds were defined by SA1, e.g. TS 22.186 for V2X. Mechanisms which provide an efficient compensation of doppler effects are considered as important.

5 – Intel Corporation (UK) Ltd

<Intel>

Q1. Do you consider scenarios with bursty traffic where dynamic interference condition and therefore the preferred number of MIMO layers and CQI may dynamically change on the slot level?

Q2. Do you envision benefits from CSI-RS overhead reduction considering need of supporting new UEs that requires burts of CSI-RS and legacy UEs that relies on legacy CSI-RS?

6 – Nokia Corporation

In the results in Figure 5-8, is there prediction involved at gNB side ? If so, can you provide more information on the assumptions for it?

7 – MediaTek Inc.

1. Please can you provide detailed steps of your proposed time-domain CSI compression?
2. Do you have simulation results for higher speeds, e.g., 120 km/hr?

8 – Motorola Mobility UK Ltd.

Thank you for the interesting contribution. My question is related to your proposal, which reads “*Study and specify time-domain CSI compression for Release 18 MIMO*”. Do you envision the Doppler-domain CSI compression enhancement as CSI measurement and reporting enhancements or only as a codebook enhancement?

9 – Telstra Corporation Limited

Thank you for your contribution. Telstra is interested in the opportunity to bring delay-Doppler channel state information feedback into 3GPP. The benefits of this approach are well understood; the examples you provide in your contribution nicely demonstrate the advantages that come with a compact channel state representation that has long coherence time. We are very keen to see this work progress.

10 – vivo Communication Technology

1. Time domain CSI compression involves prediction at gNB? if so, is it possible for gNB to predict CSI based on UL signal, e.g. SRS?
2. in the simulation, is the speed of UE constant? How do you envision performance in the scenario of NLOS with varying UE speed?

11 – HuaWei Technologies Co.

Thanks for the contribution. One comments is: The proposed codebook design seems based on DFT basis, but whether using eigen vector basis is more beneficial for the performance?

12 – Qualcomm communications-France

How to define ”channel stationary time” quantitatively? Any channel prediction is adopted in the simulation? The channel stationary time should be a function of Doppler spectrum, the simulation use a special channel with a bell-shape Doppler spectrum with average Doppler shift of near 0 Hz. can we still gain when Doppler spread increased, e.g., U-shape Doppler spectrum could be the worst case? Why not use 30ms Rel-15 as baseline?

2.1.3 Reply to questions (round 1)

**Feedback Form 2: QA on MIMO Enhancements for Rel-18
[RWS-210319]**

1 – Fraunhofer IIS

Response to Continental Automotive GmbH

Answer: Thanks for your interest in our contribution and support of our proposal.

2 – Fraunhofer IIS

Response to Samsung Research America

Thanks for your interest in our contribution. Please find our response below.

Other than CSI codebook enhancement based on Doppler-domain compression, do you also foresee other

areas of enhancement, e.g. CSI-RS and DM-RS design?

Answer: We envision a new codebook that extends the regular R16 type-II codebook to the Doppler-domain for time-domain CSI compression. For CSI measurement, a burst/bundle of CSI-RS is required instead of a single CSI-RS as for the R15/R16/R17 type-II codebooks. We have not yet considered enhancements on DM-RS, but we are open for further discussions on this topic, if needed.

3 – Fraunhofer IIS

Response to ROBERT BOSCH GmbH

Thanks for your interest in our contribution. Please find our response below.

CSI compression based on Doppler-domain information is needed for mobility scenarios. Having the Doppler domain in the loop makes it possible to predict (at least short term) the channel conditions. Therefore, we have the following questions:

Do you see any chance to learn/predict from these enhanced CSI framework, i.e., based on AI/ML- based, to enhancing mobility? How can this be achieved?

Answer: When the CSI report comprises information on the Doppler components of the channel, the gNB is aware of the CSI/channel variations over time especially in UE mobility scenarios. Based on these Doppler components, the gNB can predict the PMI/precoder over a certain time interval.

4 – Fraunhofer IIS

Response to Volkswagen AG

Thanks for your interest in our contribution and support of our proposal.

5 – Fraunhofer IIS

Response to Intel Corporation (UK) Ltd

Thanks for your interest in our contribution. Please find our response below.

Do you consider scenarios with bursty traffic where dynamic interference condition and therefore the preferred number of MIMO layers and CQI may dynamically change on the slot level?

Answer: Bursty traffic/interference can always happen to all kinds of R15/R16/R17 codebooks (type-I, type-II, e-type-II) and not only to the proposed Doppler-based enhancement of the R16 type-II codebook. Typically, multiple CBs are configured and type-II CSI (which is based on AP CSI-RS) is only triggered when high resolution PMI is required. Therefore, we think that bursty traffic/interference is not an issue as gNB is aware of it. We don't think that because of possible bursty traffic/interference, all kind of CSI reporting should always only be configured on slot level basis. This would result in a lot of overhead.

When the UE is moving even at moderate speeds, a performance loss with the current R15/R16 regular type-II codebooks is observed. When some kind of Doppler information is contained in the CSI report, the gNB may use this information to compensate for the loss by taking into account the PMI variations over time.

Do you envision benefits from CSI-RS overhead reduction considering need of supporting new UEs that requires bursts of CSI-RS and legacy UEs that relies on legacy CSI-RS?

Answer: In our view, there is no change of the CSI-RS design needed for the proposed Doppler-based CSI reporting. However, a burst/bundle of CSI-RS is required for determining the Doppler components of the codebook instead of a single CSI-RS as for the R15/R16/R17 type-II codebooks. This means some enhancements on CSI measurements are needed.

6 – Fraunhofer IIS

Response to Nokia Corporation

Thanks for your interest in our contribution. Please find our response below.

In the results in Figure 5-8, is there prediction involved at gNB side? If so, can you provide more information on the assumptions for it?

Answer: The gNB uses the Doppler components to predict the PMI/precoder over a certain time interval (until new CSI is available). It was assumed that beams (SD components), delays (FD components) and Doppler components (TD components) do not change over this time interval. A DFT basis was used to model the Doppler components of the codebook.

7 – Fraunhofer IIS

Response to MediaTek Inc.

Thanks for your interest in our contribution. Please find our response below.

Please can you provide detailed steps of your proposed time-domain CSI compression?

Answer: The proposed Doppler enhancement is a straightforward extension of the R16 regular type-II codebook with respect to the time/Doppler domain. DFT basis was used for the beams/SD components, delays/FD components and Doppler/TD components which is quite similar to the R16 type-II codebook where a DFT basis is used for the SD and FD components. The Doppler components are determined from CSI measurements on different time instances using a burst/bundle of CSI-RS. This is different to the R15/R16/R17 codebooks where only a single CSI-RS is used for channel measurement.

Do you have simulation results for higher speeds, e.g., 120 km/hr?

Answer: We have not yet evaluated high-speed scenarios (e.g., 120 km/h), but we will consider it in future evaluations.

8 – Fraunhofer IIS

Response to Motorola Mobility UK Ltd.

Thanks for your interest in our contribution. Please find our response below.

Thank you for the interesting contribution. My question is related to your proposal, which reads “*Study and specify time-domain CSI compression for Release 18 MIMO*”.

Do you envision the Doppler-domain CSI compression enhancement as CSI measurement and reporting enhancements or only as a codebook enhancement?

Answer: We envision a new codebook that extends the regular R16 type-II codebook to the Doppler-domain for time-domain CSI compression. For CSI measurement, a burst/bundle of CSI-RS is required instead of a single CSI-RS as for the R15/R16/R17 type-II codebooks. So, some enhancements on CSI measurement may be needed. Enhancements on CSI reporting may not be needed, or if needed, they are small.

9 – Fraunhofer IIS

Response to Telstra Corporation Limited

Thanks for your interest in our contribution and support of our proposal.

10 – Fraunhofer IIS

Response to vivo Communication Technology

Thanks for your interest in our contribution. Please find our response below.

Time domain CSI compression involves prediction at gNB?

Answer: The gNB uses the Doppler components to predict the PMI/precoder over a certain time interval (until new CSI is available). It was assumed that beams (SD components), delays (FD components) and Doppler components (TD components) do not change over this time interval. A DFT basis was used to model the Doppler components of the codebook.

if so, is it possible for gNB to predict CSI based on UL signal, e.g. SRS?

Answer: We think there are some issues when assuming FDD reciprocity with respect to angle, delay, and Doppler components of the UL/DL channels, and we don't see this reciprocity (especially with respect to the delay and Doppler components of the channel) in real-world channels. Moreover, it is not clear if current SRS is sufficient to estimate the Doppler components (especially the Doppler spread) of the channel.

in the simulation, is the speed of UE constant? How do you envision performance in the scenario of NLOS with varying UE speed?

Answer: A constant UE speed was assumed in the simulations. In NLOS environments, it is expected that more delays and Doppler components are needed for the PMI. Varying UE speeds will lead to varying Doppler components. The number of delays and Doppler components may depend on the scenario and UE speed.

11 – Fraunhofer IIS

Response to HuaWei Technologies Co.

Thanks for your interest in our contribution. Please find our response below.

The proposed codebook design seems based on DFT basis, but whether using eigen vector basis is more beneficial for the performance?

Answer: For the current analysis a DFT basis was assumed like in R15 for the beams or like in R16 for beams/SD and delays/FD. We did not analyze eigen-vector basis, but we are open for further discussions on this topic, if needed.

12 – Fraunhofer IIS

Response to Qualcomm communications-France

Thanks for your interest in our contribution. Please find our response below.

How to define "channel stationary time" quantitatively?

Answer: The channel stationarity time represents the change of the Doppler-delay spectrum over time. Simply speaking, it represents the correlation between adjacent time instances defined over a sliding window (when the correlation goes below a threshold of 90% or 95% the stationarity time is reached). Note that the calculation is quite similar to the coherence time (which represents the change of the beam-frequency spectrum over time).

Any channel prediction is adopted in the simulation?

Answer: The gNB uses the Doppler components to predict the PMI/precoder over a certain time interval (until new CSI is available). It was assumed that beams (SD components), delays (FD components) and Doppler components (TD components) do not change over this time interval. A DFT basis was used to model the Doppler components of the codebook.

The channel stationary time should be a function of Doppler spectrum, the simulation use a special channel with a bell-shape Doppler spectrum with average Doppler shift of near 0 Hz. can we still gain when Doppler spread increased, e.g., U-shape Doppler spectrum could be the worst case?

Answer: The channels used in the simulation are spatially consistent having U-shaped Doppler spectrum. The maximum Doppler shift of the U-shaped spectrum corresponds to the 20 km/h maximum speed of the UEs. So, the spectrum is not bell shaped around 0 Hz.

Why not use 30ms Rel-15 as baseline?

Answer: For the simulations, we used a reference of 5 ms. Of course, other values than the 5 ms can be considered, for example 30 ms. In such a case, the expected gain of the Doppler-based CSI reporting will even be larger than the gain shown in our Tdoc.

2.1.4 Round 2 Questions/Answers

Feedback Form 3: Round 2 QA on MIMO Enhancements for Rel-18 [RWS-210319]

1 – vivo Communication Technology

In TDD, current spec supports very short periodicity of SRS however SRS leads large overhead. In this sense, do you think it is possible to use SRS for precoder prediction with larger periodicity?

2.1.5 Reply to questions (round 2)

Feedback Form 4: QA on MIMO Enhancements (round 2) for Rel-18 [RWS-210319]

1 – Fraunhofer IIS

Response to vivo

In TDD, current spec supports very short periodicity of SRS however SRS leads large overhead. In this sense, do you think it is possible to use SRS for precoder prediction with larger periodicity?

Answer: We thank vivo for the follow-up question on CSI codebook enhancements for R18 MIMO. We envision a codebook that can be used for FDD and TDD systems. Possible enhancements on SRS (if needed) for CSI estimation/prediction can be separately discussed. The SRS periodicity determines the maximum Doppler shift of the channel. It should satisfy the sampling (Nyquist) theorem.

2.2 Mobile IAB (mIAB) for Rel-18 [RWS-210320]

2.2.1 Details and scope

Rel-18 should support mobile IAB (mIAB) use cases to overcome high in-vehicle penetration loss and to provide portable capacity hotspots and additional backhaul links.

As a part of the scope to address connectivity robustness and service continuity, the objectives for Rel-18 are:

- Evaluate and specify enhancements to the existing HO mechanisms to address group-mobility (UEs underneath the mIAB nodes) to reduce interruption and signaling overhead

- Evaluate and specify enhancements to the existing HO mechanisms to improve robustness and reduce signaling overhead associated with a frequent change of parent nodes for mIAB in dense FR2 network
- Evaluate and specify enhancements to the DC mechanism (together with HO) to enable a more robust and efficient change of Master/Secondary nodes, particularly in FR2.

To boost mIAB deployments, it is proposed that the scope for mIAB in Rel-18 includes support for mIAB infrastructure sharing and operation in the unlicensed spectrum. Here, the objectives are:

- Specify options/scenarios and minimum requirements for mIAB node sharing
- Specify enhancements in NR-U to support above options.

Due to dynamic network topology with mIAB nodes that creates a more complex interference environment, it is proposed that the scope for mIAB includes enhancements to interference management. The objectives within Rel-18 are:

- Specify enhancements to CLI mitigation mechanism
- Specify enhancements to resource coordination.

2.2.2 Questions&Answers

Feedback Form 5: Mobile IAB (mIAB) for Rel-18 [RWS-210320]

<p>1 – ROBERT BOSCH GmbH</p> <p>[Bosch] We support this feature as it can be used for in-vehicle relaying. However, we have this question for clarification:</p> <hr/> <p>-</p> <p>If sidelink supports commercial devices and supports relaying (at least U2N relay); should we also consider sidelink relay in these scenarios (or instead)?</p> <hr/> <p>-</p> <p>Accordingly, can you state the advantage/disadvantage of having either Uu or SL inside the vehicle ?</p>
<p>2 – Intel Corporation (UK) Ltd</p> <p><Intel></p> <p>Q1. We would like to understand more about concepts of "shared IAB node" and "shared IAB donor". Does "shared IAB node" mean multi-MTs in one IAB node? Does "shared IAB donor" mean it is connected to multiple PLMNs?</p>
<p>3 – LG Electronics Inc.</p> <p>We are also interested in mobility and interference enhancement for Rel-18 because reducing interruption by mobility is a key factor to provide stable backhaul performance. Regarding enhancements to HO/DC</p>

mechanisms in your contribution, is this intended only to enhance existing mechanisms, e.g., enhanced DAPS or DC-based zero-interruption mobility? Or any other enhancements do you expect?

4 – Lenovo Mobile Com. Technology

For the enhancements to enable NR-U in IAB, does it mean only the access links is in unlicensed, and why not to introduce the unlicensed spectrum for backhaul links.

And for the enhancements to HO/DC mechanisms, what's the difference with the current mechanisms which are discussed by R17 IAB.

5 – NTT DOCOMO INC.

For **Enhancements to enable NR-U on the access (DU)**, we have similar question as Lenovo that does it mean only NR-U for DU's access link, and if so what is the benefit of this scenario compared to operating both DU's access link and MT's backhaul link on NR-U.

6 – Apple GmbH

[Apple] Regarding the multiple IAB-MTs and the shared network environment in slide 4 we would like to clarify if the connection is indeed intended to PLMNs or NPNs/SNPNs?

2.2.3 Reply to questions (round 1)

Feedback Form 6: QA on Mobile IAB (mIAB) for Rel-18 [RWS-210320]

1 – Fraunhofer IIS

Response to ROBERT BOSCH GmbH

We support this feature as it can be used for in-vehicle relaying. However, we have this question for clarification:

-

If sidelink supports commercial devices and supports relaying (at least U2N relay); should we also consider sidelink relay in these scenarios (or instead)?

-

Accordingly, can you state the advantage/disadvantage of having either Uu or SL inside the vehicle ?

Thanks for your interest in our contribution and support of our proposal. Please find our response below.

Answer: We believe that SL and mIAB target different use cases. mIAB is a relay that can tackle high vehicular enclosure signal attenuation and supports various use cases for a number of UEs inside the vehicle – trains/busses/cars. It also extends coverage in rural areas and can extend capacity and coverage for outdoor users in hot-spot locations. We believe mIAB is a viable option as a vehicle-mounted relay, especially considering support for any data-intensive application for UEs in a vehicle due to available spectrum resources and full-fledged scheduling. mIAB, as a vehicle-mounted relay, could include support for SL, also enabling, e.g., platooning, extended sensors and other V2V/V2I/V2P use cases.

2 – Fraunhofer IIS

Response to Intel Corporation (UK) Ltd

Thanks for your interest in our contribution. Please find our response below.

We would like to understand more about concepts of "shared IAB node" and "shared IAB donor". Does "shared IAB node" mean multi-MTs in one IAB node? Does "shared IAB donor" mean it is connected to multiple PLMNs?

Answer: A shared IAB node can be realised in different ways. One option is multiple MTs in one node, each connecting to their respective IAB donors. The other option is that the IAB node is shared (both DU and MT) by multiple PLMNs. When the IAB donor is shared, it supports multiple PLMNs and can connect to multiple PLMNs' CNs or gNBs.

3 – Fraunhofer IIS

Response to LG Electronics Inc.

Thanks for your interest in our contribution. Please find our response below.

We are also interested in mobility and interference enhancement for Rel-18 because reducing interruption by mobility is a key factor to provide stable backhaul performance. Regarding enhancements to HO/DC mechanisms in your contribution, is this intended only to enhance existing mechanisms, e.g., enhanced DAPS or DC-based zero-interruption mobility? Or any other enhancements do you expect?

Answer: We believe that the existing solutions – DAPS, CHO and DC-based solutions should be considered as a basis for enhancements with mIAB. The enhancements should particularly be targeted/optimised for dense FR2 deployments.

4 – Fraunhofer IIS

Response to Lenovo Mobile Com. Technology

Thanks for your interest in our contribution. Please find our response below.

For the enhancements to enable NR-U in IAB, does it mean only the access links are in unlicensed, and why not to introduce the unlicensed spectrum for backhaul links.

Answer: This is partially a matter of scoping the work for a single release. For mIAB in Rel-18, we believe we should first consider an option where NR-U is on the access side. MT and DU operating both in the unlicensed spectrum poses challenges of access to unlicensed spectrum, resource management and coordination between MT and DU. Also, while DU can be seen as an indoor access point, MT will operate outdoor. Variations in the unlicensed spectrum occupancy and interference in outdoor environment coupled with mobility could be significant. Such variations will affect all users in a car, bus or on a train. Hence, we believe that options with licensed spectrum in the backhaul should be in the scope in the first release.

And for the enhancements to HO/DC mechanisms, what's the difference with the current mechanisms which are discussed by R17 IAB.

Answer: DAPS is currently not supported in FR2, which is of particular interest for IAB. Furthermore, we understand that there was a de-prioritisation of DAPS-like solution for IAB nodes during this week's Plenary meeting for Rel-17. Also, we believe that current solutions for DC should be optimised for mobility interruption and frequent change of Master/Secondary nodes, which will be the case for mIAB in FR2.

5 – Fraunhofer IIS

Response to NTT DOCOMO INC.

Thanks for your interest in our contribution. Please find our response below.

For Enhancements to enable NR-U on the access (DU), we have similar question as Lenovo that does it mean only NR-U for DU's access link, and if so what is the benefit of this scenario compared to operating both DU's access link and MT's backhaul link on NR-U.

Answer: This is partially a matter of scoping the work for a single release. For mIAB in Rel-18, we believe the standards should first consider an option where NR-U is on the access side. MT and DU operating both in the unlicensed spectrum poses challenges of access to unlicensed spectrum, resource management and coordination between MT and DU. Also, while DU can be seen as an indoor access point, MT will operate outdoor. Variations in the unlicensed spectrum occupancy and interference in outdoor environment coupled with mobility could be significant. Such variations will affect all users in a car, bus or on a train. Hence, we believe that options with licensed spectrum in the backhaul should be in the scope in the first release.

6 – Fraunhofer IIS

Response to Apple

Thanks for your interest in our contribution. Please find our response below.

Regarding the multiple IAB-MTs and the shared network environment in slide 4 we would like to clarify if the connection is indeed intended to PLMNs or NPNs/SNPNs?

Answer: The connection shown is towards different PLMNs core networks, according to well-established different network sharing configurations (e.g., MORAN, MOCN). Connections towards NPN/SNPNs are not precluded, and it would be a part of the scope to cover all relevant options, including NPN/SNPNs.

Feedback Form 7: Round 2 QA on Mobile IAB (mIAB) for Rel-18 [RWS-210320]

3 Summary

We thank all companies for the constructive questions and comments in the first and second round of the discussions. We are open for further offline discussions and clarifications.

2.1 MIMO Enhancements for Rel-18 [RWS-210319]

In the two rounds we got questions from 13 companies that underline the interest in this topic. Here in brief the comments and questions that were raised are summarized:

- CSI enhancements based on Doppler-domain compression for moderate and high mobility scenarios are considered as important
- Does the CSI enhancements include CSI prediction at the gNB side? - yes
- Other than CSI codebook enhancement based on Doppler-domain compression, do you also foresee other areas of enhancement, e.g. CSI-RS and DM-RS design? – CSI-RS/DM-RS design changes may not be needed, however, CSI measurement enhancement are foreseen.
- Is it possible for gNB to predict CSI based on UL signal, e.g. SRS? – There are some doubts especially for FDD; in case of TDD possible enhancements on SRS (if needed) for CSI estimation/prediction can be separately discussed to codebook enhancements.

Mobile IAB in Release 18 (RWS-210320)

Fraunhofer submitted its proposal on the scope and objectives for mIAB for Rel-18. Six companies participated in Round 1 comments/questions, which can be grouped as follows:

Inclusion of Sidelink in mIAB scenarios and the advantages/disadvantages of each of the interfaces (Uu and SL) Enhancements to HO/DC mechanisms – are they related to the existing mechanisms (DAPS, DC) and what are the differences compared to current mechanisms discussed for IAB in Rel-17 Use of unlicensed spectrum on the backhaul, in addition to the unlicensed spectrum use on the access side Infrastructure sharing (mIAB node/IAB donor) Network sharing with NPN/SNPN