**3GPP TSG-RAN WG2 Meeting#110-e R2-200xxxx**

**Electronic, 1 - 12 June 2020**

**Agenda Item:**  **6.0.3**

**Source: Huawei, HiSilicon**

**Title: Summary of [AT110-e][075][NR16] Conflicting Configurations (Huawei)**

**Document for:** **Discussion and Decision**

1 Introduction

This document is the summary of the following discussion:

**[AT110-e][075][NR16] Conflicting Configurations (Huawei)**

Scope: Treat R2-2006057 (R1 Reply LS on conflicting configurations), R2-2004905 (H003), R2-2005262 (H245), R2-2005261 (H244), possibly other related papers (e.g. for URLLC, NR-U, eMIMO)

Intended outcome: Determine Impact R1 reply LS, Treat Related documents, Agree solutions.

Deadline: Wed June 10 0500 UTC

This discussion includes the following:

R2-2006057 Reply LS on Conflicting configurations (R1-2004808; contact: Huawei) RAN1 LS in Rel-16 NR\_L1enh\_URLLC-Core, NR\_eMIMO-Core, NR\_unlic-Core To:RAN2

[R2-2004951](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_110-e/Docs/R2-2004951.zip) [H003] On merging uplink TDRA into one IE Ericsson draftCR Rel-16 38.331 16.0.0 NR\_unlic-Core, NR\_L1enh\_URLLC-Core

[R2-2005262](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_110-e/Docs/R2-2005262.zip) [38.331][H245] TP for PUSCH-TimeDomainResourceAllocationList Huawei, HiSilicon discussion Rel-16 NR\_L1enh\_URLLC-Core, NR\_unlic-Core Late

- Huawei explains that this document resolves the same thing.

- QC think we should wait for R1. Huawei don’t think this is related to enabling the features at the same time. We should do this in any case.

- Ericsson think that in any case we don’t need to have configuration issues in R2.

- Nokia wonder which TS version this is. Ericsson explains that it is based on a ASN.1 intermediate version. Nokia would be ok to do this.

- Ericsson think we asked R1 both about UL and DL.

**We assume we go this way, wait for R1 reply for final decision (in case there are issues).**

[R2-2005261](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_110-e/Docs/R2-2005261.zip) [38.331][H244] TP for PDSCH-TimeDomainResourceAllocationList Huawei, HiSilicon discussion Rel-16 NR\_eMIMO-Core, NR\_L1enh\_URLLC-Core Late

- Nokia think the lesser compatibility will trigger more full configs and are not sure this is the best way.

- Chair: can think about this for a cpl of days or so

# 2 Discussion

## 2.1 Questions 1-1/1-2

RAN1 provided the following answers:

**1)** **dmrs-UplinkTransformPrecoding-r16**

dmrs-UplinkTransformPrecoding-r16 is in the IE DMRS-UplinkConfig and is optional with the condition that "tp-pi2BPSK is included in PUSCH-Config". DMRS-UplinkConfig is used for several fields:

- in PUSCH-Config: dmrs-UplinkForPUSCH-MappingTypeA/B and dmrs-UplinkForPUSCH-MappingTypeA/B-ForDCI-Format0-2-r16

- in ConfiguredGrantConfig: for cg-DMRS-Configuration

**Q1-1**) Can dmrs-UplinkTransformPrecoding-r16 be configured for DCI format 0-2?

**[Answer]: Yes.**

**Q1-2**) Is it possible to configure dmrs-UplinkTransformPrecoding-r16 independently for each mapping type of DCI formats other than 0-2 and for each mapping type of DCI format 0-2 (if the answer to Q1-2 is "yes") or what are the restrictions?

**[Answer]: Yes. There is no restriction for the configuration of the parameter from RAN1 perspective.**

The corresponding fields are

PUSCH-Config ::= SEQUENCE {

dataScramblingIdentityPUSCH INTEGER (0..1023) OPTIONAL, -- Need S

txConfig ENUMERATED {codebook, nonCodebook} OPTIONAL, -- Need S

dmrs-UplinkForPUSCH-MappingTypeA SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

dmrs-UplinkForPUSCH-MappingTypeB SetupRelease { DMRS-UplinkConfig } OPTIONAL, -- Need M

-- other fields skipped

dmrs-UplinkForPUSCH-MappingTypeA-ForDCI-Format0-2-r16 SetupRelease { DMRS-UplinkConfig }

OPTIONAL, -- Need M

dmrs-UplinkForPUSCH-MappingTypeB-ForDCI-Format0-2-r16 SetupRelease { DMRS-UplinkConfig }

OPTIONAL, -- Need M

DMRS-UplinkConfig ::= SEQUENCE {

dmrs-Type ENUMERATED {type2} OPTIONAL, -- Need S

dmrs-AdditionalPosition ENUMERATED {pos0, pos1, pos3} OPTIONAL, -- Need S

phaseTrackingRS SetupRelease { PTRS-UplinkConfig } OPTIONAL, -- Need M

maxLength ENUMERATED {len2} OPTIONAL, -- Need S

transformPrecodingDisabled SEQUENCE {

scramblingID0 INTEGER (0..65535) OPTIONAL, -- Need S

scramblingID1 INTEGER (0..65535) OPTIONAL, -- Need S

...,

[[

dmrs-Uplink-r16 ENUMERATED {enabled} OPTIONAL -- Need R

]]

} OPTIONAL, -- Need R

transformPrecodingEnabled SEQUENCE {

nPUSCH-Identity INTEGER(0..1007) OPTIONAL, -- Need S

sequenceGroupHopping ENUMERATED {disabled} OPTIONAL, -- Need S

sequenceHopping ENUMERATED {enabled} OPTIONAL, -- Need S

...,

[[

dmrs-UplinkTransformPrecoding-r16 DMRS-UplinkTransformPrecoding-r16 OPTIONAL

-- Cond PI2-BPSK

]]

} OPTIONAL, -- Need R

...

}

Based on the above fields, it appears that 38.331 is suitable as it is. Note that RAN2 could have asked the same question about dmrs-Uplink-r16, but it was somehow forgotten.

**Q1: Do companies agree that no change is needed?**

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes/No) | Comments |
| Ericsson | Yes |  |
|  |  |  |

**Q2: If a reply LS is sent (if needed), do company agree to inform RAN1 that according to current 38.331, dmrs-Uplink-r16 can also be configured for DCI format 0-2 ?**

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes/No) | Comments |
| Ericsson | Yes |  |
|  |  |  |

## 2.2 Questions 2-1/2-2

RAN1 provided the following answers:

**2) dmrs-Downlink-r16**

dmrs-Downlink-r16 is in DMRS-DownlinkConfig which is used for several fields in PDSCH-Config: dmrs-DownlinkForPDSCH-MappingTypeA/B and dmrs-DownlinkForPDSCH-MappingTypeA/BForDCI-Format1-2-r16.

DCI format 1-2 is introduced in URLLC WI but dmrs-Downlink-r16 is introduced in eMIMO WI.

**Q2-1**) Can dmrs-Downlink-r16 be used for DCI format 1-2?

**[Answer]: Yes.**

**Q2-2**) Is it possible to configure dmrs-Downlink-r16 independently for each mapping type of DCI formats other than 1-2 and for each mapping type of DCI format 1-2 (if the answer to Q2-1 is "yes") or what are the restrictions?

**[Answer]: Yes. There is no restriction for the configuration of the parameter from RAN1 perspective.**

The corresponding fields are

PDSCH-Config ::= SEQUENCE {

dataScramblingIdentityPDSCH INTEGER (0..1023) OPTIONAL, -- Need S

dmrs-DownlinkForPDSCH-MappingTypeA SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

dmrs-DownlinkForPDSCH-MappingTypeB SetupRelease { DMRS-DownlinkConfig } OPTIONAL, -- Need M

-- other fields skipped

dmrs-DownlinkForPDSCH-MappingTypeAForDCI-Format1-2-r16 SetupRelease { DMRS-DownlinkConfig }

OPTIONAL, -- Need M

dmrs-DownlinkForPDSCH-MappingTypeBForDCI-Format1-2-r16 SetupRelease { DMRS-DownlinkConfig }

OPTIONAL, -- Need M

DMRS-DownlinkConfig ::= SEQUENCE {

dmrs-Type ENUMERATED {type2} OPTIONAL, -- Need S

dmrs-AdditionalPosition ENUMERATED {pos0, pos1, pos3} OPTIONAL, -- Need S

maxLength ENUMERATED {len2} OPTIONAL, -- Need S

scramblingID0 INTEGER (0..65535) OPTIONAL, -- Need S

scramblingID1 INTEGER (0..65535) OPTIONAL, -- Need S

phaseTrackingRS SetupRelease { PTRS-DownlinkConfig } OPTIONAL, -- Need M

...,

[[

dmrs-Downlink-r16 ENUMERATED {enabled} OPTIONAL -- Need R

]]

}

Based on the above fields, it appears that 38.331 is suitable as it is. Note that RAN2 could have asked the same question about dmrs-Uplink-r16, but it was somehow forgotten.

**Q3: Do companies agree that no change is needed?**

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes/No) | Comments |
| Ericsson | Yes |  |
|  |  |  |

## 2.3 Questions 3-1/3-2

RAN1 provided the following answers:

**3)** **PDSCH time domain resource allocation**

PDSCH-TimeDomainResourceAllocation can be configured with repetitionNumber. Meanwhile, pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 was introduced in PDSCH-Config.

**Q3-1**) Can the PDSCH time domain resource allocation for DCI format 1-2 support the use of repetitionNumber?

**[Answer]: Yes.**

**Q3-2**) If the answer to Q3-1 is yes, can repetitionNumber be configured in the PDSCH time domain resource allocation for DCI format 1-2 if it is not configured in the time domain resource allocation for other DCI formats (and vice-versa), or should it be configured in the PDSCH time domain resource allocation for all DCI formats or for none?

**[Answer]: Yes. The configuration of the repetitionNumber in pdsch-TimeDomainResourceAllocationList and in pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 is independent.**

The corresponding fields are

PDSCH-Config ::= SEQUENCE {

pdsch-TimeDomainAllocationList SetupRelease { PDSCH-TimeDomainResourceAllocationList }

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationListForDCI-Format1-2-r16

SetupRelease { PDSCH-TimeDomainResourceAllocationList }

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationList-v16xy

SetupRelease { PDSCH-TimeDomainResourceAllocationList-v16xy }

OPTIONAL, -- Need M

PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation

PDSCH-TimeDomainResourceAllocation ::= SEQUENCE {

k0 INTEGER(0..32) OPTIONAL, -- Need S

mappingType ENUMERATED {typeA, typeB},

startSymbolAndLength INTEGER (0..127)

}

PDSCH-TimeDomainResourceAllocationList-v16xy ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation-v16xy

PDSCH-TimeDomainResourceAllocation-v16xy ::= SEQUENCE {

repetitionNumber-r16 ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16} OPTIONAL -- Need R

}

Since pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 is using PDSCH-TimeDomainResourceAllocation, which does not include repetitionNumber, some change is needed.

One option (option 1) is to add one more field in PDSCH-Config:

PDSCH-Config ::= SEQUENCE {

pdsch-TimeDomainAllocationList SetupRelease { PDSCH-TimeDomainResourceAllocationList }

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationListForDCI-Format1-2-r16

SetupRelease { PDSCH-TimeDomainResourceAllocationList }

pdsch-TimeDomainAllocationListForDCI-Format1-2-v16xy-r16

SetupRelease { PDSCH-TimeDomainResourceAllocationList-v16xy }

OPTIONAL, -- Need M

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationList-v16xy

SetupRelease { PDSCH-TimeDomainResourceAllocationList-v16xy }

OPTIONAL, -- Need M

Another option (option 2) is to create a PDSCH-TimeDomainResourceAllocationList-r16 which includes the additional parameter, e.g.

PDSCH-Config ::= SEQUENCE {

pdsch-TimeDomainAllocationList SetupRelease { PDSCH-TimeDomainResourceAllocationList }

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationListForDCI-Format1-2-r16

SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationList-v16xy

SetupRelease { PDSCH-TimeDomainResourceAllocationList-v16xy }

OPTIONAL, -- Need M

PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation

PDSCH-TimeDomainResourceAllocation ::= SEQUENCE {

k0 INTEGER(0..32) OPTIONAL, -- Need S

mappingType ENUMERATED {typeA, typeB},

startSymbolAndLength INTEGER (0..127)

}

PDSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation-r16

PDSCH-TimeDomainResourceAllocation-r16 ::= SEQUENCE {

pdsch-TimeDomainResourceAllocation PDSCH-TimeDomainResourceAllocation

pdsch-TimeDomainResourceAllocation-v16xy PDSCH-TimeDomainResourceAllocation-v16xy,

...

}

PDSCH-TimeDomainResourceAllocationList-v16xy ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation-v16xy

PDSCH-TimeDomainResourceAllocation-v16xy ::= SEQUENCE {

repetitionNumber-r16 ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16} OPTIONAL -- Need R

}

-- TAG-PDSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP

-- ASN1STOP

Compared to option 1, option 2 avoids adding a new field to PDSCH-Config.

Since there are many fields in PDSCH-Config, this is more readable. In addition, should a new DCI format be added later, which uses a specific TDRA list, only one field will be needed in PSCH-Config (instead of 2 in option 1).

Yet another option (option 3) is to use PDSCH-TimeDomainResourceAllocationList-r16 like option 2, but not only for DCI format 1\_2, also for other DCI formats (1\_0 and 1\_1). In this case, when the network configures pdsch-TimeDomainAllocationList-r16, the network also releases pdsch-TimeDomainAllocationList if it was configured.

This is described below:

PDSCH-Config ::= SEQUENCE {

pdsch-TimeDomainAllocationList SetupRelease { PDSCH-TimeDomainResourceAllocationList }

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationListForDCI-Format1-2-r16

SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }

OPTIONAL, -- Need M

-- other fields skipped

pdsch-TimeDomainAllocationList-r16

SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }

OPTIONAL, -- Need M

PDSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation

PDSCH-TimeDomainResourceAllocation ::= SEQUENCE {

k0 INTEGER(0..32) OPTIONAL, -- Need S

mappingType ENUMERATED {typeA, typeB},

startSymbolAndLength INTEGER (0..127)

}

PDSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation-r16

PDSCH-TimeDomainResourceAllocation-r16 ::= SEQUENCE {

k0 INTEGER(0..32) OPTIONAL, -- Need S

mappingType ENUMERATED {typeA, typeB},

startSymbolAndLength INTEGER (0..127),

repetitionNumber ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16}

OPTIONAL, -- Cond Formats1-0and1-1

...

}

Options 1 and 2 have slightly more flexibility than option 3, as it is possible to omit the field without suffix when only repetitionNumber needs to be (re-)configured. That field is at most 24 bytes (16 elements of 9 bits).

One needs to judge whether the slight benefit justifies the slight complexity of options 1/2.

**Q4: Do company agree that some change, such as in the above options, is needed? Which option(s) do company prefer?**

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes/No)  Option(s) | Comments |
| Ericsson | Option 2 or 3. Preference on Option3 | If we do Option 2, “n1” must be added to repetitionNumber as this option forces to configure this parameter to ALL elements of the PDSCH-TimeDomainResourceAllocationList. |
|  |  |  |

## 2.4 Questions 4-1/4-2

RAN1 provided the following answers:

**4)** **PUSCH time domain resource allocation**

For **URLLC,** a new Rel-16 IE, PUSCH-TimeDomainResourceAllocationNew-r16 (name will have to be changed to avoid "New"), was defined which includes the parameters of PUSCH-TimeDomainResourceAllocation plus startSymbol, length and numberOfRepetitions. In addition, mappingType and startSymbolAndLength, which were mandatory in the Rel-15 IE PUSCH-TimeDomainResourceAllocationList, are optional in the Rel-16 IE.

For **NR-U**, a new Rel-16 IE, PUSCH-TimeDomainResourceAllocation (name will have to be changed as well), was defined (in this meeting, so not in 38.331 v 16.0.0) which includes multiplePUSCH-Allocations where each allocation is defined by mappingType and startSymbolAndLength.

The new URLLC Rel-16 IE is used in PUSCH-Config for pusch-TimeDomainAllocationListForDCI-Format0-2-r16 and pusch-TimeDomainAllocationListForDCI-Format0-1-r16.

The Rel-15 version PUSCH-TimeDomainResourceAllocationList is used for pusch-TimeDomainAllocationList in PUSCH-Config and pusch-TimeDomainAllocationList in PUSCH-ConfigCommon.

**Q4-1)** Can the multiplePUSCH-Allocations (introduced for NR-U) and startSymbol, length and numberOfRepetitions (introduced for URLLC) be configured in the same PUSCH time domain resource allocation table, used for one of the 2 above underlined fields?

**[Answer]: No for Rel-16.**

**Q4-2)** Can the multiplePUSCH-Allocations (introduced for NR-U) be used for one of the 2 above underlined fields while startSymbol, length and numberOfRepetitions (introduced for URLLC) are used in another of the above underlined fields?

In Q4-3 and Q4-4, if the answer is "yes", please indicate all the associated restrictions if any.

**[Answer]: No for Rel-16.**

According to RAN1 response no modification of current 38.331 is required.

**Q5: Do company agree that the above answer from RAN1 does not require any modification to 38.331?**

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes/No)  Option(s) | Comments |
| Ericsson | Yes | They are now separately configured by different IEs and, functional-wise, the features are covered. |
|  |  |  |

Nevertheless, it can be observed that there are now 3 IEs for a PUSCH TDRA list:

- PUSCH-TimeDomainResourceAllocationList,

- PUSCH-TimeDomainResourceAllocationListNew

- PUSCH-TimeDomainResourceAllocationListForMultiPUSCH.

They include the following fields

|  |  |  |  |
| --- | --- | --- | --- |
| Field | PUSCH-TDRAList | PUSCH-TDRAListNew | PUSCH-TDRAListForMultiPUSCH |
| k2 | INTEGER(0..32) | INTEGER(0..32) | INTEGER (0..32) |
| multiplePUSCH-Allocations |  |  | List of the following fields |
| mappingType | ENUMERATED {typeA, typeB} | ENUMERATED {typeA, typeB} OPTIONAL | ENUMERATED {typeA, typeB} |
| startSymbolAndLength | INTEGER (0..127) | INTEGER (0..127) OPTIONAL | INTEGER (0..127) |
| startSymbom |  | INTEGER (0..13) |  |
| length |  | INTEGER (1..14) |  |
| numberOfRepetitions |  | ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16} |  |

Even though there are differences, 3 fields have the same name and the same value range in the 3 IEs.

Supposing it is necessary to clarify the description of one of these 3 fields, one should consider whether the same clarification applies in the 3 places or not. If a clarification is agreed in one place only, the reader can wonder wether it is a mistake or whether it is on purpose.

In order to avoid this kind of problem, it is beneficial to have a single description covering all cases.

R2-2004951 is proposing to make PUSCH-TDRAListNew and PUSCH-TDRAListForMultiPUSCH a single IE.

R2-2005262 is proposing to make a single IE out of the 3 IEs.

At this stage, companies are asked about the intention, not about a detailed wording. Text proposals in the listed Tdocs could be modified to take into account comments.

**Q5: Do company see the benefit to define 1 IE (or 2 IEs) instead of 3 IEs for PUSCH-TDRAList? If yes, any preference between a single IE or two IEs, as suggested above?**

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes/No)  Preference | Comments |
| Ericsson | Yes | The essence of the proposals in the two papers R2-2005262 and R2-2004951 is the same, i.e., defining a single IE for all Rel-16 features.  If possible, the Rel-16 IE should also include the Rel-15 features and the principle in R2-2005262 is preferred. |
|  |  |  |

## 2.5 Questions 5-1/5-2/5-3

RAN1 provided the following answers:

**5)** **DCI format 1\_2 applicability to features introduced in NR\_eMIMO WI**

The IE ControlResourceSet includes both tci-PresentInDCI and tci-PresentInDCI-ForDCI-Format1-2. Currently both parameters can be configured in all or some CORESETs of the UE and these CORESETs may be configured with CORESETPoolIndex (mPDCCH mTRP). Further, eMIMO WI introduced a new TCI state mapping MAC CE in TS 38.321 6.1.3.24 where two TCI states can be mapped to one DCI codepoint. Currently, there is no limitation which DCI format this new MAC CE in TS 38.321 6.1.3.24 applies to.

**Q5-1)** Can the UE be configured with both DCI format 1\_1 and DCI format 1\_2 with TCI field, either in the same or different CORESETs? And can the value of tci-PresentInDCI-ForDCI-Format1-2 be different in different CORESETs?

**[Answer]: Yes to both questions.**

**Q5-2)** Can the UE be configured with mPDCCH mTRP (have at least on CORESET with CORESETPoolIndex=1) and the parameter tci-PresentInDCI-ForDCI-Format1-2?

**[Answer]: Yes.**

**Q5-3)** Does the Enhanced TCI state MAC CE in TS 38.321 6.1.3.24 apply to DCI1\_2?

**[Answer]: Yes.**

According to RAN1 response no modification of current 38.331 is required.

One observation though is that DCI format 1\_2 may be configured to have less bits for DCI field so it probably should be stated how the UE interprets the MAC CEs which are done for the full DCI field length.

This could be specified in 38.321 (since this is where MAC CEs are specified).

**Q6: Do companies agree that there is no need to change 38.331 and that some explanation should be added in 38.321 to for the case of DCI format 1\_2?**

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes/No) | Comments |
| Ericsson | unclear | As result from MIMO WI discusson, there is LS being drafted to ask RAN1 if they could specify this. Si issue will likely delay until August, but this has no ASN.1 impact. |
|  |  |  |

# 3 Conclusion

# Annex TP