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| Technical Report | |
| 3rd Generation Partnership Project;  Technical Specification Group Radio Access Network;  Study on support of reduced capability NR devices  (Release 17) | |
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# Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

# 1 Scope

This document captures the findings from the study item "Study on support of reduced capability NR devices" [2].

The study includes identification and study of potential UE complexity reduction techniques and UE power saving and battery lifetime enhancements for reduced capability UEs in applicable use cases, functionality that will enable the performance degradation of such complexity reduction to be mitigated or limited, principles for how to define and constrain such reduced capabilities, and functionality that will allow devices with reduced capabilities to be explicitly identifiable to networks and networks operators and allow operators to restrict their access if desired.

The scope of the study includes support for all FR1/FR2 bands for FDD and TDD and coexistence with Rel-15/16 UEs. This study focuses on SA mode and single connectivity. The scope of the study does not include LPWA use cases.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP RP-201677: "Revised SID on support of reduced capability NR devices".

[3] 3GPP R1-2009293: "FL summary on RedCap evaluation results".

[4] 3GPP TR 36.888: "Study on provision of low-cost Machine-Type Communications (MTC) User Equipments (UEs) based on LTE".

[5] 3GPP TR 38.830: "Study on NR coverage enhancements".

[6] 3GPP TR 38.840: "Study on User Equipment (UE) power saving in NR".

[7] 3GPP R1-070674: "LTE physical layer framework for performance verification", Orange, China Mobile, KPN, NTT DoCoMo, Sprint, T-Mobile, Vodafone, Telecom Italia.

[8] 3GPP R2-2009116: "Further considerations for eDRX", MediaTek.

[9] 3GPP R2-2009620: "RedCap power saving enhancements", Ericsson.

*\*\*\* skip non-related part \*\*\**

# 8 UE power saving features

## 8.1 Introduction to UE power saving features

The following UE power saving techniques have been studied:

- Reduced PDCCH monitoring by smaller numbers of blind decodes and CCE limits

- Extended DRX for RRC Inactive and/or Idle

- RRM relaxation for stationary devices

The outcomes of the studies of these techniques are captured in clauses 8.2 through 8.4, respectively, and summarized in clause 13.

*\*\*\* skip non-related part \*\*\**

## 8.3 Extended DRX for RRC Inactive and/or Idle

### 8.3.1 Description of feature

In LTE connected to EPC, the UE may be configured with an extended DRX (eDRX) cycle. The UE may operate in eDRX only if the UE is configured by NAS and the cell indicates support for eDRX in System Information. Note that there is no System Information indication for NB-IoT. In RRC\_IDLE, the eDRX cycle has the maximum value of 2621.44 seconds (43.69 minutes). For NB-IoT the maximum is 10485.76 seconds or 2.91 hours. Hyper SFN (H-SFN) is broadcasted in System Information and incremented by one when SFN wraps around. The Paging Hyperframe (PH) refers to the H-SFN in which the UE starts to monitor for paging during a Paging Time Window (PTW).

From RAN2 perspective, extended DRX can be specified and configured for RedCap UEs so that eDRX cycles can be used in RRC\_IDLE and in RRC\_INACTIVE states.

If extension of the eDRX cycles beyond 10.24 seconds is specified, a feasible extension mechanism is expected to be similar to what is specified for LTE. This mechanism would include the use of H-SFN, PH and PTW.

For RedCap UEs in RRC\_IDLE or RRC\_INACTIVE, if the eDRX cycle is less than or equal to 10.24 seconds, the paging monitoring configuration does not use PTW and PH. Specifically for 10.24s, the pros and cons of not using PTW and PH are as follows:

Pros:

* It enables longer eDRX cycles needed by some RedCap UEs and yet allow other UEs that do not need long eDRX cycles (>10.24s) to reuse NR R16 eDRX implementation without additional development work and without a need for an explicit capability signalling.
* NR already has 10.24sec interval in C-DRX
* For 10.24 s and RRC\_INACTIVE similar solution was adopted for LTE in eMTC

Cons:

* It is different from LTE solution for eDRX cycle = 10.24s in RRC\_IDLE
* It will impact 5GC and RAN2 will need to inform/consult SA2/CT1
* UE can no longer have multiple opportunities to receive its paging during an eDRX cycle

#### 8.3.1.1 eDRX in RRC\_IDLE

For the lower bound of the eDRC cycle, one motivation to support down to 2.56s is that (at least some) REDCAP UEs should be able to support the reception of emergency broadcast services (e.g. ETWS primary notification) within the required delay budget (of 4 seconds), which is not possible with 5.12s eDRX cycle lengths. However other solutions exist allowing REDCAP UEs to receive emergency broadcast services without requiring eDRX to support lower cycle values than legacy LTE (5.12s):

* For RedCap UEs, if the NAS configures the UE with a 2.56 DRX cycle, the RedCap UE follows this DRX even when the RAN paging cycle is shorter.
* gNB can configure 2.56s default broadcasted DRX cycle for those RedCap UEs that need to receive emergency broadcast services and a shorter UE-specific RAN paging cycle for UEs with tighter latency requirements (e.g. smartphones)

The former solution is similar to supporting eDRX cycle of 2.56s in that the UE does not need to follow shorter RAN (dedicated or default) paging cycle, and therefore has the same pros/cons: it enables a mix of smartphones and wearables in the network, with an appropriate paging cycle configured for each of them. However, these solutions assumes such REDCAP UEs do not need to monitor gNB configured default broadcasted paging (and UE-specific RAN paging) cycles which presents a potential risk of UE missing SI change indicator.

The latter solution is consistent with the LTE solution, but a default broadcasted DRX value of 2.56s is expected seldom used in existing deployments supporting smartphones and requires configuring on top a UE-specific RAN paging cycle for each such smartphones.

For the upper bound, the eDRX cycle should support up to 10485.76s, since the upper limit of the H-SFN (10bit) already is 10485.76s, and CN already supports eDRX values up to 10485.76s. Although no REDCAP use cases that require eDRX cycles beyond 2621.44s have been identified yet and little power saving gain has been observed beyond 2621.44s (simulation results show that the gain is saturated at around 40mins), there is no reason to artificially limit without technical concern.

#### 8.3.1.2 eDRX in RRC\_INACTIVE

RAN2 sees a benefit in extending the eDRX cycle in RRC\_INACTIVE beyond 10.24s for REDCAP UEs for the following reasons:

* It is very beneficial to have >10.24 sec in RRC\_INACTIVE to effectively support the usage of SDT (small data transfer) for e.g. use cases with periodic uplink data with periodicity > 10.24 s. TS 22.104 provides such usecases, e.g. some industrial wireless sensors need to transfer small packets while they are not very sensitive to DL traffic delay, but they have strict battery lifetime requirement
* Based on the results in the Appendix, there is a clear power saving gain vs eDRX in RRC\_IDLE at least for eDRX cycles of 10.24 s – couple of minutes, where the UE in eDRX in RRC\_INACTIVE additionally benefits from less signaling. Based on these results, lifetime of several years would not be achievable in some cases (e.g. 1 minute IAT) if only RRC\_IDLE can be used, because of the signaling overhead
* Signaling reduction is an additional benefit from network point of view – there is need for less RRC signaling

The resulting issues are:

* Impact on NAS retransmission, SA2/CT1 must be involved
* Potential handling of different eDRX cycles > 10.24s and/or PTWs, one for IDLE the other for INACTIVE
* It needs to be studied which Node decides the eDRX cycle for RRC\_INACTIVE

As a starting point a common PTW and eDRX cycle configuration for RRC\_IDLE and RRC\_INACTIVE, should be considered, justified by its simplicity. More flexible solutions can be considered if shown beneficial.

Two options should be considered for the deciding node for the eDRX configuration for inactive:

Option 1: CN decides the eDRX parameters for RRC\_INACTIVE

* CN has better insight on UE traffic profile
* Better for addressing the NAS retransmission timer issue
* CN is responsible for eDRX in RRC\_IDLE (and UE needs to monitor for CN paging also in RRC\_INACTIVE)

Option 2: RAN decides the eDRX parameters for RRC\_INACTIVE

* It provides more flexibility to the RAN node in the configuration of the eDRX parameters
* It allows RAN to configure different eDRX cycle for RRC INACTIVE
* In R16 eMTC connected to 5GC, it is already NR-RAN that choses and configures the final eDRX cycle for RRC\_INACTIVE, based on idle mode eDRX cycle as provided by the AMF

### 8.3.2 Analysis of UE power saving

Annex E.1 lists power saving results and analysis..

In summary, one source finds that an eDRX cycle of 10485.76 seconds (2.91 hours) can result in power saving between 34-80 % for a high SINR case and between 56-91 % for a low SINR using an RRC\_IDLE DRX cycle (with equal PTW length) from 2.56 seconds down to 320 ms. One source provides a plot of possible UE battery lifetime against eDRX cycle length. The battery lifetime for a UE with a 2-minute eDRX cycle compared to the same device with 10.24 s eDRX cycle is shown to result in between 0.38 – 340 % improvements for RRC\_IDLE and 1-419 % improvements for RRC\_INACTIVE, respectively. The evaluation has been performed for various use cases and inter-arrival times from 100 ms up to 5 min.

Editor’s note: FFS RAN2 agreed conclusions and possible recommendations and references to other results.

### 8.3.3 Analysis of performance impacts

### 8.3.4 Analysis of coexistence with legacy UEs

### 8.3.5 Analysis of specification impacts

*\*\*\* skip non-related part \*\*\**

# 13 Conclusions and recommendations

UE complexity reduction techniques have been analysed individually in clauses 7.2 through 7.7 as well as in different combinations in clause 7.8 (cost/complexity), clause 9 (coverage recovery), and clause 12 (impact on network capacity and spectral efficiency). The main observations from the coverage recovery evaluations are summarized in clause 9.1.5.

Based on the analysis of the UE complexity reduction techniques, the following is recommended for a RedCap UE.

- Maximum UE bandwidth:

- Maximum bandwidth of an FR1 RedCap UE during and after initial access is 20 MHz

- Whether an FR1 RedCap UE can optionally support a maximum bandwidth larger than 20 MHz after initial access can be discussed during the WI phase or at RAN plenary.

- Maximum bandwidth of an FR2 RedCap UE during and after initial access is 100 MHz

- Number of Rx branches:

- For FR1 FDD or FR2 bands where a non-RedCap UE is required to be equipped with a minimum of 2 Rx branches, the minimum number of Rx branches supported by specification for a RedCap UE is 1. The specification also supports of 2 Rx branches for a RedCap UE.

- For FR1 TDD bands where a non-RedCap UE is required to be equipped with a minimum of 4 Rx branches, the minimum number of Rx branches supported by specification for a RedCap UE is *N*, where *N* is to be down-selected during the WI phase or at RAN plenary between the following alternatives:

- Alt 1: *N*=2

- Alt 2: *N*=1, where *N*=2 is also supported

- Number of DL MIMO layers:

- For a RedCap UE with 1 Rx branch, the maximum number of DL MIMO layers is 1.

- For a RedCap UE with 2 Rx branches, the maximum number of DL MIMO layers is *M*, where *M* is to be down-selected during the WI phase or at RAN plenary between the following options (where different options may be selected for FR1 FDD, FR1 TDD, and FR2, respectively):

- Option 1: *M*=1, where *M*=2 is also supported

- Option 2: *M*=2

- Half-duplex FDD operation:

- HD-FDD operation type B is not supported for RedCap FR1 FDD UEs in Rel-17.

- Decide at RAN plenary whether to have support FD-FDD or HD-FDD operation type A or both by specification for an FR1 FDD RedCap UE.

- Relaxed UE processing time:

- Decide at RAN plenary whether to support relaxed UE processing time in terms of N1 and N2 by specification for a RedCap UE.

- Relaxed maximum modulation order:

- Support of 256QAM in DL is optional (instead of mandatory) for an FR1 RedCap UE.

- No other relaxations of maximum modulation order are supported by specification for a RedCap UE.

The study of UE power saving through reduced PDCCH monitoring can be summarized as follows:

- The PDCCH monitoring reduction for RedCap UEs has been studied. The study includes the evaluation of power saving benefit, system performance impacts, coexistence impacts, potential schemes, and the corresponding specification impacts.

- The power saving benefit by PDCCH monitoring reduction for RedCap UEs has been evaluated based on the agreed power model and traffic model, with the results and observations captured in clause 8.2.2.

- The system performance impact has been evaluated using PDCCH blocking rate as the metric, with the results and observations captured in clause 8.2.3. In addition, scheduling flexibility and latency impacts have also been studied in clause 8.2.3.

- Three candidate schemes for PDCCH monitoring reduction have been identified and studied with the corresponding coexistence and specification impacts captured in clause 8.2.4 and clause 8.2.5, respectively.

The study on extended DRX for RRC Inactive and/or Idle recommends the following:

- eDRX mechanism is specified for both RRC\_IDLE and RRC\_INACTIVE

- Support eDRX cycle extension in RRC\_IDLE and RRC\_INACTIVE beyond 10.24s

- The eDRX cycle in RRC\_IDLE is extended up to 10485.76s

- For UE in RRC IDLE/INACTIVE and eDRX cycle is less than or equal to 10.24s, paging monitoring does not use PTW and PH

- As a starting point a common PTW and eDRX cycle configuration for RRC\_IDLE and RRC\_INACTIVE eDRX mechanism is specified for both RRC\_IDLE and RRC\_INACTIVE

Annex A: UE power saving results

In the following tables for UE power saving results, Case 1 and Case 2 represent the following:

- Case 1: Power saving gain at approximately 25% reduction in BDs

- Case 2: Power saving gain at approximately 50% reduction in BDs

# A.1 UE power saving results for FR1

Table A.1-1: Power Saving gain, FR1, Same-Slot Scheduling, 1 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | VoIP traffic model | | Schemes  (Note 1) | Notes |
| IAT = 200ms | | IAT = 80ms | |
| Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 1 | vivo | 3.54% | 7.08% | 2.29% | 4.59% | 2.13% | 4.25% | 2.85% | 5.70% | S1 |  |
| - | 6.32% | - | 4.07% | - | 4.16% | - | - | S2 | Note 2 |
| - | 9.72% | - | 4.44% | - | 4.38% | - | - | S2 | Note 2, 3 |
| - |  | - | - | - | - | 3.80% | 5.70% | S1 | Note 4, 5 |
| 2 | Ericsson | 0.70% | 1.30% | 0.01% | 0.02% | 0.01% | 0.02% | 1.19% | 2.22% | S1 | Note 6 |
| 2.42% | 4.49% | 0.01% | 0.02% | 0.01% | 0.02% | 2.64% | 4.90% | S1 | Note 4 |
| 0.32% | 0.59% | 0.01% | 0.02% | 0.01% | 0.02% |  |  | S1 | Note 6B |
| 3 | Qualcomm | 3.22% | 6.44% | 0.96% | 1.92% | 0.65% | 1.30% | 1.53% | 3.06% | S1 | Note 7 |
| 4 | CATT | 1.83% | 3.67% | 1.10% | 2.20% | 1.04% | 2.08% | 0.90% | 1.82% | S1 |  |
| 5 | Spreadtrum | 5.70% | 11.40% | 3.40% | 6.80% | 3.20% | 6.40% | 3.10% | 6.00% | S1 |  |
| 6 | OPPO | 3.51% | 7.02% | 2.48% | 4.96% | 2.38% | 4.76% | - | - | S1 | Note 4 |
| 7 | Huawei, HiSilicon | 0.71% | 1.41% | 0.21% | 0.41% | 0.18% | 0.36% | 2.58% | 5.16% | S1 | Note 4, 8A,9A |
| 0.75% | 1.53% | 0.21% | 0.41% | 0.18% | 0.36% | 2.75% | 5.24% | S1 | Note 4, 8B, 9A |
| 2.57% | 5.14% | 2.11% | 4.06% | 1.96% | 3.91% | 3.71% | 6.23% | S1 | Note 4, 8A, 9B |
| 2.88% | 5.65% | 2.15% | 4.29% | 1.98% | 3.93% | 3.88% | 6.48% | S1 | Note 4, 8B, 9B |
| 8 | Apple | 4.46% | 8.92% | 2.66% | 5.33% | - | - | - | - | S1 | Note 4 |
| 3.38% | 6.77% | 0.65% | 1.32% | - | - | - | - | S1 | Note 4, 10 |
| 9 | Futurewei | 2.70% | 5.40% | 0.50% | 1.10% | 0.30% | 0.60% | 2.20% | 4.40% | S1 |  |
| 10 | Intel | 3.31% | 6.4% | 2.24% | 4.75% | 2.03% | 4.36% | - | - | S1 | Note 11, 12 |
| 3.2% | 6.2% | 2.1% | 4.16% | 1.76% | 3.81% | - | - | S1 | Note 13, 12 |
| 11 | ZTE | 4.15% | 8.29% | 2.60% | 5.21% | 2.29% | 4.57% | - | - | S1 | Note 4 |
| 12 | InterDigital | 4.40% | 8.80% | 1.16% | 2.04% | 0.45% | 0.92% |  |  | S1 | Note 4 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2:  Note 3: Multi-slot scheduling  Note 4: DL-only  Note 5: Size budget reduction by decoupling the configuration of DCI format 0\_1 and 1\_1, VOIP like DL only traffic  Note 6: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 6B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 7: slots "DDDU"  Note 8A: BD reduction with the same DCI size budget.  Note 8B: BD reduction by reducing DCI size budget.  Note 9A: UE can only transit to micro sleep in connected mode.  Note 9B: UE can transit to micro sleep, light sleep and deep sleep in connected mode according to the sleep duration.  Note 10: Wake-Up Signal (WUS)  Note 11: TDD: DDDDDDDSUU  Note 12: TDD: DDDSUDDSUU  Note 13: 1 packet requires 1 PDSCH for Heartbeat traffic model; 1 packet requires 24 PDSCHs for IM model, assuming cell centre UE. | | | | | | | | | | | |

Table A.1-2: Power Saving gain, FR1, Cross-Slot Scheduling, 1 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | VoIP traffic model | | Schemes (Note 1) | Notes |
| IAT = 200ms | | IAT = 80ms | |
| Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 1 | vivo | 3.13% | 4.77% | 1.95% | 2.98% | 1.80% | 2.75% | 2.47% | 3.76% | S1 |  |
| 2 | Ericsson | 0.66% | 0.81% | 0.01% | 0.01% | 0.01% | 0.01% | 1.14% | 1.39% | S1 | Note 2 |
| 2.39% | 2.91% | 0.01% | 0.02% | 0.01% | 0.02% | 2.62% | 3.19% | S1 | Note 3 |
| 0.30% | 0.36% | 0.01% | 0.01% | 0.01% | 0.01% |  |  | S1 | Note 2B |
| 3 | Samsung | 4.50% | 9% | 2.70% | 5.50% | 2.60% | 5.10% | 3.50% | 7% | S1, S2 | Note 3 |
| 4.50% | 9% | 2.70% | 5.50% | 2.60% | 5.10% | 4.50% | 3.5% | S3 |  |
| 4 | Qualcomm | 2.82% | 4.30% | 0.79% | 1.20% | 0.52% | 0.80% | 1.28% | 1.94% | S1 | Note 4 |
| 5 | OPPO | 2.77% | 5.54% | 2.13% | 4.25% | 2.04% | 4.07% | - | - | S1 | Note 3 |
| 6 | Apple | 4.05% | 6.17% | 2.29% | 3.50% | - | - | - | - | S1 | Note 3 |
| 2.98% | 4.53% | 0.54% | 0.82% | - | - | - | - | S1 | Note 3, 5 |
| 7 | ZTE | 3.7% | 7.4% | 2.28% | 4.57% | 2.03% | 4.05% | - | - | S1 | Note 3 |
| 8 | MediaTek | 2.43% | 4.45% |  |  |  |  | 2.72% | 5.41% | S1 | Note 6 |
| 0.84% | 1.68% |  |  |  |  | 0.87% | 1.74% | S1 | Note 7 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 2B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 3: DL-only  Note 4: slots "DDDU"  Note 5: Wake-Up Signal (WUS)  Note 6: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 1 slot  Note 7: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 4 slots | | | | | | | | | | | |

Table A.1-3: Power Saving gain, FR1, Same-Slot Scheduling, 2 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | | VoIP traffic model | | Schemes (Note 1) | Notes |
| IAT = 200ms | | | IAT = 80ms | |
| Case 1 | Case 2 | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 1 | vivo | 4.22% | 8.44% | | 2.88% | 5.76% | 2.71% | 5.43% | 3.45% | 6.89% | S1 |  |
| - | 8.99% | | - | 7.02% | - | 6.87% | - | - | S2 | Note 2 |
| - | 9.58% | | - | 7.56% | - | 6.89% | - | - | S2 | Note 2, Note 3 |
| - | - | | - | - | - | - | 4.60% | 6.89% |  | Note 4, Note 5 |
| 2 | Ericsson | 0.95% | 1.76% | | 0.01% | 0.02% | 0.01% | 0.02% | 1.56% | 2.89% | S1 | Note 6 |
| 3.05% | 5.66% | | 0.22% | 0.42% | 0.20% | 0.38% | 3.33% | 6.17% | S1 | Note 4 |
| 0.44% | 0.82% | | 0.01% | 0.03% | 0.01% | 0.02% |  |  | S1 | Note 6B |
| 3 | Qualcomm | 3.72% | 7.44% | | 1.25% | 2.50% | 0.86% | 1.71% | 1.98% | 3.96% |  | Note 7 |
| 4 | Nokia | - | 9.2% | | - | 6.8% | - | 6.1% | - | - | S1 | Note 4 |
| 5 | CATT | 2.16% | 4.12% | | 1.30% | 2.61% | 1.23% | 2.46% | 1.16% | 2.32% | S1 |  |
| 6 | Spreadtrum | 6.20% | 12.3% | | 4.10% | 8.20% | 3.90% | 7.80% | 3.70% | 7.20% | S1 |  |
| 7 | OPPO | 3.94% | 7.88% | | 2.81% | 5.61% | 2.70% | 5.40% | - | - | S1 | Note 4 |
| 8 | Huawei, HiSilicon | 0.64% | 1.55% | | 0.24% | 0.47% | 0.21% | 0.41% | 2.79% | 5.69% | S1 | Note 4, 8A, 9A |
| 0.82% | 1.63% | | 0.24% | 0.47% | 0.21% | 0.41% | 2.85% | 5.70% | S1 | Note 4, 8B, 9A |
| 1.47% | 4.92% | | 2.19% | 4.39% | 2.00% | 3.99% | 2.96% | 6.31% | S1 | Note 4, 8A, 9B |
| 2.83% | 5.65% | | 2.19% | 4.47% | 2.00% | 4.02% | 3.17% | 6.33% | S1 | Note 4, 8B, 9B |
| 9 | Apple | 5.10% | 10.1% | | 3.30% | 6.60% | - | - | - | - | S1 | Note 4 |
| 4.00% | 8.06% | | 0.90% | 1.80% | - | - | - | - | S1 | Note 4, 10 |
| 10 | Futurewei | 3.20% | 6.30% | | 0.70% | 1.30% | 0.40% | 0.80% | 2.70% | 5.50% | S1 |  |
| 11 | Intel | 3.46% | 6% | | 2% | 4.13% | 2.4% | 5.12% | - | - | S1 | Note 11,13 |
| 2.51% | 4.9% | | 1.9% | 4.04% | 2.3% | 4.43% | - | - | S1 | Note 12,13 |
| 12 | ZTE | 4.77% | 9.54% | | 3.03% | 6.06% | 2.94% | 5.87% | - | - | S1 | Note 4 |
| 13 | InterDigital | 5% | 10% | | 1.20% | 2.40% | 0.64% | 1.28% | - | - | S1 | Note 4 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2:  Note 3: Multi-slot scheduling  Note 4: DL-only  Note 5: Size budget reduction by decoupling the configuration of DCI format 0\_1 and 1\_1, VOIP like DL only traffic  Note 6: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 6B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 7: Slots "DDDU",  Note 8A: BD reduction with the same DCI size budget.  Note 8B: BD reduction by reducing DCI size budget.  Note 9A: UE can only transit to micro sleep in connected mode.  Note 9B: UE can transit to micro sleep, light sleep and deep sleep in connected mode according to the sleep duration.  Note 10: Wake-Up Signal (WUS)  Note 11: TDD: DDDDDDDSUU  Note 12: TDD: DDDSUDDSUU  Note 13: 1 packet requires 1 PDSCH for Heartbeat traffic model; 1 packet requires 24 PDSCHs for IM model, assuming cell centre UE. | | | | | | | | | | | | |

Table A.1-4: Power Saving gain, FR1, Cross-Slot Scheduling, 2 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | VoIP traffic model | | Schemes (Note 1) | Notes |
| IAT = 200ms | | IAT = 80ms | |
| Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |  |
| 1 | vivo | 3.80% | 7.61% | 2.50% | 4.99% | 2.34% | 4.68% | 3.04% | 6.07% | S1 |  |
| 2 | Ericsson | 0.77% | 1.44% | 0.01% | 0.02% | 0.01% | 0.02% | 1.30% | 2.41% | S1 | Note 2 |
| 2.46% | 4.57% | 0.64% | 0.78% | 0.58% | 0.71% | 2.71% | 5.02% | S1 | Note3 |
| 0.36% | 0.67% | 0.01% | 0.02% | 0.01% | 0.02% |  |  | S1 | Note 2B |
| 3 | Samsung | 4.50% | 6.90% | 2.80% | 4.20% | 2.50% | 3.90% | 3.50% | 5.30% | S1, S2 | Note 3 |
| 4.50% | 6.90% | 2.70% | 4.20% | 2.50% | 3.90% | 3.50% | 5.30% | S3 |  |
| 4 | Qualcomm | 3.31% | 6.61% | 1.03% | 2.07% | 0.71% | 1.40% | 1.67% | 3.34% | S1 | Note 4 |
| 5 | OPPO | 3.10% | 6.21% | 2.43% | 4.85% | 2.33% | 4.66% | - | - | S1 | Note 3 |
| 6 | Apple | 4.69% | 9.38% | 2.90% | 5.70% | - | - | - | - | S1 | Note 3 |
| 3.60% | 7.22% | 0.75% | 1.49% | - | - | - | - | S1 | Note 3, 5 |
| 7 | ZTE | 4.35% | 8.7% | 2.76% | 5.52% | 2.47% | 4.94% | - | - | S1 | Note 3 |
| 8 | MediaTek | 2.64% | 4.83% |  |  |  |  | 2.67% | 5.30% |  | Note 6 |
| 0.88% | 1.76% |  |  |  |  | 0.83% | 1.65% |  | Note 7 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 2B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 3: DL-only  Note 4: slots "DDDU",  Note 5: Wake-Up Signal (WUS)  Note 6: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 1 slot  Note 7: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 4 slots | | | | | | | | | | | |

# A.2 UE power saving results for FR2

Table A.2-1: Power Saving gain, FR2, Same-Slot Scheduling, 1 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | | VoIP traffic model | | Scheme  (Note 1) | Notes |
| IAT = 200ms | | IAT = 80ms | | |
| Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 | | Case 1 | Case 2 |
| 1 | Ericsson | 1.94% | 3.59% | 0.03% | 0.07% | 0.03% | | 0.06% | 2.52% | 4.66% | S1 | Note2 |
| 4.37% | 8.10% | 0.04% | 0.08% | 0.04% | | 0.07% | 4.66% | 8.64% | S1 | Note 3 |
| 0.77% | 1.43% | 0.03% | 0.06% | 0.03% | | 0.05% |  |  | S1 | Note 2B |
| 2 | CATT | 4.53% | 9.07% | 2.97% | 5.93% | 2.75% | | 5.50% | 2.88% | 5.76% | S1 |  |
| 3 | Spreadtrum | 6.60% | 13.10% | 4.30% | 8.60% | 4.00% | | 7.90% | 5.00% | 9.40% | S1 |  |
| 4 | Futurewei | 4.40% | 8.70% | 2.00% | 1.00% | 0.50% | | 1.10% | 3.90% | 7.90% | S1 |  |
| 5 | Intel | 5.48% | 10.62% | 4.78% | 7.94% | 3.36% | | 6.6% |  |  | S1 | Note 4,5 |
| 6 | ZTE | 5.76% | 11.52% | 3.55% | 7.11% | 3.09% | | 6.18% | - | - | S1 | Note 3 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 2B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 3: DL-only  Note 4: TDD: DDDSUDDDSU  Note 5: 1 packet requires 1 PDSCH for Heartbeat traffic model; 1 packet requires 16 PDSCHs for IM model, assuming cell centre UE. | | | | | | | | | | | | |

Table A.2-2: Power Saving gain, FR2, Cross-Slot Scheduling, 1 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | VoIP traffic model | | Scheme  (Note 1) | Notes |
| IAT = 200ms | | IAT = 80ms | |
| Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 1 | Ericsson | 1.40% | 2.70% | 0.02% | 0.04% | 0.02% | 0.04% | 1.94% | 3.60% | S1 | Note 2 |
| 3.65% | 6.76% | 0.03% | 0.06% | 0.03% | 0.05% | 3.94% | 7.31% | S1 | Note 3 |
| 0.55% | 1.03% | 0.02% | 0.04% | 0.02% | 0.04% |  |  | S1 | Note 2B |
| 2 | Samsung | 6.30% | 12.70% | 4.20% | 8.30% | 3.90% | 7.60% | 6.50% | 13.10% | S1, S2 | Note 3 |
| 6.30% | 12.70% | 4.20% | 8.30% | 3.90% | 7.60% | 6.50% | 13.10% | S3 | Note 3 |
| 3 | ZTE | 5.33% | 10.67% | 2.56% | 5.13% | 2.45% | 4.9% | - | - | S1 | Note 3 |
| 4 | MediaTek | 3.61% | 6.81% |  |  |  |  | 3.80% | 7.55% | S1 | Note 4 |
| 1.96% | 3.92% |  |  |  |  | 2.06% | 4.12% | S1 | Note 5 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 2B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 3: DL-only  Note 4: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 1 slot  Note 5: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 4 slots | | | | | | | | | | | |

Table A.2-3: Power Saving gain, FR2, Same-Slot Scheduling, 2 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | VoIP traffic model | | Scheme  (Note 1) | Notes |
| IAT = 200ms | | IAT = 80ms | |
| Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 1 | Ericsson | 2.45% | 4.54% | 0.04% | 0.10% | 0.04% | 0.09% | 3.10% | 5.74% | S1 | Note 2 |
| 4.84% | 8.96% | 0.06% | 0.11% | 0.05% | 0.10% | 5.13% | 9.51% | S1 | Note 3 |
| 1.04% | 1.92% | 0.04% | 0.08% | 0.04% | 0.07% |  |  | S1 | Note 2B |
| 2 | CATT | 4.81% | 9.61% | 3.34% | 6.68% | 3.12% | 6.06% | 3.19% | 6.39% | S1 |  |
| 3 | Spreadtrum | 6.80% | 13.6% | 4.90% | 11.9% | 4.6% | 9.2% | 5.5% | 10.5% | S1 |  |
| 4 | Futurewei | 4.60% | 9% | 1.10% | 2.10% | 0.50% | 1.00% | 4.50% | 8.90% | S1 |  |
| 5 | Intel | 4.43% | 9.73% | 4.2% | 7.80% | 4.57% | 8.74% | - | - | S1 | Note 4,5 |
| 6 | ZTE | 6.01% | 12.03% | 4.03% | 8.07% | 3.64% | 7.29% | - | - | S1 | Note 3 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 2B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 3: DL-only  Note 4: TDD: DDDSUDDDSU  Note 5: 1 packet requires 1 PDSCH for Heartbeat traffic model; 1 packet requires 16 PDSCHs for IM model, assuming cell centre UE. | | | | | | | | | | | |

Table A.2-4: Power Saving gain, FR2, Cross-Slot Scheduling, 2 Rx antenna

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | IM traffic model | | Heartbeat traffic model | | | | VoIP traffic model | | Scheme  (Note 1) | Notes |
| IAT = 200ms | | IAT = 80ms | |
| Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 1 | Ericsson | 1.89% | 3.50% | 0.03% | 0.07% | 0.03% | 0.06% | 2.45% | 4.54% | S1 | Note 2 |
| 4.12% | 7.64% | 0.04% | 0.08% | 0.04% | 0.07% | 4.44% | 8.22% | S1 | Note 3 |
| 0.75% | 1.40% | 0.03% | 0.06% | 0.03% | 0.05% |  |  | S1 | Note 2B |
| 2 | Samsung | 6.60% | 13.20% | 4.90% | 9.60% | 4.60% | 8.90% | 6.80% | 13.7% | S1, S2 | Note 3 |
| 6.60% | 13.20% | 4.90% | 9.60% | 4.60% | 8.90% | 6.80% | 13.7% | S3 | Note 3 |
| 3 | ZTE | 5.53% | 11.05% | 3.08% | 6.17% | 2.7% | 5.4% | - | - | S1 | Note 3 |
| 4 | MediaTek | 3.63% | 6.86% |  |  |  |  | 3.72% | 7.39% | S1 | Note 4 |
| 1.96% | 3.91% |  |  |  |  | 1.97% | 3.95% | S1 | Note 5 |
| Note 1: 'S1' represents Scheme#1, 'S2' represents Scheme#2, 'S3' represents Scheme#3  Note 2: DL and UL (for VoIP, traffic is 50% in DL and 50% in UL)  Note 2B: DL and UL (For IM traffic and Heartbeat, traffic is 50% in DL and 50% in UL)  Note 3: DL-only  Note 4: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 1 slot  Note 5: Baseline: static cross-slot scheduling (FR1: k0=2) + PDCCH monitoring periodicity of 4 slots | | | | | | | | | | | |

Annex B: PDCCH blocking rate results

In the following tables for PDCCH blocking rate results, Case 1, Case 2 and Case 3 represent the following:

- Case 1: Reference case with no reduction in BD limit

- Case 2: Approximately 25% reduction in BD limit

- Case 3: Approximately 50% reduction in BD limit

# B.1 PDCCH blocking rate results for FR1

Table B.1-1: PDCCH blocking rate for FR1, with 30kHz/20MHz, CORESET duration: 2 symbols, Delay toleration: 1, AL distribution: A1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Notes |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |  |
| 1 | Vivo | 2 | 2 | C1 | 2.02% | C1 | 3.52% | 1.5% | C1 | 3.59% | 1.6% |  |
| 3 | 2 | C1 | 3.56% | C1 | 5.03% | 1.5% | C1 | 5.08% | 1.5% |  |
| 4 | 2 | C1 | 4.82% | C1 | 6.39% | 1.6% | C1 | 7.01% | 2.2% |  |
| 5 | 2 | C1 | 5.94% | C1 | 7.64% | 1.7% | C1 | 9.42% | 3.5% |  |
| 1~5 | 2 | C1 | 0.25% | C1 | 0.41% | 0.2% | C1 | 0.41% | 0.2% | Note 1 |
| 2 | Ericsson | 3 | <=2 | C2 | 3.00% | C2 | 3.00% | 0.0% | C2 | 3.50% | 0.5% | Note 8 |
| 6 | <=2 | C2 | 6.00% | C2 | 7.00% | 1.0% | C2 | 9.00% | 3.0% | Note 8 |
| 3 | Qualcomm | 1 | 2 | C1 | 0.00% | C6 | 0.00% | 0.0% | C1 | 0.00% | 0.0% | Note 2 |
| 2 | 2 | C1 | 0.42% | C6 | 0.65% | 0.2% | C1 | 0.81% | 0.4% | Note 2 |
| 3 | 2 | C1 | 1.00% | C6 | 1.30% | 0.3% | C1 | 1.68% | 0.7% | Note 2 |
| 4 | 2 | C1 | 1.62% | C6 | 2.09% | 0.5% | C1 | 2.87% | 1.3% | Note 2 |
| 5 | 2 | C1 | 2.67% | C6 | 3.27% | 0.6% | C1 | 4.65% | 2.0% | Note 2 |
| 6 | 2 | C1 | 3.55% | C6 | 4.33% | 0.8% | C1 | 6.50% | 3.0% | Note 2 |
| 7 | 2 | C1 | 4.69% | C6 | 5.89% | 1.2% | C1 | 8.72% | 4.0% | Note 2 |
| 8 | 2 | C1 | 6.40% | C6 | 8.07% | 1.7% | C1 | 11.5% | 5.1% | Note 2 |
| 9 | 2 | C1 | 8.25% | C6 | 10.4% | 2.2% | C1 | 14.3% | 6.1% | Note 2 |
| 10 | 2 | C1 | 10.6% | C6 | 13.1% | 2.5% | C1 | 17.4% | 6.8% | Note 2 |
| 1 | 2 | C4 | 0.00% | C7 | 0.00% | 0.0% | C6 | 0.00% | 0.0% | Note 3 |
| 2 | 2 | C4 | 0.08% | C7 | 0.08% | 0.0% | C6 | 0.08% | 0.0% | Note 3 |
| 3 | 2 | C4 | 0.48% | C7 | 0.53% | 0.1% | C6 | 0.55% | 0.1% | Note 3 |
| 4 | 2 | C4 | 1.12% | C7 | 1.17% | 0.1% | C6 | 1.23% | 0.1% | Note 3 |
| 5 | 2 | C4 | 2.10% | C7 | 2.16% | 0.1% | C6 | 2.22% | 0.1% | Note 3 |
| 6 | 2 | C4 | 3.00% | C7 | 3.04% | 0.0% | C6 | 3.07% | 0.1% | Note 3 |
| 7 | 2 | C4 | 4.03% | C7 | 4.06% | 0.0% | C6 | 4.11% | 0.1% | Note 3 |
| 8 | 2 | C4 | 5.43% | C7 | 5.49% | 0.1% | C6 | 5.57% | 0.1% | Note 3 |
| 9 | 2 | C4 | 7.00% | C7 | 7.04% | 0.0% | C6 | 7.16% | 0.2% | Note 3 |
| 10 | 2 | C4 | 8.95% | C7 | 9.00% | 0.1% | C6 | 9.15% | 0.2% | Note 3 |
| 4 | Nokia | 2 | 2 | C2 | 4.00% | C8 | 4.00% | 0.0% | C2 | 4.00% | 0.0% | Note 8 |
| 3 | 2 | C2 | 6.00% | C8 | 6.00% | 0.0% | C2 | 6.00% | 0.0% | Note 8 |
| 4 | 2 | C2 | 9.00% | C8 | 10.0% | 1.0% | C2 | 12.0% | 3.0% | Note 8 |
| 5 | 2 | C2 | 12.0% | C8 | 15.0% | 3.0% | C2 | 20.0% | 8.0% | Note 8 |
| 6 | 2 | C2 | 18.0% | C8 | 21.0% | 3.0% | C2 | 31.0% | 13.0% | Note 8 |
| 7 | 2 | C2 | 28.0% | C8 | 31.0% | 3.0% | C2 | 44.0% | 16.0% | Note 8 |
| 8 | 2 | C2 | 38.0% | C8 | 41.0% | 3.0% | C2 | 58.0% | 20.0% | Note 8 |
| 5 | Huawei, HiSilicon | 5 | Note 4 | C5 | 6.07% | - |  | - | C7 | 6.07% | 0.0% | Note 5 |
| 5 | 2 | C5 | 6.07% | C6 | 6.90% | 0.8% | C1 | 9.30% | 3.2% |  |
| 10 | Note 4 | C5 | 17.3% | - |  | - | C7 | 17.3% | 0.0% | Note 5 |
| 10 | 2 | C5 | 17.3% | C6 | 23.3% | 6.0% | C1 | 24.1% | 6.8% |  |
| 6 | InterDigital | 2 |  | C1 | 1.96% | C1 | 3.31% | 1.4% | C1 | 3.43% | 1.5% |  |
| 3 |  | C1 | 3.50% | C1 | 5.08% | 1.6% | C1 | 5.30% | 1.8% |  |
| 4 |  | C1 | 4.67% | C1 | 6.31% | 1.6% | C1 | 7.04% | 2.4% |  |
| 5 |  | C1 | 5.83% | C1 | 7.32% | 1.5% | C1 | 9.22% | 3.4% |  |
| 6 |  | C1 | 7.19% | C1 | 8.55% | 1.4% | C1 | 11.8% | 4.6% |  |
| 7 |  | C1 | 8.65% | C1 | 10.1% | 1.5% | C1 | 14.4% | 5.8% |  |
| 8 |  | C1 | 10.82% | C1 | 12.2% | 1.4% | C1 | 17.6% | 6.8% |  |
| 9 |  | C1 | 13.71% | C1 | 15.1% | 1.4% | C1 | 20.8% | 7.1% |  |
| 10 |  | C1 | 17.26% | C1 | 18.4% | 1.1% | C1 | 24.2% | 6.9% |  |
| 7 | Intel | 2 | 1 | C6 | 1.9% | C9 | 1.9% | 0.0% | C8 | 1.9% | 0.0% |  |
| 4 | 1 | C6 | 6% | C9 | 6% | 0.0% | C8 | 6% | 0.0% |  |
| 8 | 1 | C6 | 20% | C9 | 20% | 0.0% | C8 | 20% | 0.0% |  |
| 8 | ZTE | 2 | 2 | C7 | 2.01% | C10 | 2.01% | 0.0% | C9 | 4.21% | 2.2% |  |
| 4 | 2 | C7 | 3.04% | C10 | 3.10% | 0.1% | C9 | 10.8% | 7.8% |  |
| 6 | 2 | C7 | 4.72% | C10 | 4.87% | 0.2% | C9 | 16.9% | 12.2% |  |
| 8 | 2 | C7 | 7.31% | C10 | 7.53% | 0.2% | C9 | 35.5% | 28.2% |  |
| 9 | Samsung | 1 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 0.00% | 0.0% | Note 8 |
| 2 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 0.00% | 0.0% | Note 8 |
| 3 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 2.00% | 2.0% | Note 8 |
| 4 | 2 | C3 | 0.00% | C2 | 1.00% | 1.0% | C2 | 7.00% | 7.0% | Note 8 |
| 5 | 2 | C3 | 0.00% | C2 | 3.00% | 3.0% | C2 | 13.0% | 13.0% | Note 8 |
| 6 | 2 | C3 | 1.00% | C2 | 6.00% | 5.0% | C2 | 20.0% | 19.0% | Note 8 |
| 7 | 2 | C3 | 2.00% | C2 | 10.0% | 8.0% | C2 | 26.0% | 24.0% | Note 8 |
| 8 | 2 | C3 | 4.00% | C2 | 15.0% | 11.0% | C2 | 32.0% | 28.0% | Note 8 |
| 9 | 2 | C3 | 6.00% | C2 | 20.0% | 14.0% | C2 | 37.0% | 31.0% | Note 8 |
| 10 | 2 | C3 | 8.00% | C2 | 25.0% | 17.0% | C2 | 42.0% | 34.0% | Note 8 |
| 1 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 0.00% | 0.0% | Note 6, 8 |
| 2 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 0.00% | 0.0% | Note 6, 8 |
| 3 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 0.00% | 0.0% | Note 6, 8 |
| 4 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 0.00% | 0.0% | Note 6, 8 |
| 5 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 2.00% | 2.0% | Note 6, 8 |
| 6 | 2 | C3 | 0.00% | C2 | 0.00% | 0.0% | C2 | 2.00% | 2.0% | Note 6, 8 |
| 7 | 2 | C3 | 0.00% | C2 | 1.00% | 1.0% | C2 | 7.00% | 7.0% | Note 6, 8 |
| 8 | 2 | C3 | 0.00% | C2 | 1.00% | 1.0% | C2 | 7.00% | 7.0% | Note 6, 8 |
| 9 | 2 | C3 | 0.00% | C2 | 3.00% | 3.0% | C2 | 13.0% | 13.0% | Note 6, 8 |
| 10 | 2 | C3 | 0.00% | C2 | 3.00% | 3.0% | C2 | 13.0% | 13.0% | Note 6, 8 |
| 1 | 2 | C3 | 0.00% | C3 | 0.00% | 0.0% | C3 | 0.00% | 0.0% | Note 7, 8 |
| 2 | 2 | C3 | 0.00% | C3 | 0.00% | 0.0% | C3 | 8.00% | 8.0% | Note 7, 8 |
| 3 | 2 | C3 | 0.00% | C3 | 0.00% | 0.0% | C3 | 14.0% | 14.0% | Note 7, 8 |
| 4 | 2 | C3 | 0.00% | C3 | 1.00% | 1.0% | C3 | 19.0% | 19.0% | Note 7, 8 |
| 5 | 2 | C3 | 0.00% | C3 | 1.00% | 1.0% | C3 | 22.0% | 22.0% | Note 7, 8 |
| 6 | 2 | C3 | 1.00% | C3 | 2.00% | 1.0% | C3 | 25.0% | 24.0% | Note 7, 8 |
| 7 | 2 | C3 | 2.00% | C3 | 3.00% | 1.0% | C3 | 28.0% | 26.0% | Note 7, 8 |
| 8 | 2 | C3 | 3.00% | C3 | 5.00% | 2.0% | C3 | 31.0% | 28.0% | Note 7, 8 |
| 9 | 2 | C3 | 6.00% | C3 | 7.00% | 1.0% | C3 | 34.0% | 28.0% | Note 7, 8 |
| 10 | 2 | C3 | 8.00% | C3 | 10.0% | 2.0% | C3 | 38.0% | 30.0% | Note 7, 8 |
| 10 | Futurewei | 1 | <= 2 | C1 | 0.00% | C6 | 0.00% | 0.0% | C1 | 0.00% | 0.0% |  |
| 2 | <= 2 | C1 | 0.00% | C6 | 1.00% | 1.0% | C1 | 1.00% | 1.0% |  |
| 3 | <= 2 | C1 | 0.00% | C6 | 3.00% | 3.0% | C1 | 4.00% | 4.0% |  |
| 4 | <= 2 | C1 | 1.00% | C6 | 4.00% | 3.0% | C1 | 7.00% | 6.0% |  |
| 5 | <= 2 | C1 | 2.00% | C6 | 7.00% | 5.0% | C1 | 12.0% | 10.0% |  |
| 6 | <= 2 | C1 | 3.00% | C6 | 9.00% | 6.0% | C1 | 15.0% | 12.0% |  |
| 7 | <= 2 | C1 | 3.00% | C6 | 15.0% | 12.0% | C1 | 23.0% | 20.0% |  |
| 8 | <= 2 | C1 | 5.00% | C6 | 17.0% | 12.0% | C1 | 25.0% | 20.0% |  |
| 9 | <= 2 | C1 | 7.00% | C6 | 20.0% | 13.0% | C1 | 33.0% | 26.0% |  |
| 10 | <= 2 | C1 | 11.0% | C6 | 26.0% | 15.0% | C1 | 36.0% | 25.0% |  |
| Note 1: Metric: the whole system blocking rate. It can be calculated by summing the product of the percentage of each number of UE simultaneously scheduled per slot and its corresponding blocking rate.  Note 2: Each UE is configured with all the ALs  Note 3: Each UE is configured with a single AL  Note 4: Reference case：2；50% BD reduction case:1  Note 5: For RedCap UEs using 2RX; BD reduction by reducing DCI size budget is evaluated (i.e. 'the number of DCI sizes to monitor per PDCCH candidate' is set to 2 for the reference case and 1 for approximately 50% reduction in BD limits).  Note 6: With enhancement of UE group scheduling with 2 UEs per DCI.  Note 7: With enhancement of PDCCH dropping based on predetermined CCE AL priority order = [1 2 4 8 16]  Note 8: Good coverage | | | | | | | | | | | | |

Table B.1-2: PDCCH blocking rate for FR1, with 30kHz/20MHz, CORESET duration: 2 symbols, Delay toleration: 1, AL distribution: A2

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Notes |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |  |
| 1 | Ericsson | 3 | <=2 | C2 | 17.0% | C2 | 17.0% | 0.0% | C2 | 21.0% | 4.0% | Note 8 |
| 6 | <=2 | C2 | 40.0% | C2 | 42.0% | 2.0% | C2 | 46.0% | 6.0% | Note 8 |
| 2 | Qualcomm | 1 | 2 | C1 | 0.0% | C6 | 0.0% | 0.0% | C1 | 0.0% | 0.0% | Note 2 |
| 2 | 2 | C1 | 3.9% | C6 | 4.3% | 0.4% | C1 | 9.4% | 5.5% | Note 2 |
| 3 | 2 | C1 | 10.5% | C6 | 11.2% | 0.7% | C1 | 18.3% | 7.8% | Note 2 |
| 4 | 2 | C1 | 17.4% | C6 | 18.4% | 1.0% | C1 | 25.7% | 8.3% | Note 2 |
| 5 | 2 | C1 | 24.8% | C6 | 26.3% | 1.5% | C1 | 32.4% | 7.6% | Note 2 |
| 6 | 2 | C1 | 32.1% | C6 | 33.8% | 1.7% | C1 | 38.9% | 6.8% | Note 2 |
| 7 | 2 | C1 | 38.5% | C6 | 40.4% | 1.9% | C1 | 44.3% | 5.8% | Note 2 |
| 8 | 2 | C1 | 44.4% | C6 | 46.2% | 1.8% | C1 | 49.2% | 4.8% | Note 2 |
| 9 | 2 | C1 | 48.9% | C6 | 50.7% | 1.8% | C1 | 53.1% | 4.2% | Note 2 |
| 10 | 2 | C1 | 53.2% | C6 | 55.0% | 1.8% | C1 | 56.7% | 3.5% | Note 2 |
| 1 | 2 | C4 | 0.0% | C7 | 0.0% | 0.0% | C6 | 0.0% | 0.0% | Note 3 |
| 2 | 2 | C4 | 3.5% | C7 | 3.5% | 0.0% | C6 | 3.5% | 0.0% | Note 3 |
| 3 | 2 | C4 | 8.1% | C7 | 8.1% | 0.0% | C6 | 8.1% | 0.0% | Note 3 |
| 4 | 2 | C4 | 13.9% | C7 | 13.9% | 0.0% | C6 | 13.9% | 0.0% | Note 3 |
| 5 | 2 | C4 | 21.1% | C7 | 21.1% | 0.0% | C6 | 21.2% | 0.1% | Note 3 |
| 6 | 2 | C4 | 28.7% | C7 | 28.8% | 0.1% | C6 | 28.9% | 0.2% | Note 3 |
| 7 | 2 | C4 | 35.8% | C7 | 35.9% | 0.1% | C6 | 36.0% | 0.2% | Note 3 |
| 8 | 2 | C4 | 42.1% | C7 | 42.2% | 0.1% | C6 | 42.3% | 0.2% | Note 3 |
| 9 | 2 | C4 | 47.3% | C7 | 47.3% | 0.0% | C6 | 47.4% | 0.1% | Note 3 |
| 10 | 2 | C4 | 51.8% | C7 | 51.9% | 0.1% | C6 | 52.0% | 0.2% | Note 3 |
| 3 | Nokia | 2 | 2 | C2 | 19.0% | C8 | 21.0% | 2.0% | C2 | 21.0% | 2.0% | Note 8 |
| 3 | 2 | C2 | 36.0% | C8 | 38.0% | 2.0% | C2 | 47.0% | 11.0% | Note 8 |
| 4 | 2 | C2 | 64.0% | C8 | 68.0% | 4.0% | C2 | 78.0% | 14.0% | Note 8 |
| 5 | 2 | C2 | 87.0% | C8 | 88.0% | 1.0% | C2 | 94.0% | 7.0% | Note 8 |
| 6 | 2 | C2 | 97.0% | C8 | 98.0% | 1.0% | C2 | 99.0% | 2.0% | Note 8 |
| 7 | 2 | C2 | 100% | C8 | 100% | 0.0% | C2 | 100% | 0.0% | Note 8 |
| 4 | ZTE | 2 | 2 | C8 | 9.5% | C11 | 9.5% | 0.0% | C10 | 10.0% | 0.5% |  |
| 4 | 2 | C8 | 24.7% | C11 | 24.8% | 0.1% | C10 | 27.2% | 2.5% |  |
| 6 | 2 | C8 | 39.2% | C11 | 39.4% | 0.2% | C10 | 42.8% | 3.6% |  |
| 8 | 2 | C8 | 49.5% | C11 | 49.6% | 0.1% | C10 | 53.9% | 4.4% |  |
| 5 | Samsung | 1 | 2 | C3 | 0.0% | C2 | 0.0% | 0.0% | C2 | 0.00 | 0.0% | Note 8 |
| 2 | 2 | C3 | 0.0% | C2 | 1.0% | 1.0% | C2 | 3.0% | 3.0% | Note 8 |
| 3 | 2 | C3 | 0.0% | C2 | 1.0% | 1.0% | C2 | 7.0% | 7.0% | Note 8 |
| 4 | 2 | C3 | 1.0% | C2 | 3.0% | 2.0% | C2 | 12.0% | 11.0% | Note 8 |
| 5 | 2 | C3 | 2.0% | C2 | 5.0% | 3.0% | C2 | 18.0% | 16.0% | Note 8 |
| 6 | 2 | C3 | 3.0% | C2 | 8.0% | 5.0% | C2 | 23.0% | 20.0% | Note 8 |
| 7 | 2 | C3 | 5.0% | C2 | 11.0% | 6.0% | C2 | 28.0% | 23.0% | Note 8 |
| 8 | 2 | C3 | 8.0% | C2 | 15.0% | 7.0% | C2 | 32.0% | 24.0% | Note 8 |
| 9 | 2 | C3 | 11.0% | C2 | 18.0% | 7.0% | C2 | 36.0% | 25.0% | Note 8 |
| 10 | 2 | C3 | 15.0% | C2 | 22.0% | 7.0% | C2 | 40.0% | 25.0% | Note 8 |
| 1 | 2 | C3 | 0.0% | C2 | 0.0% | 0.0% | C2 | 0.0% | 0.0% | Note 6, 8 |
| 2 | 2 | C3 | 0.0% | C2 | 0.0% | 0.0% | C2 | 0.00, | 0.0% | Note 6, 8 |
| 3 | 2 | C3 | 0.0% | C2 | 2.6% | 2.6% | C2 | 3.0% | 3.0% | Note 6, 8 |
| 4 | 2 | C3 | 0.0% | C2 | 2.6% | 2.6% | C2 | 3.0% | 3.0% | Note 6, 8 |
| 5 | 2 | C3 | 0.0% | C2 | 4.6% | 4.6% | C2 | 7.0% | 7.0% | Note 6, 8 |
| 6 | 2 | C3 | 0.0% | C2 | 4.6% | 4.6% | C2 | 7.0% | 7.0% | Note 6, 8 |
| 7 | 2 | C3 | 1.0% | C2 | 7.3% | 6.3% | C2 | 12.0% | 11.0% | Note 6, 8 |
| 8 | 2 | C3 | 1.0% | C2 | 7.3% | 6.3% | C2 | 12.0% | 11.0% | Note 6, 8 |
| 9 | 2 | C3 | 2.0% | C2 | 12.4% | 10.4% | C2 | 18.0% | 16.0% | Note 6, 8 |
| 10 | 2 | C3 | 2.0% | C2 | 12.4% | 10.4% | C2 | 18.0% | 16.0% | Note 6, 8 |
| 1 | 2 | C3 | 0.0% | C4 | 0.0% | 0.0% | C4 | 0.0% | 0.0% | Note 7, 8 |
| 2 | 2 | C3 | 0.0% | C4 | 1.0% | 1.0% | C4 | 3.0% | 3.0% | Note 7, 8 |
| 3 | 2 | C3 | 0.0% | C4 | 1.0% | 1.0% | C4 | 6.0% | 6.0% | Note 7, 8 |
| 4 | 2 | C3 | 1.0% | C4 | 2.0% | 1.0% | C4 | 9.0% | 8.0% | Note 7, 8 |
| 5 | 2 | C3 | 2.0% | C4 | 3.0% | 1.0% | C4 | 11.0% | 9.0% | Note 7, 8 |
| 6 | 2 | C3 | 3.0% | C4 | 5.0% | 2.0% | C4 | 15.0% | 12.0% | Note 7, 8 |
| 7 | 2 | C3 | 5.0% | C4 | 7.0% | 2.0% | C4 | 18.0% | 13.0% | Note 7, 8 |
| 8 | 2 | C3 | 8.0% | C4 | 10.0% | 2.0% | C4 | 22.0% | 14.0% | Note 7, 8 |
| 9 | 2 | C3 | 11.0% | C4 | 13.0% | 2.0% | C4 | 25.0% | 14.0% | Note 7, 8 |
| 10 | 2 | C3 | 15.0% | C4 | 16.0% | 1.0% | C4 | 29.0% | 14.0% | Note 7, 8 |
| Note 1: Metric: the whole system blocking rate. It can be calculated by summing the product of the percentage of each number of UE simultaneously scheduled per slot and its corresponding blocking rate.  Note 2: Each UE is configured with all the ALs  Note 3: Each UE is configured with a single AL  Note 4: Reference case：2；50% BD reduction case:1  Note 5: For RedCap UEs using 2RX; BD reduction by reducing DCI size budget is evaluated (i.e. 'the number of DCI sizes to monitor per PDCCH candidate' is set to 2 for the reference case and 1 for approximately 50% reduction in BD limits).  Note 6: With enhancement of UE group scheduling with 2 UEs per DCI.  Note 7: With enhancement of PDCCH dropping based on predetermined CCE AL priority order = [1 2 4 8 16]  Note 8: Medium coverage | | | | | | | | | | | | |

Table B.1-3: PDCCH blocking rate for FR1, with 30kHz/20MHz, CORESET duration: 2 symbols, Delay toleration: 1, AL distribution: A3

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Notes |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |
| 1 | Ericsson | 3 | <= 2 | C2 | 46.0% | C2 | 47.0% | 1.0% | C2 | 49.0% | 3.0% | Note 8 |
| 6 | <= 2 | C2 | 66.0% | C2 | 67.0% | 1.0% | C2 | 69.0% | 3.0% | Note 8 |
| 2 | Qualcomm | 1 | 2 | C1 | 0.0% | C6 | 0.0% | 0.0% | C1 | 0.0% | 0.0% | Note 2 |
| 2 | 2 | C1 | 18.5% | C6 | 19.0% | 0.4% | C1 | 23.4% | 4.9% | Note 2 |
| 3 | 2 | C1 | 35.5% | C6 | 36.3% | 0.8% | C1 | 40.0% | 4.5% | Note 2 |
| 4 | 2 | C1 | 48.0% | C6 | 49.1% | 1.1% | C1 | 51.5% | 3.5% | Note 2 |
| 5 | 2 | C1 | 56.8% | C6 | 58.0% | 1.2% | C1 | 59.7% | 2.9% | Note 2 |
| 6 | 2 | C1 | 62.7% | C6 | 64.0% | 1.3% | C1 | 65.4% | 2.7% | Note 2 |
| 7 | 2 | C1 | 67.4% | C6 | 68.8% | 1.4% | C1 | 70.0% | 2.6% | Note 2 |
| 8 | 2 | C1 | 70.9% | C6 | 72.3% | 1.4% | C1 | 73.4% | 2.5% | Note 2 |
| 9 | 2 | C1 | 73.5% | C6 | 74.8% | 1.3% | C1 | 75.9% | 2.4% | Note 2 |
| 10 | 2 | C1 | 75.7% | C6 | 77.0% | 1.3% | C1 | 78.0% | 2.3% | Note 2 |
| 1 | 2 | C4 | 0.0% | C7 | 0.0% | 0.0% | C6 | 0.0% | 0.0% | Note 3 |
| 2 | 2 | C4 | 17.9% | C7 | 17.9% | 0.0% | C6 | 17.9% | 0.0% | Note 3 |
| 3 | 2 | C4 | 33.9% | C7 | 33.9% | 0.0% | C6 | 33.9% | 0.0% | Note 3 |
| 4 | 2 | C4 | 46.2% | C7 | 46.3% | 0.0% | C6 | 46.3% | 0.1% | Note 3 |
| 5 | 2 | C4 | 54.8% | C7 | 54.9% | 0.1% | C6 | 54.9% | 0.1% | Note 3 |
| 6 | 2 | C4 | 60.8% | C7 | 60.8% | 0.1% | C6 | 60.9% | 0.1% | Note 3 |
| 7 | 2 | C4 | 65.4% | C7 | 65.5% | 0.1% | C6 | 65.6% | 0.2% | Note 3 |
| 8 | 2 | C4 | 69.0% | C7 | 69.1% | 0.1% | C6 | 69.1% | 0.2% | Note 3 |
| 9 | 2 | C4 | 71.5% | C7 | 71.6% | 0.1% | C6 | 71.7% | 0.2% | Note 3 |
| 10 | 2 | C4 | 73.7% | C7 | 73.8% | 0.1% | C6 | 73.9% | 0.2% | Note 3 |
| 3 | ZTE | 2 | 2 | C9 | 32.0% | C12 | 32.1% | 0.1% | C11 | 32.2% | 0.2% |  |
| 4 | 2 | C9 | 55.3% | C12 | 55.5% | 0.1% | C10 | 57.7% | 2.3% |  |
| 6 | 2 | C9 | 66.4% | C12 | 66.6% | 0.2% | C10 | 69.0% | 2.6% |  |
| 8 | 2 | C9 | 72.0% | C12 | 72.5% | 0.5% | C10 | 75.0% | 3.0% |  |
| 4 | Samsung | 1 | 2 | C3 | 0.0% | C2 | 0.0% | 0.0% | C2 | 0.00 | 0.0% | Note 8 |
| 2 | 2 | C3 | 0.0% | C2 | 8.0% | 8.0% | C2 | 12.0% | 12.0% | Note 8 |
| 3 | 2 | C3 | 3.0% | C2 | 15.0% | 12% | C2 | 22.0% | 19.0% | Note 8 |
| 4 | 2 | C3 | 7.0% | C2 | 20.0% | 13% | C2 | 30.0% | 23.0% | Note 8 |
| 5 | 2 | C3 | 12.0% | C2 | 26.0% | 14% | C2 | 36.0% | 24.0% | Note 8 |
| 6 | 2 | C3 | 17.0% | C2 | 30.0% | 13% | C2 | 41.0% | 24.0% | Note 8 |
| 7 | 2 | C3 | 22.0% | C2 | 34.0% | 12% | C2 | 46.0% | 24.0% | Note 8 |
| 8 | 2 | C3 | 28.0% | C2 | 37.0% | 9.0% | C2 | 49.0% | 21.0% | Note 8 |
| 9 | 2 | C3 | 33.0% | C2 | 41.0% | 8.0% | C2 | 52.0% | 19.0% | Note 8 |
| 10 | 2 | C3 | 38.0% | C2 | 43.0% | 5.0% | C2 | 55.0% | 17.0% | Note 8 |
| 1 | 2 | C3 | 0.0% | C2 | 0.0% | 0.0% | C2 | 0.0% | 0.0% | Note 6, 8 |
| 2 | 2 | C3 | 0.0% | C2 | 0.0% | 0.0% | C2 | 0.0% | 0.0% | Note 6, 8 |
| 3 | 2 | C3 | 0.0% | C2 | 1.0% | 1.0% | C2 | 12.0% | 12.0% | Note 6, 8 |
| 4 | 2 | C3 | 0.0% | C2 | 1.0% | 1.0% | C2 | 12.0% | 12.0% | Note 6, 8 |
| 5 | 2 | C3 | 3.0% | C2 | 1.0% | -2.0% | C2 | 22.0% | 19.0% | Note 6, 8 |
| 6 | 2 | C3 | 3.0% | C2 | 1.0% | -2.0% | C2 | 22.0% | 19.0% | Note 6, 8 |
| 7 | 2 | C3 | 7.0% | C2 | 3.0% | -4.0% | C2 | 30.0% | 23.0% | Note 6, 8 |
| 8 | 2 | C3 | 7.0% | C2 | 3.0% | -4.0% | C2 | 30.0% | 23.0% | Note 6, 8 |
| 9 | 2 | C3 | 12.0% | C2 | 5.0% | -7.0% | C2 | 36.0% | 24.0% | Note 6, 8 |
| 10 | 2 | C3 | 12.0% | C2 | 5.0% | -7.0% | C2 | 36.0% | 24.0% | Note 6, 8 |
| 1 | 2 | C3 | 0.0% | C5 | 0.0% | 0.0% | C5 | 0.0% | 0.0% | Note 7, 8 |
| 2 | 2 | C3 | 0.0% | C5 | 0.0% | 0.0% | C5 | 0.0% | 0.0% | Note 7, 8 |
| 3 | 2 | C3 | 3.0% | C5 | 3.0% | 0.0% | C5 | 4.0% | 1.0% | Note 7, 8 |
| 4 | 2 | C3 | 7.0% | C5 | 8.0% | 1.0% | C5 | 8.0% | 1.0% | Note 7, 8 |
| 5 | 2 | C3 | 12.0% | C5 | 13.0% | 1.0% | C5 | 13.0% | 1.0% | Note 7, 8 |
| 6 | 2 | C3 | 17.0% | C5 | 18.0% | 1.0% | C5 | 18.0% | 1.0% | Note 7, 8 |
| 7 | 2 | C3 | 22.0% | C5 | 23.0% | 1.0% | C5 | 24.0% | 2.0% | Note 7, 8 |
| 8 | 2 | C3 | 28.0% | C5 | 28.0% | 0.0% | C5 | 30.0% | 2.0% | Note 7, 8 |
| 9 | 2 | C3 | 33.0% | C5 | 34.0% | 1.0% | C5 | 35.0% | 2.0% | Note 7, 8 |
| 10 | 2 | C3 | 38.0% | C5 | 38.0% | 0.0% | C5 | 40.0% | 2.0% | Note 7, 8 |
| Note 1: Metric: the whole system blocking rate. It can be calculated by summing the product of the percentage of each number of UE simultaneously scheduled per slot and its corresponding blocking rate.  Note 2: Each UE is configured with all the ALs  Note 3: Each UE is configured with a single AL  Note 4: Reference case：2；50% BD reduction case:1  Note 5: For RedCap UEs using 2RX; BD reduction by reducing DCI size budget is evaluated (i.e. 'the number of DCI sizes to monitor per PDCCH candidate' is set to 2 for the reference case and 1 for approximately 50% reduction in BD limits).  Note 6: With enhancement of UE group scheduling with 2 UEs per DCI.  Note 7: With enhancement of PDCCH dropping based on predetermined CCE AL priority order = [1 2 4 8 16]  Note 8: Poor coverage | | | | | | | | | | | | |

Table B.1-4: PDCCH blocking rate for FR1, with 30kHz/20MHz, CORESET duration: 2 symbols, Delay toleration: 1, AL distribution: Others except A1/A2/A3

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | AL distribution in Table 6.2-5 | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Comments |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |
| Huawei, HiSilicon | A4 | 5 | Note 4 | C5 | 12.3% | - |  | - | C7 | 12.30% | 0.0% | Note 1, 2 |
| A4 | 5 | 2 | C5 | 12.3% | C6 | 13.8% | 1.5% | C1 | 16.30% | 4.0% | Note1 |
| A4 | 10 | Note 4 | C5 | 29.4% | - |  | - | C7 | 29.40% | 0.0% | Note1, 2 |
| A4 | 10 | 2 | C5 | 29.4% | C6 | 33.9% | 4.5% | C1 | 34.30% | 4.9% | Note1 |
| Panasonic [5] | A7 | 4 |  | C1 | 5.93% | C14 | 7.07% | 1.1% | C13 | 13.9% | 8.0% |  |
| A7 | 6 |  | C1 | 10.1% | C14 | 13.7% | 3.6% | C13 | 23.2% | 13.1% |  |
| Note 1: For RedCap UEs using 1RX;  Note 2: BD reduction by reducing DCI size budget is evaluated (i.e. 'the number of DCI sizes to monitor per PDCCH candidate' is set to 2 for the reference case and 1 for approximately 50% reduction in BD limits). | | | | | | | | | | | | |

Table B.1-5: PDCCH blocking rate for FR1, with 15kHz/20MHz, CORESET duration: 2 symbols, Delay toleration: 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | AL distribution in Table 6.2-5 | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Comments |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |
| vivo | A1 | 2 | 2 | C1 | 0.00% | C1 | 1.36% | 1.36% | C1 | 1.17% | 1.17% |  |
| A1 | 3 | 2 | C1 | 0.56% | C1 | 2.14% | 1.58% | C1 | 2.32% | 1.76% |  |
| A1 | 4 | 2 | C1 | 1.31% | C1 | 2.94% | 1.63% | C1 | 3.35% | 2.04% |  |
| A1 | 5 | 2 | C1 | 1.90% | C1 | 3.73% | 1.83% | C1 | 4.14% | 2.24% |  |
| A1 | 1~5 | 2 | C1 | 0.02% | C1 | 0.17% | 0.15% | C1 | 0.05% | 0.03% | Note 1 |
| Note 1: Metric: the whole system blocking rate. It can be calculated by summing the product of the percentage of each number of UE simultaneously scheduled per slot and its corresponding blocking rate. | | | | | | | | | | | | |

Table B.1-6: PDCCH blocking rate for FR1, with 15kHz/20MHz, CORESET duration: 3 symbols, Delay toleration: 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | AL distribution in Table1 6.2-5 | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Note |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |
| vivo | A1 | 2 | 2 | C1 | 0.00% | C1 | 0.89% | 0.89% | C1 | 0.90% | 0.90% |  |
| A1 | 3 | 2 | C1 | 0.34% | C1 | 1.54% | 1.20% | C1 | 1.59% | 1.25% |  |
| A1 | 4 | 2 | C1 | 0.62% | C1 | 2.25% | 1.63% | C1 | 2.16% | 1.54% |  |
| A1 | 5 | 2 | C1 | 1.08% | C1 | 2.76% | 1.68% | C1 | 2.82% | 1.74% |  |
| A1 | 1~5 | 2 | C1 | 0.01% | C1 | 0.18% | 0.17% | C1 | 0.25% | 0.24% | Note 1 |
| Nokia | A1 | 2 | 2 | C2 | 0.00% | C8 | 0.00% | 0.00% | C2 | 0.00% | 0.00% |  |
| A1 | 3 | 2 | C2 | 1.00% | C8 | 1.00% | 0.00% | C2 | 2.00% | 1.00% |  |
| A1 | 4 | 2 | C2 | 2.00% | C8 | 3.00% | 1.00% | C2 | 6.00% | 4.00% |  |
| A1 | 5 | 2 | C2 | 4.00% | C8 | 7.00% | 3.00% | C2 | 11.0% | 7.00% |  |
| A1 | 6 | 2 | C2 | 10.0% | C8 | 12.0% | 2.00% | C2 | 16.0% | 6.00% |  |
| A1 | 7 | 2 | C2 | 15.0% | C8 | 17.0% | 2.00% | C2 | 23.0% | 8.00% |  |
| A1 | 8 | 2 | C2 | 18.0% | C8 | 22.0% | 4.00% | C2 | 31.0% | 13.0% |  |
| Intel | A1 | 2 | 1 | C10 | 0.01% | C13 | 0.01% | 0.00% | C12 | 0.01% | 0.00% |  |
| A1 | 4 | 1 | C10 | 0.02% | C13 | 0.02% | 0.00% | C12 | 0.12% | 0.10% |  |
| A1 | 8 | 1 | C10 | 0.07% | C13 | 0.07% | 0.00% | C12 | 0.28% | 0.21% |  |
| A1 | 10 | 1 | C10 | 0.20% | C13 | 0.20% | 0.00% | C12 | 0.6% | 0.40% |  |
| A1 | 15 | 1 | C10 | 1.80% | C13 | 1.80% | 0.00% | C12 | 2.5% | 0.70% |  |
| Note 1: Metric: the whole system blocking rate. It can be calculated by summing the product of the percentage of each number of UE simultaneously scheduled per slot and its corresponding blocking rate. | | | | | | | | | | | | |

Table B.1-7: PDCCH blocking rate for FR1, with 15kHz/20MHz, CORESET duration: 2 symbols, Delay toleration: 1, 2 or 3 slots

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | AL distribution in Table 6.2-5 | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Comments |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |  |
| ZTE | A1 | 2 | 2 | C7 | 0.00% | C10 | 0.00% | 0.00% | C9 | 0.14% | 0.14% | Note 1 |
| A1 | 4 | 2 | C7 | 0.08% | C10 | 0.08% | 0.00% | C9 | 0.62% | 0.54% | Note 1 |
| A1 | 6 | 2 | C7 | 0.30% | C10 | 0.49% | 0.19% | C9 | 1.34% | 1.04% | Note 1 |
| A1 | 8 | 2 | C7 | 0.70% | C10 | 1.12% | 0.42% | C9 | 2.26% | 1.56% | Note 1 |
| A1 | 2 | 2 | C7 | 0.00% | C10 | 0.00% | 0.00% | C9 | 0.06% | 0.06% | Note 2 |
| A1 | 4 | 2 | C7 | 0.03% | C10 | 0.05% | 0.02% | C9 | 0.29% | 0.26% | Note 2 |
| A1 | 6 | 2 | C7 | 0.15% | C10 | 0.25% | 0.10% | C9 | 0.67% | 0.52% | Note 2 |
| A1 | 8 | 2 | C7 | 0.37% | C10 | 0.61% | 0.24% | C9 | 1.18% | 0.81% | Note 2 |
| A1 | 2 | 2 | C7 | 0.00% | C10 | 0.00% | 0.00% | C9 | 0.04% | 0.04% | Note 3 |
| A1 | 4 | 2 | C7 | 0.03% | C10 | 0.04% | 0.01% | C9 | 0.22% | 0.19% | Note 3 |
| A1 | 6 | 2 | C7 | 0.08% | C10 | 0.16% | 0.08% | C9 | 0.46% | 0.38% | Note 3 |
| A1 | 8 | 2 | C7 | 0.24% | C10 | 0.40% | 0.16% | C9 | 0.84% | 0.60% | Note 3 |
| A2 | 2 | 2 | C8 | 0.00% | C10 | 0.76% | 0.76% | C9 | 2.02% | 2.02% | Note 1 |
| A2 | 4 | 2 | C8 | 2.48% | C10 | 4.28% | 1.80% | C9 | 9.01% | 6.53% | Note 1 |
| A2 | 6 | 2 | C8 | 10.23% | C10 | 11.14% | 0.91% | C9 | 16.91% | 6.68% | Note 1 |
| A2 | 8 | 2 | C8 | 18.23% | C10 | 18.88% | 0.65% | C9 | 24.53% | 6.30% | Note 1 |
| A3 | 2 | 2 | C9 | 0.00% | C10 | 0.03% | 0.03% | C9 | 0.03% | 0.03% | Note 1 |
| A3 | 4 | 2 | C9 | 23.58% | C10 | 24.32% | 0.74% | C9 | 26.61% | 3.03% | Note 1 |
| A3 | 6 | 2 | C9 | 39.39% | C10 | 39.50% | 0.11% | C9 | 41.55% | 2.16% | Note 1 |
| A3 | 8 | 2 | C9 | 48.95% | C10 | 49.18% | 0.23% | C9 | 51.50% | 2.55% | Note 1 |
| Note 1: Delay toleration is 1 slot  Note 2: Delay toleration is 2 slots  Note 3: Delay toleration is 3 slots | | | | | | | | | | | | |

Table B.1-8: PDCCH blocking rate for FR1, with 30kHz/20MHz, CORESET duration: 3 symbols, Delay toleration: 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | AL distribution in Table 6.2-5 | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Comments |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |  |
| vivo | A1 | 2 | 2 | C1 | 0.67% | C1 | 1.58% | 0.91% | C1 | 1.48% | 0.81% |  |
| A1 | 3 | 2 | C1 | 1.62% | C1 | 2.95% | 1.33% | C1 | 3.13% | 1.51% |  |
| A1 | 4 | 2 | C1 | 2.34% | C1 | 4.39% | 2.05% | C1 | 4.80% | 2.46% |  |
| A1 | 5 | 2 | C1 | 3.35% | C1 | 5.74% | 2.39% | C1 | 5.81% | 2.46% |  |
| A1 | 1~5 | 2 | C1 | 0.10% | C1 | 0.20% | 0.10% | C1 | 0.20% | 0.10% | Note 1 |
| Note 1: Metric: the whole system blocking rate. It can be calculated by summing the product of the percentage of each number of UE simultaneously scheduled per slot and its corresponding blocking rate. | | | | | | | | | | | | |

Table B.1-9: PDCCH blocking rate for FR1, with 30kHz/20MHz, CORESET duration: 2 symbols, Delay toleration: 1, DCI size = 60 bits (NOT including CRC)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | AL distribution in Table 6.2-5 | # users | # DCI sizes | Case 1 | | Case 2 | | Case 3 | | | Comments |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |  |
| Huawei, HiSilicon | A5 | 5 | Note 1 | C5 | 8.60% | - | - | C2 | 8.60% | 0.0% | Note 2 |
| A5 | 10 | Note 1 | C5 | 23.20% | - | - | C2 | 23.20% | 0.0% | Note 2 |
| A6 | 5 | Note 1 | C5 | 14.5% | - | - | C2 | 14.5% | 0.0% | Note 2 |
| A6 | 10 | Note 1 | C5 | 33.70% | - | - | C2 | 33.70% | 0.0% | Note 2 |
| Note 1: Reference case：2；50% BD reduction case:1  Note 2: For RedCap UEs using 2RX; BD reduction by reducing DCI size budget is evaluated (i.e. 'the number of DCI sizes to monitor per PDCCH candidate' is set to 2 for the reference case and 1 for approximately 50% reduction in BD limits). | | | | | | | | | | | |

# B.2 PDCCH blocking rate results for FR2

Table B.2-1: PDCCH blocking rate due to reduced blind decoding for FR2, with 120kHz, CORESET duration: 2 symbols, Delay toleration: 1, AL distribution: A1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Comments |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |
| 1 | Ericsson | 3 | <=2 | C2 | 1.00% | C2 | 1.2% | 0.20% | C2 | 4.4% | 3.4% | Note 1,5 |
| 6 | <= 2 | C2 | 3.90% | C2 | 6.8% | 2.90% | C2 | 14.0% | 10.1% | Note 1, 5 |
| 2 | Qualcomm | 2 | 2 | C1 | 0.20% | C5 | 0.4% | 0.20% | C1 | 4.0% | 3.8% |  |
| 4 | 2 | C1 | 1.10% | C5 | 1.9% | 0.80% | C1 | 11.4% | 10.3% |  |
| 6 | 2 | C1 | 2.60% | C5 | 4.5% | 1.90% | C1 | 17.7% | 15.1% |  |
| 8 | 2 | C1 | 5.10% | C5 | 7.8% | 2.70% | C1 | 23.5% | 18.4% |  |
| 10 | 2 | C1 | 8.40% | C5 | 12.0% | 3.60% | C1 | 28.9% | 20.5% |  |
| 12 | 2 | C1 | 12.70% | C5 | 16.6% | 3.90% | C1 | 33.5% | 20.8% |  |
| 14 | 2 | C1 | 17.70% | C5 | 21.5% | 3.80% | C1 | 38.0% | 20.3% |  |
| 16 | 2 | C1 | 22.90% | C5 | 26.5% | 3.60% | C1 | 41.7% | 18.8% |  |
| 18 | 2 | C1 | 28.20% | C5 | 31.4% | 3.20% | C1 | 45.4% | 17.2% |  |
| 20 | 2 | C1 | 33.50% | C5 | 36.1% | 2.60% | C1 | 48.7% | 15.2% |  |
| 3 | Nokia | 2 | 2 | C1 | 0.00% | C1 | 1.0% | 1.00% | C1 | 3.0% | 3.0% |  |
| 3 | 2 | C1 | 2.00% | C1 | 4.0% | 2.00% | C1 | 7.0% | 5.0% |  |
| 4 | 2 | C1 | 6.00% | C1 | 9.0% | 3.00% | C1 | 15.0% | 9.0% |  |
| 5 | 2 | C1 | 11.00% | C1 | 14.0% | 3.00% | C1 | 26.0% | 15.0% |  |
| 6 | 2 | C1 | 15.00% | C1 | 20.0% | 5.00% | C1 | 40.0% | 25.0% |  |
| 7 | 2 | C1 | 20.00% | C1 | 29.0% | 9.00% | C1 | 59.0% | 39.0% |  |
| 8 | 2 | C1 | 26.00% | C1 | 40.0% | 14.00% | C1 | 77.0% | 51.0% |  |
| 4 | Samsung | 1 | 2 | C1 | 0.00% | C2 | 5.0% | 5.00% | C2 | 8.0% | 8.0% | Note 5 |
| 2 | 2 | C1 | 0.00% | C2 | 5.0% | 5.00% | C2 | 8.0% | 8.0% | Note 5 |
| 3 | 2 | C1 | 0.00% | C2 | 7.0% | 7.00% | C2 | 14.0% | 14.0% | Note 5 |
| 4 | 2 | C1 | 1.00% | C2 | 12.0% | 11.00% | C2 | 22.0% | 21.0% | Note 5 |
| 5 | 2 | C1 | 3.00% | C2 | 18.0% | 15.00% | C2 | 31.0% | 28.0% | Note 5 |
| 6 | 2 | C1 | 7.00% | C2 | 24.0% | 17.00% | C2 | 38.0% | 31.0% | Note 5 |
| 7 | 2 | C1 | 11.00% | C2 | 31.0% | 20.00% | C2 | 45.0% | 34.0% | Note 5 |
| 8 | 2 | C1 | 16.00% | C2 | 37.0% | 21.00% | C2 | 50.0% | 34.0% | Note 5 |
| 9 | 2 | C1 | 22.00% | C2 | 42.0% | 20.00% | C2 | 55.0% | 33.0% | Note 5 |
| 10 | 2 | C1 | 26.00% | C2 | 47.0% | 21.00% | C2 | 59.0% | 33.0% | Note 5 |
| 1 | 2 | C1 | 0.00% | C2 | 5.0% | 5.00% | C2 | 8.0% | 8.0% | Note 3, 5 |
| 2 | 2 | C1 | 0.00% | C2 | 5.0% | 5.00% | C2 | 8.0% | 8.0% | Note 3, 5 |
| 3 | 2 | C1 | 0.00% | C2 | 5.0% | 5.00% | C2 | 8.0% | 8.0% | Note 3, 5 |
| 4 | 2 | C1 | 0.00% | C2 | 5.0% | 5.00% | C2 | 8.0% | 8.0% | Note 3, 5 |
| 5 | 2 | C1 | 0.00% | C2 | 7.0% | 7.00% | C2 | 14.0% | 14.0% | Note 3, 5 |
| 6 | 2 | C1 | 0.00% | C2 | 7.0% | 7.00% | C2 | 14.0% | 14.0% | Note 3, 5 |
| 7 | 2 | C1 | 1.00% | C2 | 12.0% | 11.00% | C2 | 22.0% | 21.0% | Note 3, 5 |
| 8 | 2 | C1 | 1.00% | C2 | 12.0% | 11.00% | C2 | 22.0% | 21.0% | Note 3, 5 |
| 9 | 2 | C1 | 3.00% | C2 | 18.0% | 15.00% | C2 | 31.0% | 28.0% | Note 3, 5 |
| 10 | 2 | C1 | 3.00% | C2 | 18.0% | 15.00% | C2 | 31.0% | 28.0% | Note 3,5 |
| 1 | 2 | C1 | 0.00% | C3 | 10.0% | 10.00% | C3 | 10.0% | 10.0% | Note 4,5 |
| 2 | 2 | C1 | 0.00% | C3 | 10.0% | 10.00% | C3 | 18.0% | 18.0% | Note 4,5 |
| 3 | 2 | C1 | 0.00% | C3 | 10.0% | 10.00% | C3 | 24.0% | 24.0% | Note 4,5 |
| 4 | 2 | C1 | 1.00% | C3 | 11.0% | 10.00% | C3 | 29.0% | 28.0% | Note 4,5 |
| 5 | 2 | C1 | 3.00% | C3 | 13.0% | 10.00% | C3 | 32.0% | 29.0% | Note 4,5 |
| 6 | 2 | C1 | 7.00% | C3 | 16.0% | 9.00% | C3 | 36.0% | 29.0% | Note 4,5 |
| 7 | 2 | C1 | 11.00% | C3 | 20.0% | 9.00% | C3 | 41.0% | 30.0% | Note 4,5 |
| 8 | 2 | C1 | 16.00% | C3 | 25.0% | 9.00% | C3 | 44.0% | 28.0% | Note 4,5 |
| 9 | 2 | C1 | 22.00% | C3 | 30.0% | 8.00% | C3 | 49.0% | 27.0% | Note 4,5 |
| 10 | 2 | C1 | 26.00% | C3 | 35.0% | 9.00% | C3 | 52.0% | 26.0% | Note 4,5 |
| Note 1: Digital Beamforming.  Note 3: With enhancement of UE group scheduling with 2 UEs per DCI.  Note 4: With enhancement of PDCCH dropping based on predetermined CCE AL priority order = [1 2 4 8 16]  Note 5: Good coverage | | | | | | | | | | | | |

Table B.2-2: PDCCH blocking rate due to reduced blind decoding for FR2, with 120kHz, CORESET duration: 2 symbols, Delay toleration: 1, AL distribution: A2

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Notes |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |
| 1 | Ericsson | 3 | <= 2 | C2 | 18.0% | C2 | 20.0% | 2.0% | C2 | 24.00% | 6.0% | Note 1,6 |
| 6 | <= 2 | C2 | 36.0% | C2 | 40.0% | 4.0% | C2 | 44.00% | 8.0% | Note 1,6 |
| 2 | Qualcomm | 1 | 2 | C1 | 0.0% | C5 | 0.0% | 0.0% | C1 | 0.00% | 0.0% |  |
| 2 | 2 | C1 | 7.4% | C5 | 7.8% | 0.4% | C1 | 10.80% | 3.4% |  |
| 3 | 2 | C1 | 14.2% | C5 | 15.3% | 1.1% | C1 | 20.30% | 6.1% |  |
| 4 | 2 | C1 | 20.4% | C5 | 22.0% | 1.6% | C1 | 28.00% | 7.6% |  |
| 5 | 2 | C1 | 25.9% | C5 | 27.9% | 2.0% | C1 | 34.50% | 8.6% |  |
| 6 | 2 | C1 | 31.2% | C5 | 33.6% | 2.4% | C1 | 40.40% | 9.2% |  |
| 7 | 2 | C1 | 35.8% | C5 | 38.4% | 2.6% | C1 | 45.30% | 9.5% |  |
| 8 | 2 | C1 | 40.3% | C5 | 43.0% | 2.7% | C1 | 49.70% | 9.4% |  |
| 9 | 2 | C1 | 44.0% | C5 | 46.7% | 2.7% | C1 | 53.30% | 9.3% |  |
| 10 | 2 | C1 | 47.5% | C5 | 50.1% | 2.6% | C1 | 56.60% | 9.1% |  |
| 3 | ZTE | 2 | 2 | C2 | 9.2% | C6 | 10.0% | 0.8% | C1 | 22.88% | 13.7% | Note 5 |
| 4 | 2 | C2 | 26.1% | C6 | 28.9% | 2.9% | C1 | 44.00% | 18.0% | Note 5 |
| 6 | 2 | C2 | 40.9% | C6 | 43.3% | 2.5% | C1 | 54.92% | 14.1% | Note 5 |
| 8 | 2 | C2 | 51.9% | C6 | 54.3% | 2.5% | C1 | 62.61% | 10.7% | Note 5 |
| 4 | Samsung | 1 | 2 | C1 | 0.0% | C2 | 40.0% | 40.0% | C2 | 61.00% | 61.0% | Note 5 |
| 2 | 2 | C1 | 11.0% | C2 | 42.0% | 31.0% | C2 | 61.00% | 50.0% | Note 5 |
| 3 | 2 | C1 | 19.0% | C2 | 45.0% | 26.0% | C2 | 61.00% | 42.0% | Note 5 |
| 4 | 2 | C1 | 25.0% | C2 | 47.0% | 22.0% | C2 | 62.00% | 37.0% | Note 5 |
| 5 | 2 | C1 | 30.0% | C2 | 50.0% | 20.0% | C2 | 63.00% | 33.0% | Note 5 |
| 6 | 2 | C1 | 35.0% | C2 | 52.0% | 17.0% | C2 | 64.00% | 29.0% | Note 5 |
| 7 | 2 | C1 | 39.0% | C2 | 54.0% | 15.0% | C2 | 66.00% | 27.0% | Note 5 |
| 8 | 2 | C1 | 43.0% | C2 | 56.0% | 13.0% | C2 | 67.00% | 24.0% | Note 5 |
| 9 | 2 | C1 | 46.0% | C2 | 58.0% | 12.0% | C2 | 68.00% | 22.0% | Note 5 |
| 10 | 2 | C1 | 49.0% | C2 | 60.0% | 11.0% | C2 | 69.00% | 20.0% | Note 5 |
| 1 | 2 | C1 | 0.0% | C2 | 40.0% | 40.0% | C2 | 61.00% | 61.0% | Note3, 5 |
| 2 | 2 | C1 | 0.0% | C2 | 40.0% | 40.0% | C2 | 61.00% | 61.0% | Note3, 5 |
| 3 | 2 | C1 | 11.0% | C2 | 42.0% | 31.0% | C2 | 61.00% | 50.0% | Note3, 5 |
| 4 | 2 | C1 | 11.0% | C2 | 42.0% | 31.0% | C2 | 61.00% | 50.0% | Note3, 5 |
| 5 | 2 | C1 | 19.0% | C2 | 45.0% | 26.0% | C2 | 61.00% | 42.0% | Note3, 5 |
| 6 | 2 | C1 | 19.0% | C2 | 45.0% | 26.0% | C2 | 61.00% | 42.0% | Note3, 5 |
| 7 | 2 | C1 | 25.0% | C2 | 47.0% | 22.0% | C2 | 62.00% | 37.0% | Note3, 5 |
| 8 | 2 | C1 | 25.0% | C2 | 47.0% | 22.0% | C2 | 62.00% | 37.0% | Note3, 5 |
| 9 | 2 | C1 | 30.0% | C2 | 50.0% | 20.0% | C2 | 63.00% | 33.0% | Note3, 5 |
| 10 | 2 | C1 | 30.0% | C2 | 50.0% | 20.0% | C2 | 63.00% | 33.0% | Note3, 5 |
| 1 | 2 | C1 | 0.0% | C4 | 0.0% | 0.0% | C4 | 20.00% | 20.0% | Note 4, 5 |
| 2 | 2 | C1 | 11.0% | C4 | 11.0% | 0.0% | C4 | 30.00% | 19.0% | Note 4, 5 |
| 3 | 2 | C1 | 19.0% | C4 | 19.0% | 0.0% | C4 | 38.00% | 19.0% | Note 4, 5 |
| 4 | 2 | C1 | 25.0% | C4 | 27.0% | 2.0% | C4 | 43.00% | 18.0% | Note 4, 5 |
| 5 | 2 | C1 | 30.0% | C4 | 32.0% | 2.0% | C4 | 48.00% | 18.0% | Note 4, 5 |
| 6 | 2 | C1 | 35.0% | C4 | 37.0% | 2.0% | C4 | 52.00% | 17.0% | Note 4, 5 |
| 7 | 2 | C1 | 39.0% | C4 | 41.0% | 2.0% | C4 | 55.00% | 16.0% | Note 4, 5 |
| 8 | 2 | C1 | 43.0% | C4 | 45.0% | 2.0% | C4 | 58.00% | 15.0% | Note 4, 5 |
| 9 | 2 | C1 | 46.0% | C4 | 49.0% | 3.0% | C4 | 61.00% | 15.0% | Note 4, 5 |
| 10 | 2 | C1 | 49.0% | C4 | 53.0% | 4.0% | C4 | 63.00% | 14.0% | Note 4, 5 |
| Note 1: Digital Beamforming.  Note 3: With enhancement of UE group scheduling with 2 UEs per DCI.  Note 4: With enhancement of PDCCH dropping based on predetermined CCE AL priority order = [1 2 4 8 16]  Note 5: Medium coverage | | | | | | | | | | | | |

Table B.2-3: PDCCH blocking rate due to reduced blind decoding for FR2, with 120kHz, CORESET duration: 2 symbols, Delay toleration: 1, AL distribution: A3

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Company | # users | # DCI sizes | Case 1 | | Case 2 | | | Case 3 | | | Notes |
| # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 | # PDCCH candidates for AL [1,2,4,8,16] in Table 6.2-6 | PDCCH blocking rate | Blocking rate increase relative to Case 1 |
| 1 | Ericsson | 3 | <= 2 | C2 | 45.0% | C2 | 47.0% | 2.0% | C2 | 49.0% | 4.0% | Note 1, 5 |
| 6 | <= 2 | C2 | 63.0% | C2 | 65.0% | 2.0% | C2 | 67.0% | 4.0% | Note 1, 5 |
| 2 | Qualcomm | 1 | 2 | C1 | 0.0% | C5 | 0.0% | 0.0% | C1 | 0.0% | 0.0% |  |
| 2 | 2 | C1 | 21.2% | C5 | 21.7% | 0.5% | C1 | 23.1% | 1.9% |  |
| 3 | 2 | C1 | 36.2% | C5 | 37.0% | 0.8% | C1 | 39.4% | 3.2% |  |
| 4 | 2 | C1 | 46.8% | C5 | 47.9% | 1.1% | C1 | 50.5% | 3.7% |  |
| 5 | 2 | C1 | 54.1% | C5 | 55.4% | 1.3% | C1 | 58.3% | 4.2% |  |
| 6 | 2 | C1 | 59.5% | C5 | 60.9% | 1.4% | C1 | 63.8% | 4.3% |  |
| 7 | 2 | C1 | 63.9% | C5 | 65.4% | 1.5% | C1 | 68.3% | 4.4% |  |
| 8 | 2 | C1 | 67.2% | C5 | 68.7% | 1.5% | C1 | 71.5% | 4.3% |  |
| 9 | 2 | C1 | 69.7% | C5 | 71.2% | 1.5% | C1 | 74.1% | 4.4% |  |
| 10 | 2 | C1 | 71.7% | C5 | 73.1% | 1.4% | C1 | 76.1% | 4.4% |  |
| 3 | Samsung | 1 | 2 | C1 | 0.0% | C2 | 20.0% | 20.0% | C2 | 49.0% | 49.0% | Note 5 |
| 2 | 2 | C1 | 15.0% | C2 | 32.0% | 17.0% | C2 | 58.0% | 43.0% | Note 5 |
| 3 | 2 | C1 | 25.0% | C2 | 42.0% | 17.0% | C2 | 64.0% | 39.0% | Note 5 |
| 4 | 2 | C1 | 34.0% | C2 | 49.0% | 15.0% | C2 | 68.0% | 34.0% | Note 5 |
| 5 | 2 | C1 | 41.0% | C2 | 55.0% | 14.0% | C2 | 72.0% | 31.0% | Note 5 |
| 6 | 2 | C1 | 47.0% | C2 | 59.0% | 12.0% | C2 | 74.0% | 27.0% | Note 5 |
| 7 | 2 | C1 | 52.0% | C2 | 63.0% | 11.0% | C2 | 76.0% | 24.0% | Note 5 |
| 8 | 2 | C1 | 56.0% | C2 | 66.0% | 10.0% | C2 | 78.0% | 22.0% | Note 5 |
| 9 | 2 | C1 | 59.0% | C2 | 68.0% | 9.0% | C2 | 79.0% | 20.0% | Note 5 |
| 10 | 2 | C1 | 62.0% | C2 | 71.0% | 9.0% | C2 | 80.0% | 18.0% | Note 5 |
| 1 | 2 | C1 | 0.0% | C2 | 20.0% | 20.0% | C2 | 49.0% | 49.0% | Note 3, 5 |
| 2 | 2 | C1 | 0.0% | C2 | 20.0% | 20.0% | C2 | 49.0% | 49.0% | Note 3, 5 |
| 3 | 2 | C1 | 15.0% | C2 | 32.0% | 17.0% | C2 | 58.0% | 43.0% | Note 3, 5 |
| 4 | 2 | C1 | 15.0% | C2 | 32.0% | 17.0% | C2 | 58.0% | 43.0% | Note 3, 5 |
| 5 | 2 | C1 | 25.0% | C2 | 42.0% | 17.0% | C2 | 64.0% | 39.0% | Note 3, 5 |
| 6 | 2 | C1 | 25.0% | C2 | 42.0% | 17.0% | C2 | 64.0% | 39.0% | Note 3, 5 |
| 7 | 2 | C1 | 34.0% | C2 | 49.0% | 15.0% | C2 | 68.0% | 34.0% | Note 3, 5 |
| 8 | 2 | C1 | 34.0% | C2 | 49.0% | 15.0% | C2 | 68.0% | 34.0% | Note 3, 5 |
| 9 | 2 | C1 | 41.0% | C2 | 55.0% | 14.0% | C2 | 72.0% | 31.0% | Note 3, 5 |
| 10 | 2 | C1 | 41.0% | C2 | 55.0% | 14.0% | C2 | 72.0% | 31.0% | Note 3, 5 |
| 1 | 2 | C1 | 0.0% | C4 | 0.0% | 0.0% | C5 | 5.0% | 5.0% | Note 4,5 |
| 2 | 2 | C1 | 14.0% | C4 | 15.0% | 1.0% | C5 | 19.0% | 5.0% | Note 4,5 |
| 3 | 2 | C1 | 26.0% | C4 | 26.0% | 0.0% | C5 | 31.0% | 5.0% | Note 4,5 |
| 4 | 2 | C1 | 34.0% | C4 | 35.0% | 1.0% | C5 | 40.0% | 6.0% | Note 4,5 |
| 5 | 2 | C1 | 41.0% | C4 | 42.0% | 1.0% | C5 | 47.0% | 6.0% | Note 4,5 |
| 6 | 2 | C1 | 47.0% | C4 | 48.0% | 1.0% | C5 | 52.0% | 5.0% | Note 4,5 |
| 7 | 2 | C1 | 52.0% | C4 | 52.0% | 0.0% | C5 | 57.0% | 5.0% | Note 4,5 |
| 8 | 2 | C1 | 56.0% | C4 | 56.0% | 0.0% | C5 | 61.0% | 5.0% | Note 4,5 |
| 9 | 2 | C1 | 59.0% | C4 | 60.0% | 1.0% | C5 | 64.0% | 5.0% | Note 4,5 |
| 10 | 2 | C1 | 62.0% | C4 | 63.0% | 1.0% | C5 | 67.0% | 5.0% | Note 4,5 |
| Note 1: Digital Beamforming.  Note 3: With enhancement of UE group scheduling with 2 UEs per DCI.  Note 4: With enhancement of PDCCH dropping based on predetermined CCE AL priority order = [1 2 4 8 16]  Note 5: Poor coverage | | | | | | | | | | | | |

Annex C: Link budget evaluation results

# C.1 Urban scenario at 2.6 GHz

Link budget evaluation results for the Urban scenario at 2.6 GHz from all the sourcing companies are captured in Tables C.1-1, C.1-2, C.1-3, and C.1-4. Tables C.1-1, C.1-2, and C.1-3 show the MIL results for reference NR UEs with 4 Rx branches (100MHz bandwidth), RedCap UEs with 2 Rx branches (20MHz bandwidth), and RedCap UEs with 1 Rx branch (20MHz bandwidth), respectively. For every sourcing-company result, the values of the target MIL and the amount of compensation for each channel that has MIL below the target value are highlighted.

Additionally, the MPL results are provided Table C.1-4. The detailed link budget calculations from the sourcing companies can be found in [3].

Table C.1-1: Link budget performance (MIL) for the reference NR UE (100MHz BW, 4Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban 2.6GHz, 4Rx Reference UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 165.9 | 170.1 | 163.6 | 162.3 | 162.4 |  | 158.6 | 154.8 | 151.8 | 139.4 | 150.0 |  | 139.4 |
| Margin (dB) | 26.4 | 30.6 | 24.1 | 22.8 | 22.9 |  | 19.2 | 15.4 | 12.4 | 0.0 | 10.6 |  |  |
| ZTE | MIL (dB) | 157.0 | 167.4 | 167.6 | 157.7 | 158.0 |  | 162.6 | 160.9 | 158.4 | 142.0 | 156.5 |  | 142.0 |
| Margin (dB) | 15.0 | 25.4 | 25.7 | 15.7 | 16.0 |  | 20.7 | 18.9 | 16.4 | 0.0 | 14.5 |  |  |
| OPPO | MIL (dB) | 167.5 | 171.5 | 169.9 | 162.2 | 165.2 |  | 155.0 | 155.1 | 155.2 | 145.1 | 154.7 |  | 145.1 |
| Margin (dB) | 22.3 | 26.3 | 24.8 | 17.1 | 20.1 |  | 9.9 | 9.9 | 10.1 | 0.0 | 9.6 |  |  |
| CATT | MIL (dB) | 164.7 | 168.7 | 167.6 | 161.5 | 163.8 |  | 160.3 | 158.9 | 156.9 | 145.9 | 153.5 |  | 145.9 |
| Margin (dB) | 18.7 | 22.7 | 21.6 | 15.5 | 17.8 |  | 14.4 | 12.9 | 10.9 | 0.0 | 7.6 |  |  |
| vivo | MIL (dB) | 157.6 | 165.6 | 162.0 | 157.1 | 158.6 | 160.8 | 156.2 | 153.6 | 151.1 | 137.8 | 152.5 | 149.7 | 137.8 |
| Margin (dB) | 19.8 | 27.8 | 24.2 | 19.4 | 20.9 | 23.0 | 18.4 | 15.9 | 13.3 | 0.0 | 14.7 | 11.9 |  |
| Xiaomi | MIL (dB) | 166.3 | 166.3 | 168.4 | 162.9 | 165.3 |  | 161.6 | 158.9 | 157.2 | 146.7 | 154.6 |  | 146.7 |
| Margin (dB) | 19.5 | 19.5 | 21.6 | 16.1 | 18.5 |  | 14.9 | 12.2 | 10.5 | 0.0 | 7.9 |  |  |
| Futurewei | MIL (dB) | 164.8 | 166.8 | 164.3 | 162.8 | 163.2 |  |  |  |  | 151.6 | 153.5 |  | 151.6 |
| Margin (dB) | 13.1 | 15.1 | 12.6 | 11.1 | 11.5 |  |  |  |  | 0.0 | 1.9 |  |  |
| Nokia | MIL (dB) | 168.3 | 168.3 | 166.8 | 167.3 | 165.8 |  | 151.7 |  | 150.2 | 138.6 | 147.8 | 150.3 | 138.6 |
| Margin (dB) | 29.7 | 29.7 | 28.2 | 28.7 | 27.2 |  | 13.1 |  | 11.6 | 0.0 | 9.2 | 11.7 |  |
| DOCOMO | MIL (dB) | 165.6 | 169.6 | 166.2 | 160.5 | 162.6 |  | 161.1 | 164.9 |  | 145.7 | 154.6 |  | 145.7 |
| Margin (dB) | 19.9 | 23.9 | 20.4 | 14.7 | 16.9 |  | 15.4 | 19.2 |  | 0.0 | 8.9 |  |  |
| CMCC | MIL (dB) | 162.8 | 168.4 | 166.7 | 160.8 | 163.4 | 163.8 | 156.3 | 154.5 | 152.3 | 139.8 | 152.8 | 158.6 | 139.8 |
| Margin (dB) | 23.0 | 28.6 | 26.9 | 21.0 | 23.6 | 24.1 | 16.5 | 14.7 | 12.6 | 0.0 | 13.1 | 18.9 |  |
| Panasonic | MIL (dB) |  | 169.0 | 161.0 |  |  |  |  |  |  |  |  |  |  |
| Margin (dB) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Huawei | MIL (dB) | 164.0 | 168.0 | 164.2 | 161.1 | 160.9 |  | 160.6 |  | 158.3 | 139.0 | 149.6 |  | 139.0 |
| Margin (dB) | 25.0 | 29.0 | 25.3 | 22.1 | 21.9 |  | 21.6 |  | 19.3 | 0.0 | 10.7 |  |  |
| Spreadtrum | MIL (dB) | 165.0 | 169.0 | 166.9 | 163.8 | 163.8 | 166.3 | 158.4 | 156.6 | 156.2 | 145.7 | 153.5 | 155.8 | 145.7 |
| Margin (dB) | 19.3 | 23.3 | 21.2 | 18.1 | 18.1 | 20.6 | 12.7 | 10.9 | 10.5 | 0.0 | 7.8 | 10.1 |  |
| Apple | MIL (dB) | 160.5 | 168.5 | 163.9 | 153.8 | 157.0 |  |  |  | 150.8 | 140.0 | 144.7 |  | 140.0 |
| Margin (dB) | 20.5 | 28.5 | 23.9 | 13.8 | 17.0 |  |  |  | 10.8 | 0.0 | 4.8 |  |  |
| Ericsson | MIL (dB) | 162.0 | 162.0 | 162.5 | 156.9 | 159.4 | 163.8 | 154.8 | 155.5 | 153.6 | 143.9 | 151.2 | 155.1 | 143.9 |
| Margin (dB) | 18.0 | 18.0 | 18.5 | 12.9 | 15.4 | 19.8 | 10.9 | 11.6 | 9.6 | 0.0 | 7.3 | 11.1 |  |
| InterDigital | MIL (dB) | 164.47 | 168.47 | 166.15 | 160.47 | 162.55 |  | 160.6 |  | 156.4 | 143.24 | 152.84 |  | 143.24 |
| Margin (dB) | 21.23 | 25.23 | 22.91 | 17.23 | 19.31 |  | 17.36 |  | 13.16 | 0.0 | 9.6 |  |  |
| Qualcomm | MIL (dB) | 161.3 |  | 163.4 | 158.3 | 159.8 |  |  |  | 146.5 | 139.4 | 148.2 |  | 139.4 |
| Margin (dB) | 22.0 |  | 24.0 | 18.9 | 20.4 |  |  |  | 7.2 | 0.0 | 8.9 |  |  |
| Intel | MIL (dB) | 165.7 | 166.9 | 163.5 | 166.4 | 164.1 | 165.7 | 162.0 | 160.8 | 158.2 | 143.9 | 154.6 | 156.8 | 143.9 |
| Margin (dB) | 21.7 | 23.0 | 19.6 | 22.4 | 20.1 | 21.8 | 18.1 | 16.8 | 14.2 | 0.0 | 10.6 | 12.8 |  |

Table C.1-2: Link budget performance (MIL) for the RedCap UE (20MHz BW, 2Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban 2.6GHz, 2Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 160.1 | 164.1 | 156.7 | 155.8 | 156.7 |  | 155.2 | 151.6 | 148.3 | 136.4 | 147.0 |  | 139.4 |
| Margin (dB) | 20.6 | 24.6 | 17.2 | 16.3 | 17.2 |  | 15.8 | 12.2 | 8.9 | -3.0 | 7.6 |  |  |
| ZTE | MIL (dB) |  |  |  |  |  |  | 159.6 | 157.9 | 155.4 | 139.0 | 153.5 |  | 142.0 |
| Margin (dB) |  |  |  |  |  |  | 17.7 | 15.9 | 13.4 | -3.0 | 11.5 |  |  |
| OPPO | MIL (dB) | 161.2 | 165.2 | 164.6 | 155.2 | 159.0 |  | 151.9 | 152.0 | 151.9 | 141.9 | 151.7 |  | 145.1 |
| Margin (dB) | 16.0 | 20.0 | 19.5 | 10.1 | 13.8 |  | 6.8 | 6.8 | 6.7 | -3.2 | 6.6 |  |  |
| CATT | MIL (dB) | 159.2 | 163.2 | 161.7 | 153.7 | 157.4 |  | 157.3 | 155.9 | 153.9 | 142.9 | 150.5 |  | 145.9 |
| Margin (dB) | 13.2 | 17.2 | 15.7 | 7.8 | 11.4 |  | 11.4 | 10.0 | 7.9 | -3.0 | 4.6 |  |  |
| vivo | MIL (dB) | 151.9 | 160.0 | 154.9 | 149.6 | 151.4 | 155.4 | 153.2 | 150.6 | 148.1 | 135.0 | 149.4 | 146.7 | 137.8 |
| Margin (dB) | 14.2 | 22.2 | 17.2 | 11.8 | 13.7 | 17.6 | 15.4 | 12.9 | 10.3 | -2.8 | 11.6 | 8.9 |  |
| Xiaomi | MIL (dB) | 160.8 | 160.8 | 160.9 | 155.4 | 158.4 |  | 158.6 | 155.9 | 154.2 | 143.7 | 151.6 |  | 146.7 |
| Margin (dB) | 14.0 | 14.0 | 14.1 | 8.6 | 11.6 |  | 11.9 | 9.2 | 7.5 | -3.0 | 4.9 |  |  |
| Futurewei | MIL (dB) | 159.0 | 161.0 | 159.3 | 157.3 | 158.1 |  |  |  |  | 148.6 | 150.5 |  | 151.6 |
| Margin (dB) | 7.3 | 9.3 | 7.6 | 5.6 | 6.4 |  |  |  |  | -3.0 | -1.1 |  |  |
| Nokia | MIL (dB) | 162.5 | 162.5 | 160.3 | 161.5 | 160.3 |  | 148.7 |  | 147.2 | 135.6 | 144.8 | 147.3 | 138.6 |
| Margin (dB) | 23.9 | 23.9 | 21.7 | 22.9 | 21.7 |  | 10.1 |  | 8.6 | -3.0 | 6.2 | 8.7 |  |
| DOCOMO | MIL (dB) | 159.8 | 163.8 | 159.9 | 152.9 | 156.0 |  | 158.1 | 161.9 |  | 142.7 | 151.6 |  | 145.7 |
| Margin (dB) | 14.1 | 18.1 | 14.1 | 7.2 | 10.3 |  | 12.4 | 16.2 |  | -3.0 | 5.9 |  |  |
| CMCC | MIL (dB) | 157.2 | 162.8 | 161.1 | 154.6 | 157.4 | 158.8 | 153.3 | 151.5 | 149.3 | 136.8 | 149.8 | 155.6 | 139.8 |
| Margin (dB) | 17.4 | 23.0 | 21.3 | 14.8 | 17.6 | 19.0 | 13.5 | 11.7 | 9.6 | -3.0 | 10.1 | 15.9 |  |
| Panasonic | MIL (dB) |  | 163.5 | 154.7 |  |  |  |  |  |  |  |  |  |  |
| Margin (dB) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Huawei | MIL (dB) | 158.0 | 162.0 | 156.9 | 154.6 | 154.6 |  | 157.6 |  | 155.3 | 136.0 | 146.6 |  | 139.0 |
| Margin (dB) | 19.0 | 23.0 | 17.9 | 15.7 | 15.6 |  | 18.6 |  | 16.3 | -3.0 | 7.7 |  |  |
| Spreadtrum | MIL (dB) | 159.0 | 163.0 | 160.9 | 157.8 | 157.8 | 160.3 | 155.4 | 153.6 | 153.2 | 142.7 | 147.5 | 152.8 | 145.7 |
| Margin (dB) | 13.2 | 17.2 | 15.1 | 12.0 | 12.0 | 14.5 | 9.7 | 7.9 | 7.5 | -3.0 | 1.8 | 7.0 |  |
| Apple | MIL (dB) | 154.4 | 162.4 | 157.4 | 147.3 | 150.4 |  |  |  | 147.8 | 137.0 | 141.7 |  | 140.0 |
| Margin (dB) | 14.4 | 22.4 | 17.4 | 7.3 | 10.4 |  |  |  | 7.8 | -3.0 | 1.8 |  |  |
| Ericsson | MIL (dB) | 155.8 | 155.8 | 156.5 | 150.2 | 152.9 | 157.8 | 151.9 | 152.5 | 150.6 | 140.9 | 148.2 | 152.1 | 143.9 |
| Margin (dB) | 11.8 | 11.8 | 12.5 | 6.2 | 8.9 | 13.8 | 8.0 | 8.6 | 6.7 | -3.0 | 4.3 | 8.1 |  |
| InterDigital | MIL (dB) | 158.77 | 162.8 | 160.29 | 153.87 | 156.80 |  | 157.1 |  | 152.8 | 140.24 | 149.84 |  | 143.24 |
| Margin (dB) | 15.53 | 19.56 | 17.05 | 10.63 | 13.56 |  | 13.86 |  | 9.56 | -3.0 | 6.6 |  |  |
| Qualcomm | MIL (dB) | 155.8 |  | 157.8 | 152.0 | 154.3 |  |  |  | 143.5 | 136.4 | 145.2 |  | 139.4 |
| Margin (dB) | 16.5 |  | 18.4 | 12.6 | 14.9 |  |  |  | 4.2 | -3.0 | 5.9 |  |  |
| Intel | MIL (dB) | 159.8 | 161.0 | 157.6 | 160.7 | 158.0 | 162.7 | 159.0 | 157.8 | 155.2 | 140.9 | 151.6 | 153.8 | 143.9 |
| Margin (dB) | 15.8 | 17.1 | 13.7 | 16.7 | 14.0 | 18.8 | 15.1 | 13.8 | 11.2 | -3.0 | 7.6 | 9.8 |  |

Table C.1-3: Link budget performance (MIL) for the RedCap UE (20MHz BW, 1Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban 2.6GHz, 1Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 156.6 | 160.6 | 151.9 | 150.6 | 153.2 |  | 155.2 | 151.6 | 148.3 | 136.4 | 147.0 |  | 139.4 |
| Margin (dB) | 17.1 | 21.1 | 12.4 | 11.1 | 13.7 |  | 15.8 | 12.2 | 8.9 | -3.0 | 7.6 |  |  |
| ZTE | MIL (dB) | 147.8 | 158.3 | 160.8 | 151.0 | 151.4 |  | 159.6 | 157.9 | 155.4 | 139.0 | 153.5 |  | 142.0 |
| Margin (dB) | 5.9 | 16.3 | 18.8 | 9.0 | 9.4 |  | 17.7 | 15.9 | 13.4 | -3.0 | 11.5 |  |  |
| OPPO | MIL (dB) | 157.2 | 161.2 | 162.0 | 149.2 | 155.1 |  | 151.9 | 152.0 | 151.9 | 141.9 | 151.7 |  | 145.1 |
| Margin (dB) | 12.1 | 16.1 | 16.9 | 4.1 | 9.9 |  | 6.8 | 6.8 | 6.7 | -3.2 | 6.6 |  |  |
| CATT | MIL (dB) | 155.5 | 159.5 | 157.8 | 147.6 | 154.0 |  | 157.3 | 155.9 | 153.9 | 142.9 | 150.5 |  | 145.9 |
| Margin (dB) | 9.5 | 13.5 | 11.9 | 1.6 | 8.0 |  | 11.4 | 10.0 | 7.9 | -3.0 | 4.6 |  |  |
| vivo | MIL (dB) | 148.7 | 156.8 | 150.6 | 144.7 | 146.8 | 152.3 | 153.2 | 150.6 | 148.1 | 135.0 | 149.4 | 146.7 | 137.8 |
| Margin (dB) | 10.9 | 19.0 | 12.8 | 6.9 | 9.0 | 14.5 | 15.4 | 12.9 | 10.3 | -2.8 | 11.6 | 8.9 |  |
| Xiaomi | MIL (dB) | 157.6 | 157.6 | 157.3 | 150.2 | 154.4 |  | 158.6 | 155.9 | 154.2 | 143.7 | 151.6 |  | 146.7 |
| Margin (dB) | 10.9 | 10.9 | 10.5 | 3.4 | 7.6 |  | 11.9 | 9.2 | 7.5 | -3.0 | 4.9 |  |  |
| Futurewei | MIL (dB) | 156.4 | 158.4 | 157.3 | 154.3 | 154.9 |  |  |  |  | 148.6 | 150.5 |  | 151.6 |
| Margin (dB) | 4.7 | 6.7 | 5.6 | 2.6 | 3.2 |  |  |  |  | -3.0 | -1.1 |  |  |
| Nokia | MIL (dB) | 158.5 | 158.5 | 156.8 | 157.8 | 156.5 |  | 148.7 |  | 147.2 | 135.6 | 144.8 | 147.3 | 138.6 |
| Margin (dB) | 19.9 | 19.9 | 18.2 | 19.2 | 17.9 |  | 10.1 |  | 8.6 | -3.0 | 6.2 | 8.7 |  |
| DOCOMO | MIL (dB) | 156.4 | 160.4 | 155.7 | 147.3 | 151.9 |  | 158.1 | 161.9 |  | 142.7 | 151.6 |  | 145.7 |
| Margin (dB) | 10.7 | 14.7 | 10.0 | 1.5 | 6.1 |  | 12.4 | 16.2 |  | -3.0 | 5.9 |  |  |
| CMCC | MIL (dB) |  |  |  |  |  |  | 153.3 | 151.5 | 149.3 | 136.8 | 149.8 | 155.6 | 139.8 |
| Margin (dB) |  |  |  |  |  |  | 13.5 | 11.7 | 9.6 | -3.0 | 10.1 | 15.9 |  |
| Panasonic | MIL (dB) |  | 160.6 | 150.9 |  |  |  |  |  |  |  |  |  |  |
| Margin (dB) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Huawei | MIL (dB) | 154.9 | 158.9 | 153.1 | 150.3 | 150.7 |  | 157.6 |  | 155.3 | 136.0 | 146.6 |  | 139.0 |
| Margin (dB) | 15.9 | 19.9 | 14.1 | 11.4 | 11.7 |  | 18.6 |  | 16.3 | -3.0 | 7.7 |  |  |
| Spreadtrum | MIL (dB) | 156.0 | 160.0 | 157.9 | 154.8 | 154.8 | 157.3 | 155.4 | 153.6 | 153.2 | 142.7 | 147.5 | 152.8 | 145.7 |
| Margin (dB) | 10.2 | 14.2 | 12.1 | 9.0 | 9.0 | 11.5 | 9.7 | 7.9 | 7.5 | -3.0 | 1.8 | 7.0 |  |
| Apple | MIL (dB) | 151.0 | 159.0 | 152.8 | 141.8 | 146.1 |  |  |  | 147.8 | 137.0 | 141.7 |  | 140.0 |
| Margin (dB) | 11.0 | 19.0 | 12.8 | 1.8 | 6.1 |  |  |  | 7.8 | -3.0 | 1.8 |  |  |
| Ericsson | MIL (dB) | 152.8 | 152.8 | 153.3 | 145.3 | 148.9 | 153.9 | 151.9 | 152.5 | 150.6 | 140.9 | 148.2 | 152.1 | 143.9 |
| Margin (dB) | 8.8 | 8.8 | 9.3 | 1.3 | 4.9 | 9.9 | 8.0 | 8.6 | 6.7 | -3.0 | 4.3 | 8.1 |  |
| InterDigital | MIL (dB) | 155.57 | 159.57 | 157.22 | 149.27 | 153.69 |  | 157.1 |  | 152.8 | 140.24 | 149.84 |  | 143.24 |
| Margin (dB) | 12.33 | 16.33 | 13.98 | 6.03 | 10.45 |  | 13.86 |  | 9.56 | -3.0 | 6.6 |  |  |
| Qualcomm | MIL (dB) | 152.5 |  | 154.7 | 148.1 | 151.0 |  |  |  | 143.5 | 136.4 | 145.2 |  | 139.4 |
| Margin (dB) | 13.2 |  | 15.3 | 8.7 | 11.6 |  |  |  | 4.2 | -3.0 | 5.9 |  |  |
| Intel | MIL (dB) |  |  |  |  |  |  | 159.0 | 157.8 | 155.2 | 140.9 | 151.6 | 153.8 | 143.9 |
| Margin (dB) |  |  |  |  |  |  | 15.1 | 13.8 | 11.2 | -3.0 | 7.6 | 9.8 |  |

Table C.1-4: MPL (dB) results for Urban 2.6 GHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban 2.6GHz** | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 |
| Samsung | Reference NR UE | 132.1 | 136.3 | 132.8 | 131.5 | 131.6 |  | 124.8 | 121.0 | 118.0 | 108.7 | 119.3 |  |
| 2Rx RedCap | 126.3 | 130.3 | 125.9 | 125.0 | 125.9 |  | 121.4 | 117.8 | 114.5 | 105.7 | 116.3 |  |
| 1Rx RedCap | 122.8 | 126.8 | 121.1 | 119.8 | 122.4 |  | 121.4 | 117.8 | 114.5 | 105.7 | 116.3 |  |
| ZTE | Reference NR UE | 123.2 | 133.6 | 136.9 | 126.9 | 127.2 |  | 128.8 | 127.1 | 124.6 | 111.2 | 125.8 |  |
| 2Rx RedCap |  |  |  |  |  |  | 125.8 | 124.1 | 121.6 | 108.2 | 122.8 |  |
| 1Rx RedCap | 114.0 | 124.4 | 130.0 | 120.2 | 120.7 |  | 125.8 | 124.1 | 121.6 | 108.2 | 122.8 |  |
| OPPO | Reference NR UE | 133.7 | 137.7 | 139.2 | 131.5 | 134.5 |  | 121.2 | 121.3 | 121.4 | 114.4 | 124.0 |  |
| 2Rx RedCap | 127.3 | 131.3 | 133.9 | 124.5 | 128.2 |  | 118.1 | 118.2 | 118.1 | 111.2 | 121.0 |  |
| 1Rx RedCap | 123.4 | 127.4 | 131.3 | 118.5 | 124.3 |  | 118.1 | 118.2 | 118.1 | 111.2 | 121.0 |  |
| CATT | Reference NR UE | 130.9 | 134.9 | 136.8 | 130.7 | 133.0 |  | 126.5 | 125.1 | 123.1 | 115.2 | 122.8 |  |
| 2Rx RedCap | 125.4 | 129.4 | 130.9 | 123.0 | 126.6 |  | 123.5 | 122.1 | 120.1 | 112.2 | 119.8 |  |
| 1Rx RedCap | 121.7 | 125.7 | 127.1 | 116.8 | 123.2 |  | 123.5 | 122.1 | 120.1 | 112.2 | 119.8 |  |
| vivo | Reference NR UE | 123.8 | 131.8 | 131.2 | 126.4 | 127.9 | 127.0 | 122.4 | 119.8 | 117.3 | 107.0 | 121.8 | 115.9 |
| 2Rx RedCap | 118.1 | 126.2 | 124.2 | 118.9 | 120.7 | 121.6 | 119.4 | 116.8 | 114.3 | 104.2 | 118.6 | 112.9 |
| 1Rx RedCap | 114.9 | 123.0 | 119.9 | 113.9 | 116.0 | 118.5 | 119.4 | 116.8 | 114.3 | 104.2 | 118.6 | 112.9 |
| Xiaomi | Reference NR UE | 132.5 | 132.5 | 137.6 | 132.1 | 134.5 |  | 127.8 | 125.1 | 123.4 | 116.0 | 123.9 |  |
| 2Rx RedCap | 127.0 | 127.0 | 130.1 | 124.6 | 127.6 |  | 124.8 | 122.1 | 120.4 | 113.0 | 120.9 |  |
| 1Rx RedCap | 123.8 | 123.8 | 126.5 | 119.4 | 123.6 |  | 124.8 | 122.1 | 120.4 | 113.0 | 120.9 |  |
| Futurewei | Reference NR UE | 131.0 | 133.0 | 133.5 | 132.0 | 132.4 |  |  |  |  | 120.9 | 122.8 |  |
| 2Rx RedCap | 125.2 | 127.2 | 128.5 | 126.5 | 127.3 |  |  |  |  | 117.9 | 119.8 |  |
| 1Rx RedCap | 122.6 | 124.6 | 126.5 | 123.5 | 124.1 |  |  |  |  | 117.9 | 119.8 |  |
| Nokia | Reference NR UE | 134.5 | 134.5 | 136.1 | 136.6 | 135.1 |  | 117.9 |  | 116.4 | 107.9 | 117.1 | 119.2 |
| 2Rx RedCap | 128.7 | 128.7 | 129.6 | 130.8 | 129.6 |  | 114.9 |  | 113.4 | 104.9 | 114.1 | 116.2 |
| 1Rx RedCap | 124.7 | 124.7 | 126.1 | 127.1 | 125.8 |  | 114.9 |  | 113.4 | 104.9 | 114.1 | 116.2 |
| DOCOMO | Reference NR UE | 131.8 | 135.8 | 135.4 | 129.8 | 131.9 |  | 127.3 | 131.1 |  | 115.0 | 123.9 |  |
| 2Rx RedCap | 126.0 | 130.0 | 129.1 | 122.2 | 125.3 |  | 124.3 | 128.1 |  | 112.0 | 120.9 |  |
| 1Rx RedCap | 122.6 | 126.6 | 125.0 | 116.5 | 121.2 |  | 124.3 | 128.1 |  | 112.0 | 120.9 |  |
| CMCC | Reference NR UE | 129.0 | 134.6 | 135.9 | 130.0 | 132.6 | 130.0 | 122.5 | 120.7 | 118.5 | 109.0 | 122.1 | 124.8 |
| 2Rx RedCap | 123.4 | 129.0 | 130.3 | 123.8 | 126.6 | 125.0 | 119.5 | 117.7 | 115.5 | 106.0 | 119.1 | 121.8 |
| 1Rx RedCap |  |  |  |  |  |  | 119.5 | 117.7 | 115.5 | 106.0 | 119.1 | 121.8 |
| Panasonic | Reference NR UE |  | 135.2 | 130.2 |  |  |  |  |  |  |  |  |  |
| 2Rx RedCap |  | 129.7 | 123.9 |  |  |  |  |  |  |  |  |  |
| 1Rx RedCap |  | 126.8 | 120.1 |  |  |  |  |  |  |  |  |  |
| Huawei | Reference NR UE | 133.2 | 137.2 | 136.5 | 133.4 | 133.2 |  | 129.8 |  | 127.5 | 111.2 | 121.9 |  |
| 2Rx RedCap | 127.1 | 131.1 | 129.2 | 126.9 | 126.9 |  | 126.8 |  | 124.5 | 108.2 | 118.9 |  |
| 1Rx RedCap | 124.1 | 128.1 | 125.3 | 122.6 | 123.0 |  | 126.8 |  | 124.5 | 108.2 | 118.9 |  |
| Spreadtrum | Reference NR UE | 131.2 | 135.2 | 136.1 | 133.0 | 133.0 | 135.5 | 124.6 | 122.8 | 122.4 | 115.0 | 122.8 | 122.0 |
| 2Rx RedCap | 125.2 | 129.2 | 130.1 | 127.0 | 127.0 | 129.5 | 121.6 | 119.8 | 119.4 | 112.0 | 116.8 | 119.0 |
| 1Rx RedCap | 122.2 | 126.2 | 127.1 | 124.0 | 124.0 | 126.5 | 121.6 | 119.8 | 119.4 | 112.0 | 116.8 | 119.0 |
| Apple | Reference NR UE | 126.7 | 134.7 | 133.1 | 123.0 | 126.2 |  |  |  | 117.0 | 109.2 | 114.0 |  |
| 2Rx RedCap | 120.6 | 128.6 | 126.6 | 116.5 | 119.6 |  |  |  | 114.0 | 106.2 | 111.0 |  |
| 1Rx RedCap | 117.2 | 125.2 | 122.0 | 111.0 | 115.3 |  |  |  | 114.0 | 106.2 | 111.0 |  |
| Ericsson | Reference NR UE | 128.2 | 128.2 | 131.7 | 126.1 | 128.6 | 133.0 | 121.0 | 121.7 | 119.7 | 113.2 | 120.5 | 121.3 |
| 2Rx RedCap | 122.0 | 122.0 | 125.7 | 119.4 | 122.1 | 127.0 | 118.1 | 118.7 | 116.8 | 110.2 | 117.5 | 118.3 |
| 1Rx RedCap | 119.0 | 119.0 | 122.5 | 114.5 | 118.1 | 123.1 | 118.1 | 118.7 | 116.8 | 110.2 | 117.5 | 118.3 |
| InterDigital | Reference NR UE | 130.7 | 134.7 | 135.4 | 129.7 | 131.8 |  | 126.8 |  | 122.6 | 112.5 | 122.1 |  |
| 2Rx RedCap | 125.0 | 129.0 | 129.6 | 123.1 | 126.1 |  | 123.3 |  | 119.0 | 109.5 | 119.1 |  |
| 1Rx RedCap | 121.8 | 125.8 | 126.5 | 118.5 | 123.0 |  | 123.3 |  | 119.0 | 109.5 | 119.1 |  |
| Qualcomm | Reference NR UE | 127.5 |  | 132.6 | 127.5 | 129.0 |  |  |  | 112.7 | 108.6 | 117.5 |  |
| 2Rx RedCap | 122.0 |  | 127.0 | 121.2 | 123.5 |  |  |  | 109.7 | 105.6 | 114.5 |  |
| 1Rx RedCap | 118.7 |  | 123.9 | 117.3 | 120.2 |  |  |  | 109.7 | 105.6 | 114.5 |  |
| Intel | Reference NR UE | 131.9 | 133.1 | 132.8 | 135.7 | 133.4 | 135.0 | 128.2 | 127.0 | 124.4 | 113.2 | 123.8 | 123.0 |
| 2Rx RedCap | 126.0 | 127.2 | 126.9 | 130.0 | 127.3 | 132.0 | 125.2 | 124.0 | 121.4 | 110.2 | 120.8 | 120.0 |
| 1Rx RedCap |  |  |  |  |  |  | 125.2 | 124.0 | 121.4 | 110.2 | 120.8 | 120.0 |

# C.2 Rural scenario at 0.7 GHz

Link budget evaluation results for the Rural scenario at 0.7 GHz from all the sourcing companies are captured in Tables C.2-1, C.2-2, C.2-3, and C.2-4. Tables C.2-1, C.2-2, and C.2-3 show the MIL results for reference NR UEs with 2 Rx branches (100MHz bandwidth), RedCap UEs with 2 Rx branches (20MHz bandwidth), and RedCap UEs with 1 Rx branch (20MHz bandwidth), respectively. For every sourcing-company result, the values of the target MIL and the amount of compensation for each channel that has MIL below the target value are highlighted.

Additionally, the MPL results are provided Table C.2-4. The detailed link budget calculations from the sourcing companies can be found in [3].

Table C.2-1: Link budget performance (MIL) for the reference NR UE (20MHz BW, 2Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Rural 700MHz, 2Rx Reference UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH format0 | Target /Option3 |
| Samsung | MIL (dB) | 162.4 | 162.4 | 157.9 | 157.9 | 158.9 |  | 158.3 | 154.5 | 151.5 | 146.6 | 149.5 |  | 146.6 |
| Margin (dB) | 15.9 | 15.9 | 11.4 | 11.4 | 12.4 |  | 11.7 | 7.9 | 4.9 | 0.0 | 2.9 |  |  |
| ZTE | MIL (dB) | 154.8 | 158.5 | 157.4 | 154.4 | 154.7 |  | 152.6 | 150.6 | 147.9 | 143.6 | 143.2 |  | 143.2 |
| Margin (dB) | 11.6 | 15.3 | 14.2 | 11.2 | 11.5 |  | 9.4 | 7.4 | 4.7 | 0.4 | 0.0 |  |  |
| OPPO | MIL (dB) | 163.1 | 163.1 | 162.0 | 157.0 | 161.0 |  | 149.0 | 149.1 | 148.9 | 150.0 | 149.5 |  | 148.9 |
| Margin (dB) | 14.2 | 14.2 | 13.0 | 8.0 | 12.1 |  | 0.1 | 0.2 | 0.0 | 1.1 | 0.5 |  |  |
| CATT | MIL (dB) | 158.7 | 158.7 | 155.9 | 153.5 | 156.8 |  | 156.7 | 155.4 | 153.3 | 147.9 | 150.7 |  | 147.9 |
| Margin (dB) | 10.7 | 10.7 | 8.0 | 5.6 | 8.9 |  | 8.7 | 7.5 | 5.4 | 0.0 | 2.7 |  |  |
| vivo | MIL (dB) | 155.0 | 155.1 | 152.0 | 149.8 | 152.7 | 159.2 | 150.3 | 147.4 | 145.0 | 144.0 | 146.3 | 145.7 | 144.0 |
| Margin (dB) | 11.0 | 11.1 | 8.0 | 5.8 | 8.8 | 15.2 | 6.3 | 3.5 | 1.1 | 0.0 | 2.3 | 1.7 |  |
| Xiaomi | MIL (dB) | 160.0 | 160.0 | 157.6 | 154.9 | 158.1 |  | 158.0 | 155.4 | 152.9 | 149.7 | 150.9 |  | 149.7 |
| Margin (dB) | 10.3 | 10.3 | 7.9 | 5.2 | 8.4 |  | 8.3 | 5.7 | 3.2 | 0.0 | 1.2 |  |  |
| Futurewei | MIL (dB) | 161.1 | 161.1 | 158.1 | 157.9 | 159.1 |  |  |  |  | 150.8 | 153.0 |  | 150.8 |
| Margin (dB) | 10.4 | 10.4 | 7.4 | 7.2 | 8.4 |  |  |  |  | 0.0 | 2.2 |  |  |
| Nokia | MIL (dB) | 158.0 | 158.0 | 159.5 | 156.7 | 159.4 |  | 144.9 |  | 143.7 | 144.2 | 138.5 | 147.9 | 138.5 |
| Margin (dB) | 19.5 | 19.5 | 21.0 | 18.1 | 20.9 |  | 6.4 |  | 5.2 | 5.6 | 0.0 | 9.4 |  |
| DOCOMO | MIL (dB) | 162.5 | 162.5 | 158.1 | 155.1 | 158.1 |  | 155.9 | 161.2 |  | 146.7 | 149.5 |  | 146.7 |
| Margin (dB) | 15.8 | 15.8 | 11.4 | 8.4 | 11.4 |  | 9.2 | 14.6 |  | 0.0 | 2.8 |  |  |
| Panasonic | MIL (dB) |  | 161.8 | 151.8 |  |  |  | 152.6 | 150.2 | 146.2 | 141.8 | 144.6 |  | 141.8 |
| Margin (dB) |  | 20.0 | 10.0 |  |  |  | 10.8 | 8.4 | 4.4 | 0.0 | 2.8 |  |  |
| Huawei | MIL (dB) | 157.2 | 157.2 | 152.9 | 152.9 | 153.6 |  | 152.8 |  | 150.6 | 141.8 | 145.3 |  | 141.8 |
| Margin (dB) | 15.5 | 15.5 | 11.1 | 11.1 | 11.8 |  | 11.0 |  | 8.8 | 0.0 | 3.5 |  |  |
| Spreadtrum | MIL (dB) | 161.0 | 161.0 | 159.0 | 160.0 | 160.0 | 163.0 | 160.5 | 157.5 | 157.3 | 151.5 | 154.5 | 156.8 | 151.5 |
| Margin (dB) | 9.6 | 9.6 | 7.6 | 8.6 | 8.6 | 11.6 | 9.0 | 6.0 | 5.8 | 0.0 | 3.0 | 5.4 |  |
| Apple | MIL (dB) | 157.7 | 157.7 | 155.9 | 151.5 | 155.7 |  |  |  |  | 143.7 |  |  | 143.7 |
| Margin (dB) | 14.0 | 14.0 | 12.2 | 7.8 | 12.0 |  |  |  |  | 0.0 |  |  |  |
| Ericsson | MIL (dB) | 157.3 | 156.6 | 155.6 | 153.2 | 155.9 | 157.3 | 149.4 | 157.9 | 147.4 | 142.9 | 145.0 | 147.9 | 142.9 |
| Margin (dB) | 14.5 | 13.8 | 12.8 | 10.4 | 13.1 | 14.5 | 6.5 | 15.0 | 4.5 | 0.0 | 2.1 | 5.1 |  |
| InterDigital | MIL (dB) | 161.2 | 161.2 | 158.5 | 152.31 | 155.16 |  | 155.8 |  | 150.8 | 146.7 | 144.44 |  | 144.44 |
| Margin (dB) | 16.76 | 16.76 | 14.06 | 7.87 | 10.72 |  | 11.36 |  | 6.36 | 2.26 | 0.0 |  |  |
| Qualcomm | MIL (dB) | 158.4 |  | 154.5 | 152.9 | 154.9 |  |  |  | 143.8 | 141.3 | 143.8 |  | 141.3 |
| Margin (dB) | 17.1 |  | 13.2 | 11.6 | 13.6 |  |  |  | 2.5 | 0.0 | 2.5 |  |  |
| Intel | MIL (dB) | 161.6 | 161.6 | 158.3 | 162.7 | 160.1 | 160.4 | 154.4 | 154.7 | 152.0 | 146.7 | 149.6 | 152.3 | 146.7 |
| Margin (dB) | 14.9 | 14.9 | 11.6 | 16.0 | 13.4 | 13.7 | 7.7 | 8.0 | 5.3 | 0.0 | 2.8 | 5.6 |  |

Table C.2-2: Link budget performance (MIL) for the RedCap UE (20MHz BW, 2Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Rural 700MHz, 2Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH format0 | Target /Option3 |
| Samsung | MIL (dB) | 159.4 | 159.4 | 154.9 | 154.9 | 155.9 |  | 155.3 | 151.5 | 148.5 | 143.6 | 146.5 |  | 146.6 |
| Margin (dB) | 12.9 | 12.9 | 8.4 | 8.4 | 9.4 |  | 8.7 | 4.9 | 1.9 | -3.0 | -0.1 |  |  |
| ZTE | MIL (dB) |  |  |  |  |  |  | 149.6 | 147.6 | 144.9 | 140.6 | 140.2 |  | 143.2 |
| Margin (dB) |  |  |  |  |  |  | 6.4 | 4.4 | 1.7 | -2.6 | -3.0 |  |  |
| OPPO | MIL (dB) | 160.1 | 160.1 | 159.0 | 154.0 | 158.0 |  | 146.0 | 146.1 | 145.9 | 147.0 | 146.5 |  | 148.9 |
| Margin (dB) | 11.2 | 11.2 | 10.0 | 5.0 | 9.1 |  | -2.9 | -2.8 | -3.0 | -1.9 | -2.5 |  |  |
| CATT | MIL (dB) | 155.4 | 155.4 | 152.8 | 150.5 | 153.8 |  | 153.6 | 152.4 | 150.3 | 144.9 | 147.7 |  | 147.9 |
| Margin (dB) | 7.5 | 7.5 | 4.9 | 2.6 | 5.9 |  | 5.6 | 4.5 | 2.4 | -3.1 | -0.3 |  |  |
| vivo | MIL (dB) | 152.0 | 152.1 | 149.0 | 146.8 | 149.7 | 156.2 | 147.3 | 144.4 | 142.0 | 141.0 | 143.3 | 142.7 | 144.0 |
| Margin (dB) | 8.0 | 8.1 | 5.0 | 2.8 | 5.8 | 12.2 | 3.3 | 0.5 | -1.9 | -3.0 | -0.7 | -1.3 |  |
| Xiaomi | MIL (dB) | 157.0 | 157.0 | 154.6 | 151.9 | 155.1 |  | 155.0 | 152.4 | 149.9 | 146.7 | 147.9 |  | 149.7 |
| Margin (dB) | 7.3 | 7.3 | 4.9 | 2.2 | 5.4 |  | 5.3 | 2.7 | 0.2 | -3.0 | -1.8 |  |  |
| Futurewei | MIL (dB) | 158.1 | 158.1 | 155.1 | 154.9 | 156.1 |  |  |  |  | 147.8 | 150.0 |  | 150.8 |
| Margin (dB) | 7.4 | 7.4 | 4.4 | 4.2 | 5.4 |  |  |  |  | -3.0 | -0.8 |  |  |
| Nokia | MIL (dB) | 155.0 | 155.0 | 156.5 | 153.7 | 156.4 |  | 141.9 |  | 140.7 | 141.2 | 135.5 | 144.9 | 138.5 |
| Margin (dB) | 16.5 | 16.5 | 18.0 | 15.1 | 17.9 |  | 3.4 |  | 2.2 | 2.6 | -3.0 | 6.4 |  |
| DOCOMO | MIL (dB) |  |  |  |  |  |  | 152.9 | 158.2 |  | 143.7 | 146.5 |  | 146.7 |
| Margin (dB) |  |  |  |  |  |  | 6.2 | 11.6 |  | -3.0 | -0.2 |  |  |
| Panasonic | MIL (dB) |  | 158.8 | 148.8 |  |  |  | 149.6 | 147.2 | 143.2 | 138.8 | 141.6 |  | 141.8 |
| Margin (dB) |  | 17.0 | 7.0 |  |  |  | 7.8 | 5.4 | 1.4 | -3.0 | -0.2 |  |  |
| Huawei | MIL (dB) | 154.2 | 154.2 | 149.9 | 149.9 | 150.6 |  | 149.8 |  | 147.6 | 138.8 | 142.3 |  | 141.8 |
| Margin (dB) | 12.5 | 12.5 | 8.1 | 8.1 | 8.8 |  | 8.0 |  | 5.8 | -3.0 | 0.5 |  |  |
| Spreadtrum | MIL (dB) | 158.0 | 158.0 | 156.0 | 157.0 | 157.0 | 160.0 | 157.5 | 154.5 | 154.3 | 148.5 | 151.5 | 153.8 | 151.5 |
| Margin (dB) | 6.6 | 6.6 | 4.6 | 5.6 | 5.6 | 8.6 | 6.0 | 3.0 | 2.8 | -3.0 | 0.0 | 2.4 |  |
| Apple | MIL (dB) | 154.7 | 154.7 | 152.9 | 148.5 | 152.7 |  |  |  |  | 140.7 |  |  | 143.7 |
| Margin (dB) | 11.0 | 11.0 | 9.2 | 4.8 | 9.0 |  |  |  |  | -3.0 |  |  |  |
| Ericsson | MIL (dB) | 154.3 | 153.6 | 149.0 | 150.2 | 152.9 | 154.3 | 146.4 | 154.9 | 144.4 | 139.9 | 142.0 | 144.9 | 142.9 |
| Margin (dB) | 11.5 | 10.8 | 6.2 | 7.4 | 10.1 | 11.5 | 3.5 | 12.0 | 1.5 | -3.0 | -0.9 | 2.1 |  |
| InterDigital | MIL (dB) | 158.2 | 158.2 | 155.52 | 149.31 | 152.16 |  | 152.8 |  | 147.8 | 143.7 | 141.44 |  | 144.44 |
| Margin (dB) | 13.76 | 13.76 | 11.08 | 4.87 | 7.72 |  | 8.36 |  | 3.36 | -0.74 | -3.0 |  |  |
| Qualcomm | MIL (dB) | 155.4 |  | 151.5 | 149.9 | 151.9 |  |  |  | 140.8 | 138.3 | 140.8 |  | 141.3 |
| Margin (dB) | 14.1 |  | 10.2 | 8.6 | 10.6 |  |  |  | -0.5 | -3.0 | -0.5 |  |  |
| Intel | MIL (dB) |  |  |  |  |  |  | 151.4 | 151.7 | 149.0 | 143.7 | 146.6 | 149.3 | 146.7 |
| Margin (dB) |  |  |  |  |  |  | 4.7 | 5.0 | 2.3 | -3.0 | -0.2 | 2.6 |  |

Table C.2-3: Link budget performance (MIL) for the RedCap UE (20MHz BW, 1Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Rural 700MHz, 1Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH format0 | Target /Option3 |
| Samsung | MIL (dB) | 155.7 | 155.7 | 150.6 | 149.0 | 152.2 |  | 155.3 | 151.5 | 148.5 | 143.6 | 146.5 |  | 146.6 |
| Margin (dB) | 9.2 | 9.2 | 4.1 | 2.5 | 5.7 |  | 8.7 | 4.9 | 1.9 | -3.0 | -0.1 |  |  |
| ZTE | MIL (dB) | 148.3 | 152.0 | 149.7 | 146.5 | 146.7 |  | 149.6 | 147.6 | 144.9 | 140.6 | 140.2 |  | 143.2 |
| Margin (dB) | 5.1 | 8.8 | 6.5 | 3.3 | 3.5 |  | 6.4 | 4.4 | 1.7 | -2.6 | -3.0 |  |  |
| OPPO | MIL (dB) | 155.5 | 155.5 | 155.4 | 148.6 | 153.8 |  | 146.0 | 146.1 | 145.9 | 147.0 | 146.5 |  | 148.9 |
| Margin (dB) | 6.6 | 6.6 | 6.5 | -0.4 | 4.8 |  | -2.9 | -2.8 | -3.0 | -1.9 | -2.5 |  |  |
| CATT | MIL (dB) | 152.0 | 152.0 | 149.6 | 144.1 | 149.5 |  | 153.6 | 152.4 | 150.3 | 144.9 | 147.7 |  | 147.9 |
| Margin (dB) | 4.0 | 4.0 | 1.7 | -3.9 | 1.5 |  | 5.6 | 4.5 | 2.4 | -3.1 | -0.3 |  |  |
| vivo | MIL (dB) | 149.3 | 149.3 | 145.5 | 141.5 | 145.7 | 152.4 | 147.3 | 144.4 | 142.0 | 141.0 | 143.3 | 142.7 | 144.0 |
| Margin (dB) | 5.3 | 5.3 | 1.5 | -2.5 | 1.8 | 8.4 | 3.3 | 0.5 | -1.9 | -3.0 | -0.7 | -1.3 |  |
| Xiaomi | MIL (dB) | 153.6 | 153.6 | 150.5 | 146.2 | 150.6 |  | 155.0 | 152.4 | 149.9 | 146.7 | 147.9 |  | 149.7 |
| Margin (dB) | 3.9 | 3.9 | 0.8 | -3.5 | 0.9 |  | 5.3 | 2.7 | 0.2 | -3.0 | -1.8 |  |  |
| Futurewei | MIL (dB) | 154.2 | 154.2 | 150.9 | 149.0 | 153.1 |  |  |  |  | 147.8 | 150.0 |  | 150.8 |
| Margin (dB) | 3.5 | 3.5 | 0.1 | -1.7 | 2.4 |  |  |  |  | -3.0 | -0.8 |  |  |
| Nokia | MIL (dB) | 150.7 | 150.7 | 153.9 | 150.0 | 153.4 |  | 141.9 |  | 140.7 | 141.2 | 135.5 | 144.9 | 138.5 |
| Margin (dB) | 12.2 | 12.2 | 15.4 | 11.5 | 14.9 |  | 3.4 |  | 2.2 | 2.6 | -3.0 | 6.4 |  |
| DOCOMO | MIL (dB) | 156.2 | 156.2 | 150.9 | 145.8 | 150.8 |  | 152.9 | 158.2 |  | 143.7 | 146.5 |  | 146.7 |
| Margin (dB) | 9.5 | 9.5 | 4.2 | -0.9 | 4.1 |  | 6.2 | 11.6 |  | -3.0 | -0.2 |  |  |
| Panasonic | MIL (dB) |  | 155.9 | 145.1 |  |  |  | 149.6 | 147.2 | 143.2 | 138.8 | 141.6 |  | 141.8 |
| Margin (dB) |  | 14.1 | 3.3 |  |  |  | 7.8 | 5.4 | 1.4 | -3.0 | -0.2 |  |  |
| Huawei | MIL (dB) | 150.9 | 150.9 | 146.2 | 145.6 | 146.6 |  | 149.8 |  | 147.6 | 138.8 | 142.3 |  | 141.8 |
| Margin (dB) | 9.1 | 9.1 | 4.4 | 3.8 | 4.8 |  | 8.0 |  | 5.8 | -3.0 | 0.5 |  |  |
| Spreadtrum | MIL (dB) | 155.0 | 155.0 | 153.0 | 154.0 | 153.0 | 157.0 | 157.5 | 154.5 | 154.3 | 148.5 | 151.5 | 153.8 | 151.5 |
| Margin (dB) | 3.6 | 3.6 | 1.6 | 2.6 | 1.6 | 5.6 | 6.0 | 3.0 | 2.8 | -3.0 | 0.0 | 2.4 |  |
| Apple | MIL (dB) | 151.7 | 151.7 | 148.8 | 144.0 | 148.0 |  |  |  |  | 140.7 |  |  | 143.7 |
| Margin (dB) | 8.0 | 8.0 | 5.1 | 0.3 | 4.3 |  |  |  |  | -3.0 |  |  |  |
| Ericsson | MIL (dB) | 149.9 | 150.1 | 149.0 | 146.1 | 149.2 | 149.9 | 146.4 | 154.9 | 144.4 | 139.9 | 142.0 | 144.9 | 142.9 |
| Margin (dB) | 7.1 | 7.3 | 6.2 | 3.3 | 6.4 | 7.1 | 3.5 | 12.0 | 1.5 | -3.0 | -0.9 | 2.1 |  |
| InterDigital | MIL (dB) | 154.4 | 154.4 | 151.87 | 143.79 | 148.53 |  | 152.8 |  | 147.8 | 143.7 | 141.44 |  | 144.44 |
| Margin (dB) | 9.96 | 9.96 | 7.43 | -0.65 | 4.09 |  | 8.36 |  | 3.36 | -0.74 | -3.0 |  |  |
| Qualcomm | MIL (dB) | 151.6 |  | 148.1 | 145.4 | 148.5 |  |  |  | 140.8 | 138.3 | 140.8 |  | 141.3 |
| Margin (dB) | 10.3 |  | 6.8 | 4.1 | 7.2 |  |  |  | -0.5 | -3.0 | -0.5 |  |  |
| Intel | MIL (dB) | 154.6 | 154.6 | 151.9 | 156.4 | 153.6 | 157.4 | 151.4 | 151.7 | 149.0 | 143.7 | 146.6 | 149.3 | 146.7 |
| Margin (dB) | 7.9 | 7.9 | 5.2 | 9.7 | 6.9 | 10.7 | 4.7 | 5.0 | 2.3 | -3.0 | -0.2 | 2.6 |  |

Table C.2-4: MPL (dB) results for Rural 700MHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Rural 700MHz** | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH Format 0 |
| Samsung | Reference NR UE | 141.5 | 141.5 | 140.3 | 140.3 | 141.3 |  | 137.3 | 133.5 | 130.5 | 128.9 | 131.8 |  |
| 2Rx RedCap | 138.5 | 138.5 | 137.3 | 137.3 | 138.3 |  | 134.3 | 130.5 | 127.5 | 125.9 | 128.8 |  |
| 1Rx RedCap | 134.8 | 134.8 | 133.0 | 131.4 | 134.6 |  | 134.3 | 130.5 | 127.5 | 125.9 | 128.8 |  |
| ZTE | Reference NR UE | 133.9 | 137.6 | 139.7 | 136.8 | 137.1 |  | 131.7 | 129.6 | 126.9 | 125.9 | 125.6 |  |
| 2Rx RedCap |  |  |  |  |  |  | 128.7 | 126.6 | 123.9 | 122.9 | 122.6 |  |
| 1Rx RedCap | 127.3 | 131.0 | 132.1 | 128.9 | 129.1 |  | 128.7 | 126.6 | 123.9 | 122.9 | 122.6 |  |
| OPPO | Reference NR UE | 142.2 | 142.2 | 144.4 | 139.3 | 143.4 |  | 128.1 | 128.2 | 128.0 | 132.4 | 131.9 |  |
| 2Rx RedCap | 139.2 | 139.2 | 141.4 | 136.3 | 140.4 |  | 125.1 | 125.2 | 125.0 | 129.4 | 128.9 |  |
| 1Rx RedCap | 134.6 | 134.6 | 137.8 | 130.9 | 136.2 |  | 125.1 | 125.2 | 125.0 | 129.4 | 128.9 |  |
| CATT | Reference NR UE | 137.7 | 137.7 | 138.3 | 135.9 | 139.2 |  | 135.7 | 134.4 | 132.3 | 130.3 | 133.0 |  |
| 2Rx RedCap | 134.4 | 134.4 | 135.2 | 132.9 | 136.2 |  | 132.6 | 131.4 | 129.3 | 127.2 | 130.0 |  |
| 1Rx RedCap | 131.0 | 131.0 | 132.0 | 126.4 | 131.9 |  | 132.6 | 131.4 | 129.3 | 127.2 | 130.0 |  |
| vivo | Reference NR UE | 134.0 | 134.2 | 134.4 | 132.2 | 135.1 | 138.2 | 129.3 | 126.5 | 124.1 | 126.3 | 128.7 | 124.7 |
| 2Rx RedCap | 131.0 | 131.2 | 131.4 | 129.2 | 132.1 | 135.2 | 126.3 | 123.5 | 121.1 | 123.3 | 125.7 | 121.7 |
| 1Rx RedCap | 128.4 | 128.4 | 127.9 | 123.8 | 128.1 | 131.5 | 126.3 | 123.5 | 121.1 | 123.3 | 125.7 | 121.7 |
| Xiaomi | Reference NR UE | 139.1 | 139.1 | 140.0 | 137.3 | 140.5 |  | 137.0 | 134.4 | 132.0 | 132.1 | 133.3 |  |
| 2Rx RedCap | 136.1 | 136.1 | 137.0 | 134.3 | 137.5 |  | 134.0 | 131.4 | 129.0 | 129.1 | 130.3 |  |
| 1Rx RedCap | 132.7 | 132.7 | 132.9 | 128.6 | 133.0 |  | 134.0 | 131.4 | 129.0 | 129.1 | 130.3 |  |
| Futurewei | Reference NR UE | 140.2 | 140.2 | 140.5 | 140.3 | 141.5 |  |  |  |  | 133.1 | 135.3 |  |
| 2Rx RedCap | 137.2 | 137.2 | 137.5 | 137.3 | 138.5 |  |  |  |  | 130.1 | 132.3 |  |
| 1Rx RedCap | 133.3 | 133.3 | 133.3 | 131.4 | 135.5 |  |  |  |  | 130.1 | 132.3 |  |
| Nokia | Reference NR UE | 135.5 | 135.5 | 140.7 | 137.8 | 140.6 |  | 122.4 |  | 121.1 | 125.3 | 119.7 | 129.0 |
| 2Rx RedCap | 132.5 | 132.5 | 137.7 | 134.8 | 137.6 |  | 119.4 |  | 118.1 | 122.3 | 116.7 | 126.0 |
| 1Rx RedCap | 128.2 | 128.2 | 135.1 | 131.2 | 134.6 |  | 119.4 |  | 118.1 | 122.3 | 116.7 | 126.0 |
| DOCOMO | Reference NR UE | 141.5 | 141.5 | 140.5 | 137.4 | 140.5 |  | 135.0 | 140.3 |  | 129.1 | 131.9 |  |
| 2Rx RedCap |  |  |  |  |  |  | 132.0 | 137.3 |  | 126.1 | 128.9 |  |
| 1Rx RedCap | 135.2 | 135.2 | 133.3 | 128.2 | 133.2 |  | 132.0 | 137.3 |  | 126.1 | 128.9 |  |
| Panasonic | Reference NR UE |  | 140.9 | 134.2 |  |  |  | 131.7 | 129.3 | 125.3 | 124.2 | 127.0 |  |
| 2Rx RedCap |  | 137.9 | 131.2 |  |  |  | 128.7 | 126.3 | 122.3 | 121.2 | 124.0 |  |
| 1Rx RedCap |  | 135.0 | 127.5 |  |  |  | 128.7 | 126.3 | 122.3 | 121.2 | 124.0 |  |
| Huawei | Reference NR UE | 136.3 | 136.3 | 135.3 | 135.3 | 136.0 |  | 131.9 |  | 129.6 | 124.2 | 127.7 |  |
| 2Rx RedCap | 133.3 | 133.3 | 132.3 | 132.3 | 133.0 |  | 128.9 |  | 126.6 | 121.2 | 124.7 |  |
| 1Rx RedCap | 129.9 | 129.9 | 128.6 | 128.0 | 129.0 |  | 128.9 |  | 126.6 | 121.2 | 124.7 |  |
| Spreadtrum | Reference NR UE | 140.1 | 140.1 | 141.4 | 142.4 | 142.4 | 145.4 | 139.5 | 136.5 | 136.3 | 133.8 | 136.8 | 135.9 |
| 2Rx RedCap | 137.1 | 137.1 | 138.4 | 139.4 | 139.4 | 142.4 | 136.5 | 133.5 | 133.3 | 130.8 | 133.8 | 132.9 |
| 1Rx RedCap | 134.1 | 134.1 | 135.4 | 136.4 | 135.4 | 139.4 | 136.5 | 133.5 | 133.3 | 130.8 | 133.8 | 132.9 |
| Apple | Reference NR UE | 136.8 | 136.8 | 138.3 | 133.9 | 138.1 |  |  |  |  | 126.1 |  |  |
| 2Rx RedCap | 133.8 | 133.8 | 135.3 | 130.9 | 135.1 |  |  |  |  | 123.1 |  |  |
| 1Rx RedCap | 130.8 | 130.8 | 131.2 | 126.4 | 130.4 |  |  |  |  | 123.1 |  |  |
| Ericsson | Reference NR UE | 136.4 | 135.7 | 138.0 | 135.6 | 138.3 | 139.7 | 128.4 | 136.9 | 126.4 | 125.2 | 127.3 | 127.0 |
| 2Rx RedCap | 133.4 | 132.7 | 131.4 | 132.6 | 135.3 | 136.7 | 125.4 | 133.9 | 123.4 | 122.2 | 124.3 | 124.0 |
| 1Rx RedCap | 129.0 | 129.2 | 131.4 | 128.5 | 131.6 | 132.3 | 125.4 | 133.9 | 123.4 | 122.2 | 124.3 | 124.0 |
| InterDigital | Reference NR UE | 140.3 | 140.3 | 140.9 | 134.7 | 137.5 |  | 134.8 |  | 129.8 | 129.1 | 126.8 |  |
| 2Rx RedCap | 137.3 | 137.3 | 137.9 | 131.7 | 134.5 |  | 131.8 |  | 126.8 | 126.1 | 123.8 |  |
| 1Rx RedCap | 133.4 | 133.4 | 134.2 | 126.2 | 130.9 |  | 131.8 |  | 126.8 | 126.1 | 123.8 |  |
| Qualcomm | Reference NR UE | 137.5 |  | 136.9 | 135.3 | 137.3 |  |  |  | 122.8 | 123.7 | 126.2 |  |
| 2Rx RedCap | 134.5 |  | 133.9 | 132.3 | 134.3 |  |  |  | 119.8 | 120.7 | 123.2 |  |
| 1Rx RedCap | 130.7 |  | 130.5 | 127.8 | 130.9 |  |  |  | 119.8 | 120.7 | 123.2 |  |
| Intel | Reference NR UE | 140.7 | 140.7 | 140.7 | 145.1 | 142.5 | 142.8 | 133.4 | 133.7 | 131.0 | 129.1 | 131.9 | 131.4 |
| 2Rx RedCap |  |  |  |  |  |  | 130.4 | 130.7 | 128.0 | 126.1 | 128.9 | 128.4 |
| 1Rx RedCap | 133.7 | 133.7 | 134.3 | 138.8 | 136.0 | 139.8 | 130.4 | 130.7 | 128.0 | 126.1 | 128.9 | 128.4 |

# C.3 Urban scenario at 4 GHz

Link budget evaluation results for the Urban scenario at 4 GHz from all the sourcing companies are captured in Tables C.3-1, C.3-2, C.3-3, and C.3-4. Tables C.3-1, C.3-2, and C.3-3 show the MIL results for reference NR UEs with 4 Rx branches (100MHz bandwidth), RedCap UEs with 2 Rx branches (20MHz bandwidth), and RedCap UEs with 1 Rx branch (20MHz bandwidth), respectively. For every sourcing-company result, the values of the target MIL and the amount of compensation for each channel that has MIL below the target value are highlighted.

Additionally, the MPL results are provided Table C.3-4. The detailed link budget calculations from the sourcing companies can be found in [3].

Table C.3-1: Link budget performance (MIL) for the reference NR UE (100MHz BW, 4Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban, 4GHz, 4Rx Ref NR UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 165.9 | 170.1 | 162.6 | 162.3 | 162.4 |  | 158.6 | 154.8 | 151.9 | 142.0 | 150.0 |  | 142.0 |
| Margin (dB) | 23.8 | 28.0 | 20.5 | 20.2 | 20.3 |  | 16.6 | 12.8 | 9.9 | 0.0 | 8.0 |  |  |
| ZTE | MIL (dB) | 147.8 | 158.2 | 157.3 | 148.3 | 148.6 |  | 162.6 | 160.9 | 158.3 | 143.0 | 156.3 |  | 143.0 |
| Margin (dB) | 4.8 | 15.2 | 14.3 | 5.3 | 5.5 |  | 19.6 | 17.9 | 15.3 | 0.0 | 13.3 |  |  |
| OPPO | MIL (dB) | 158.5 | 162.5 | 158.9 | 153.4 | 156.2 |  | 155.0 | 155.0 | 155.2 | 147.0 | 154.7 |  | 147.0 |
| Margin (dB) | 11.4 | 15.4 | 11.9 | 6.4 | 9.2 |  | 8.0 | 8.0 | 8.2 | 0.0 | 7.7 |  |  |
| vivo | MIL (dB) | 157.7 | 165.7 | 161.9 | 157.1 | 158.6 | 160.8 | 156.3 | 153.8 | 151.0 | 139.3 | 152.3 | 149.6 | 139.3 |
| Margin (dB) | 18.4 | 26.4 | 22.6 | 17.8 | 19.3 |  | 17.0 | 14.5 | 11.8 | 0.0 | 13.0 | 10.3 |  |
| Futurewei | MIL (dB) | 155.9 | 157.9 | 156.0 | 153.0 | 155.1 |  |  |  |  | 152.6 | 153.5 |  | 152.6 |
| Margin (dB) | 3.2 | 5.2 | 3.3 | 0.3 | 2.4 |  | -152.6 | -152.6 | -152.6 | 0.0 | 0.9 |  |  |
| Nokia | MIL (dB) | 168.4 | 168.4 | 165.3 | 168.8 | 165.9 |  | 151.7 |  | 150.2 | 140.8 | 147.3 | 155.1 | 140.8 |
| Margin (dB) | 27.6 | 27.6 | 24.5 | 28.0 | 25.1 |  | 10.9 | -140.8 | 9.4 | 0.0 | 6.5 | 14.3 |  |
| DOCOMO | MIL (dB) | 156.8 | 160.8 | 157.5 | 151.5 | 153.6 |  | 161.2 | 164.8 |  | 146.8 | 154.6 |  | 146.8 |
| Margin (dB) | 10.0 | 14.0 | 10.7 | 4.7 | 6.8 |  | 14.5 | 18.1 | -146.8 | 0.0 | 7.9 |  |  |
| Huawei | MIL (dB) | 164.0 | 168.0 | 164.2 | 161.1 | 160.9 |  | 160.5 |  | 158.8 | 140.0 | 149.7 |  | 140.0 |
| Margin (dB) | 24.0 | 28.0 | 24.2 | 21.1 | 20.8 |  | 20.5 | -140.0 | 18.7 | 0.0 | 9.6 |  |  |
| Spreadtrum | MIL (dB) | 155.8 | 160.0 | 157.8 | 154.8 | 154.8 | 157.8 | 158.2 | 156.2 | 158.0 | 145.4 | 153.5 | 155.6 | 145.4 |
| Margin (dB) | 10.3 | 14.5 | 12.3 | 9.3 | 9.3 |  | 12.8 | 10.8 | 12.6 | 0.0 | 8.1 | 10.1 |  |
| Ericsson | MIL (dB) | 149.0 | 153.0 | 149.7 | 143.6 | 146.5 | 150.9 | 153.6 | 155.5 | 153.6 | 144.0 | 151.3 | 154.9 | 143.6 |
| Margin (dB) | 5.4 | 9.4 | 6.1 | 0.0 | 2.9 |  | 10.0 | 12.0 | 10.1 | 0.5 | 7.7 | 11.3 |  |
| InterDigital | MIL (dB) | 155.47 | 159.5 | 157.13 | 160.42 | 162.55 |  | 160.6 |  | 156.6 | 144.9 | 152.87 |  | 144.9 |
| Margin (dB) | 10.57 | 14.6 | 12.23 | 15.52 | 17.65 |  | 15.7 |  | 11.7 | 0.0 | 7.97 |  |  |
| Qualcomm | MIL (dB) | 152.3 |  | 151.3 | 147.1 | 148.6 |  |  |  | 146.5 | 140.7 | 154.1 |  | 140.7 |
| Margin (dB) | 11.6 | -140.7 | 10.6 | 6.4 | 7.9 |  |  |  | 5.8 | 0.0 | 13.4 |  |  |
| Intel | MIL (dB) | 156.3 | 157.4 | 152.7 | 157.0 | 154.7 | 156.3 | 161.5 | 160.3 | 157.7 | 140.0 | 147.0 | 156.3 | 140.0 |
| Margin (dB) | 16.3 | 17.4 | 12.7 | 17.0 | 14.7 |  | 21.5 | 20.3 | 17.7 | 0.0 | 7.0 | 16.3 |  |
| Lenovo, Motorola Mobility | MIL (dB) | 157.8 |  | 152.5 | 153.1 | 156.0 |  | 163.0 | 158.2 | 154.0 | 148.3 | 154.2 |  | 148.3 |
| Margin (dB) | 9.5 |  | 4.2 | 4.8 | 7.7 |  | 14.7 | 9.9 | 5.7 | 0 | 5.9 |  |  |

Note: 4 sources (Samsung, vivo, Nokia, Huawei) assume DL PSD 33 dBm/MHz and other sources use DL PSD 24 dBm/MHz.

Table C.3-2: Link budget performance (MIL) for the RedCap UE (20MHz BW, 2Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban, 4GHz, 2Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 160.1 | 164.1 | 156.9 | 155.8 | 156.8 |  | 155.3 | 151.5 | 148.5 | 139.0 | 147.0 |  | 142.0 |
| Margin (dB) | 18.0 | 22.0 | 14.8 | 13.7 | 14.7 |  | 13.3 | 9.5 | 6.5 | -3.0 | 5.0 |  |  |
| OPPO | MIL (dB) | 152.2 | 156.2 | 154.5 | 146.3 | 150.0 |  | 151.9 | 152.0 | 151.9 | 144.0 | 151.7 |  | 147.0 |
| Margin (dB) | 5.1 | 9.1 | 7.5 | -0.7 | 3.0 |  | 4.9 | 5.0 | 4.9 | -3.0 | 4.7 |  |  |
| vivo | MIL (dB) | 152.0 | 160.0 | 155.2 | 149.6 | 151.5 | 155.3 | 153.3 | 150.8 | 148.0 | 136.4 | 149.6 | 146.6 | 139.3 |
| Margin (dB) | 12.7 | 20.7 | 16.0 | 10.3 | 12.3 | 16.0 | 14.0 | 11.5 | 8.8 | -2.8 | 10.3 | 7.3 |  |
| Futurewei | MIL (dB) | 150.3 | 152.3 | 150.1 | 146.3 | 149.1 |  |  |  |  | 149.6 | 150.5 |  | 152.6 |
| Margin (dB) | -2.4 | -0.4 | -2.6 | -6.4 | -3.6 |  |  |  |  | -3.0 | -2.1 |  |  |
| Nokia | MIL (dB) | 162.5 | 162.5 | 158.6 | 163.4 | 160.0 |  | 148.7 |  | 147.2 | 137.8 | 144.3 | 152.1 | 140.8 |
| Margin (dB) | 21.7 | 21.7 | 17.8 | 22.6 | 19.2 |  | 7.9 |  | 6.4 | -3.0 | 3.5 | 11.3 |  |
| DOCOMO | MIL (dB) | 150.9 | 154.9 | 150.8 | 143.9 | 147.0 |  | 158.2 | 161.8 |  | 143.8 | 151.6 |  | 146.8 |
| Margin (dB) | 4.1 | 8.1 | 4.0 | -2.8 | 0.2 |  | 11.5 | 15.1 |  | -3.0 | 4.9 |  |  |
| Huawei | MIL (dB) | 158.0 | 162.0 | 156.9 | 154.7 | 154.6 |  | 157.5 |  | 155.8 | 137.0 | 146.7 |  | 140.0 |
| Margin (dB) | 18.0 | 22.0 | 16.9 | 14.6 | 14.6 |  | 17.5 |  | 15.7 | -3.0 | 6.6 |  |  |
| Spreadtrum | MIL (dB) | 149.8 | 154.0 | 151.8 | 148.8 | 148.8 | 151.8 | 155.2 | 153.2 | 155.0 | 142.4 | 150.5 | 152.6 | 145.4 |
| Margin (dB) | 4.3 | 8.5 | 6.3 | 3.3 | 3.3 | 6.3 | 9.8 | 7.8 | 9.6 | -3.0 | 5.1 | 7.1 |  |
| Ericsson | MIL (dB) | 142.8 | 146.8 | 143.5 | 137.2 | 139.9 | 145.0 | 150.6 | 152.5 | 150.6 | 141.0 | 148.3 | 151.9 | 143.6 |
| Margin (dB) | -0.8 | 3.2 | -0.1 | -6.4 | -3.7 | 1.4 | 7.0 | 9.0 | 7.1 | -2.5 | 4.7 | 8.3 |  |
| InterDigital | MIL (dB) | 149.77 | 153.8 | 151.30 | 153.83 | 156.80 |  | 157.1 |  | 152.8 | 141.9 | 149.87 |  | 144.9 |
| Margin (dB) | 4.87 | 8.9 | 6.4 | 8.93 | 11.9 |  | 12.2 |  | 7.9 | -3.0 | 4.97 |  |  |
| Qualcomm | MIL (dB) | 146.8 |  | 145.6 | 140.8 | 143.1 |  |  |  | 143.5 | 137.0 | 144.0 |  | 140.7 |
| Margin (dB) | 6.1 |  | 4.9 | 0.1 | 2.4 |  |  |  | 2.8 | -3.7 | 3.3 |  |  |
| Intel | MIL (dB) | 150.4 | 151.5 | 146.5 | 151.4 | 148.6 | 153.3 | 158.5 | 157.3 | 154.7 | 137.7 | 151.1 | 153.3 | 140.0 |
| Margin (dB) | 10.4 | 11.5 | 6.5 | 11.4 | 8.6 | 13.3 | 18.5 | 17.3 | 14.7 | -2.3 | 11.2 | 13.3 |  |

Note: 4 sources (Samsung, vivo, Nokia, Huawei) assume DL PSD 33 dBm/MHz and other sources use DL PSD 24 dBm/MHz

Table C.3-3: Link budget performance (MIL) for the RedCap UE (20MHz BW, 1Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban, 4GHz, 1Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 156.6 | 160.6 | 152.2 | 150.6 | 153.2 |  | 155.3 | 151.5 | 148.5 | 139.0 | 147.0 |  | 142.0 |
| Margin (dB) | 14.5 | 18.5 | 10.1 | 8.5 | 11.1 |  | 13.3 | 9.5 | 6.5 | -3.0 | 5.0 |  |  |
| ZTE | MIL (dB) | 138.6 | 149.0 | 151.6 | 141.7 | 141.9 |  | 159.6 | 157.9 | 155.3 | 140.0 | 153.3 |  | 143.0 |
| Margin (dB) | -4.5 | 6.0 | 8.6 | -1.3 | -1.1 |  | 16.6 | 14.9 | 12.3 | -3.0 | 10.3 |  |  |
| OPPO | MIL (dB) | 148.2 | 152.2 | 151.9 | 140.8 | 146.2 |  | 151.9 | 152.0 | 151.9 | 144.0 | 151.7 |  | 147.0 |
| Margin (dB) | 1.2 | 5.2 | 4.9 | -6.2 | -0.8 |  | 4.9 | 5.0 | 4.9 | -3.0 | 4.7 |  |  |
| vivo | MIL (dB) | 148.8 | 156.8 | 150.6 | 144.8 | 146.8 | 152.6 | 153.3 | 150.8 | 148.0 | 136.4 | 149.6 | 146.6 | 139.3 |
| Margin (dB) | 9.6 | 17.6 | 11.4 | 5.6 | 7.5 | 13.4 | 14.0 | 11.5 | 8.8 | -2.8 | 10.3 | 7.3 |  |
| Futurewei | MIL (dB) | 146.7 | 148.7 | 145.3 | 139.3 | 143.0 |  |  |  |  | 149.6 | 150.5 |  | 152.6 |
| Margin (dB) | -6.0 | -4.0 | -7.4 | -13.4 | -9.7 |  |  |  |  | -3.0 | -2.1 |  |  |
| Nokia | MIL (dB) | 158.5 | 158.5 | 154.8 | 159.6 | 156.5 |  | 148.7 |  | 147.2 | 137.8 | 144.3 | 152.1 | 140.8 |
| Margin (dB) | 17.7 | 17.7 | 14.0 | 18.8 | 15.7 |  | 7.9 |  | 6.4 | -3.0 | 3.5 | 11.3 |  |
| DOCOMO | MIL (dB) | 147.6 | 151.6 | 146.8 | 138.3 | 142.9 |  | 158.2 | 161.8 |  | 143.8 | 151.6 |  | 146.8 |
| Margin (dB) | 0.8 | 4.8 | 0.0 | -8.5 | -3.9 |  | 11.5 | 15.1 |  | -3.0 | 4.9 |  |  |
| Huawei | MIL (dB) | 154.5 | 158.5 | 153.1 | 150.4 | 150.8 |  | 157.5 |  | 155.8 | 137.0 | 146.7 |  | 140.0 |
| Margin (dB) | 14.5 | 18.5 | 13.0 | 10.3 | 10.7 |  | 17.5 |  | 15.7 | -3.0 | 6.6 |  |  |
| Spreadtrum | MIL (dB) | 146.8 | 151.0 | 148.8 | 145.8 | 145.8 | 148.8 | 155.2 | 153.2 | 155.0 | 142.4 | 150.5 | 152.6 | 145.4 |
| Margin (dB) | 1.3 | 5.5 | 3.3 | 0.3 | 0.3 | 3.3 | 9.8 | 7.8 | 9.6 | -3.0 | 5.1 | 7.1 |  |
| Ericsson | MIL (dB) | 139.7 | 143.8 | 139.8 | 132.4 | 136.0 | 141.4 | 150.6 | 152.5 | 150.6 | 141.0 | 148.3 | 151.9 | 143.6 |
| Margin (dB) | -3.9 | 0.2 | -3.8 | -11.2 | -7.6 | -2.2 | 7.0 | 9.0 | 7.1 | -2.5 | 4.7 | 8.3 |  |
| InterDigital | MIL (dB) | 146.57 | 150.6 | 148.23 | 149.29 | 153.67 |  | 157.1 |  | 152.8 | 141.9 | 149.87 |  | 144.9 |
| Margin (dB) | 1.67 | 5.7 | 3.33 | 4.39 | 8.77 |  | 12.2 |  | 7.9 | -3.0 | 4.97 |  |  |
| Qualcomm | MIL (dB) | 143.5 |  | 142.4 | 136.9 | 139.8 |  |  |  | 143.5 | 137.0 | 144.0 |  | 140.7 |
| Margin (dB) | 2.8 |  | 1.7 | -3.8 | -0.9 |  |  |  | 2.8 | -3.7 | 3.3 |  |  |
| Lenovo, Motorola Mobility | MIL (dB) | 146.3 |  | 145.7 | 140.2 | 145.4 |  | 160.0 | 155.2 | 154.0 | 145.3 | 151.2 |  | 148.3 |
| Margin (dB) | -2.0 |  | -2.6 | -8.1 | -2.9 |  | 11.7 | 6.9 | 5.7 | -3.0 | 2.9 |  |  |

Note: 4 sources (Samsung, vivo, Nokia, Huawei) assume DL PSD 33 dBm/MHz and other sources use DL PSD 24 dBm/MHz

Table C.3-4: MPL (dB) results for Urban 4 GHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Urban 2.6GHz** | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 |
| Samsung | Reference NR UE | 132.1 | 136.3 | 131.8 | 131.5 | 131.6 |  | 124.8 | 121.0 | 118.1 | 111.3 | 119.3 |  |
| 2Rx RedCap | 126.3 | 130.3 | 126.1 | 125.0 | 126.0 |  | 121.5 | 117.7 | 114.7 | 108.3 | 116.3 |  |
| 1Rx RedCap | 122.8 | 126.8 | 121.4 | 119.8 | 122.4 |  | 121.5 | 117.7 | 114.7 | 108.3 | 116.3 |  |
| ZTE | Reference NR UE | 114.0 | 124.4 | 126.6 | 117.6 | 117.8 |  | 128.8 | 127.1 | 124.5 | 112.3 | 125.6 |  |
| 2Rx RedCap |  |  |  |  |  |  | 125.8 | 124.1 | 121.5 | 109.3 | 122.6 |  |
| 1Rx RedCap | 104.8 | 115.2 | 120.9 | 111.0 | 111.2 |  | 125.8 | 124.1 | 121.5 | 109.3 | 122.6 |  |
| OPPO | Reference NR UE | 124.6 | 128.6 | 128.1 | 122.7 | 125.5 |  | 121.2 | 121.2 | 121.4 | 116.3 | 124.0 |  |
| 2Rx RedCap | 118.3 | 122.3 | 123.8 | 115.6 | 119.2 |  | 118.1 | 118.2 | 118.1 | 113.2 | 121.0 |  |
| 1Rx RedCap | 114.4 | 118.4 | 121.2 | 110.1 | 115.5 |  | 118.1 | 118.2 | 118.1 | 113.2 | 121.0 |  |
| vivo | Reference NR UE | 123.9 | 131.9 | 131.1 | 126.4 | 127.9 | 127.0 | 122.5 | 120.0 | 117.2 | 108.5 | 121.6 | 115.8 |
| 2Rx RedCap | 118.2 | 126.2 | 124.5 | 118.9 | 120.8 | 121.5 | 119.5 | 117.0 | 114.2 | 105.7 | 118.8 | 112.8 |
| 1Rx RedCap | 115.0 | 123.0 | 119.9 | 114.1 | 116.1 | 118.8 | 119.5 | 117.0 | 114.2 | 105.7 | 118.8 | 112.8 |
| Futurewei | Reference NR UE | 122.1 | 124.1 | 125.2 | 122.2 | 124.3 |  |  |  |  | 121.9 | 122.8 |  |
| 2Rx RedCap | 116.5 | 118.5 | 119.3 | 115.5 | 118.3 |  |  |  |  | 118.9 | 119.8 |  |
| 1Rx RedCap | 112.9 | 114.9 | 114.5 | 108.5 | 112.2 |  |  |  |  | 118.9 | 119.8 |  |
| Nokia | Reference NR UE | 134.6 | 134.6 | 134.6 | 138.1 | 135.2 |  | 117.9 |  | 116.4 | 110.1 | 116.6 | 124.3 |
| 2Rx RedCap | 128.7 | 128.7 | 127.9 | 132.7 | 129.3 |  | 114.9 |  | 113.4 | 107.1 | 113.6 | 121.3 |
| 1Rx RedCap | 124.7 | 124.7 | 124.1 | 128.9 | 125.8 |  | 114.9 |  | 113.4 | 107.1 | 113.6 | 121.3 |
| DOCOMO | Reference NR UE | 123.0 | 127.0 | 126.8 | 120.7 | 122.9 |  | 127.4 | 131.0 |  | 116.0 | 123.9 |  |
| 2Rx RedCap | 117.0 | 121.0 | 120.1 | 113.2 | 116.3 |  | 124.4 | 128.0 |  | 113.0 | 120.9 |  |
| 1Rx RedCap | 113.8 | 117.8 | 116.0 | 107.5 | 112.2 |  | 124.4 | 128.0 |  | 113.0 | 120.9 |  |
| Huawei | Reference NR UE | 130.2 | 134.2 | 133.5 | 130.4 | 130.2 |  | 126.7 |  | 124.9 | 109.3 | 118.9 |  |
| 2Rx RedCap | 124.2 | 128.2 | 126.2 | 123.9 | 123.9 |  | 123.7 |  | 121.9 | 106.3 | 115.9 |  |
| 1Rx RedCap | 120.7 | 124.7 | 122.3 | 119.6 | 120.0 |  | 123.7 |  | 121.9 | 106.3 | 115.9 |  |
| Spreadtrum | Reference NR UE | 122.0 | 126.2 | 127.0 | 124.0 | 124.0 | 127.0 | 124.4 | 122.4 | 124.2 | 114.7 | 122.8 | 121.8 |
| 2Rx RedCap | 116.0 | 120.2 | 121.0 | 118.0 | 118.0 | 121.0 | 121.4 | 119.4 | 121.2 | 111.7 | 119.8 | 118.8 |
| 1Rx RedCap | 113.0 | 117.2 | 118.0 | 115.0 | 115.0 | 118.0 | 121.4 | 119.4 | 121.2 | 111.7 | 119.8 | 118.8 |
| Ericsson | Reference NR UE | 115.2 | 119.2 | 118.9 | 112.8 | 115.7 | 120.1 | 119.8 | 121.7 | 119.8 | 113.3 | 120.6 | 121.1 |
| 2Rx RedCap | 109.0 | 113.0 | 112.7 | 106.4 | 109.1 | 114.2 | 116.8 | 118.7 | 116.8 | 110.3 | 117.6 | 118.1 |
| 1Rx RedCap | 105.9 | 110.0 | 109.0 | 101.6 | 105.2 | 110.6 | 116.8 | 118.7 | 116.8 | 110.3 | 117.6 | 118.1 |
| InterDigital | Reference NR UE | 121.7 | 125.7 | 126.4 | 129.7 | 131.8 |  | 126.8 |  | 122.8 | 114.2 | 122.1 |  |
| 2Rx RedCap | 116.0 | 120.0 | 120.6 | 123.1 | 126.1 |  | 123.3 |  | 119.0 | 111.2 | 119.1 |  |
| 1Rx RedCap | 112.8 | 116.8 | 117.5 | 118.6 | 122.9 |  | 123.3 |  | 119.0 | 111.2 | 119.1 |  |
| Qualcomm | Reference NR UE | 118.5 |  | 120.6 | 116.4 | 117.9 |  |  |  | 112.7 | 109.3 | 123.4 |  |
| 2Rx RedCap | 113.0 |  | 114.9 | 110.1 | 112.4 |  |  |  | 109.7 | 106.3 | 120.4 |  |
| 1Rx RedCap | 109.7 |  | 111.7 | 106.2 | 109.1 |  |  |  | 109.7 | 106.3 | 120.4 |  |
| Intel | Reference NR UE | 122.5 | 123.6 | 122.0 | 126.2 | 123.9 | 125.6 | 127.7 | 126.5 | 123.9 | 110.0 | 123.4 | 122.5 |
| 2Rx RedCap | 116.6 | 117.7 | 115.8 | 120.6 | 117.8 | 122.6 | 124.7 | 123.5 | 120.9 | 107.0 | 120.4 | 119.5 |

Note: 4 sources (Samsung, vivo, Nokia, Huawei) assume DL PSD 33 dBm/MHz and other sources use DL PSD 24 dBm/MHz

# C.4 Indoor scenario at 28 GHz

Link budget evaluation results for the Indoor scenario at 28 GHz from all the sourcing companies are captured in Tables C.4-1, C.4-2, C.4-3, C.4-4, and C.4-5. Tables C.4-1, C.4-2, C.4-3, and C.4-4 show the MIL results for reference NR UEs with 2 Rx branches (100MHz bandwidth), RedCap UEs with 1 Rx branch (100MHz bandwidth), RedCap UEs with 2 Rx branches (50MHz bandwidth), and RedCap UEs with 1 Rx branch (50MHz bandwidth), respectively. For every sourcing-company result, the values of the target MIL and the amount of compensation for each channel that has MIL below the target value are highlighted.

Additionally, the MPL results are provided Table C.4-5. The detailed link budget calculations from the sourcing companies can be found in [3].

Table C.4-1: Link budget performance (MIL) for the reference NR UE

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Indoor, 28GHz, 100MHz, 2Rx Ref NR UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 146.5 | 146.5 | 141.3 | 145.1 | 142.5 |  | 157.8 | 153.8 | 150.9 | 133.3 | 149.4 |  | 133.3 |
| Margin (dB) | 13.2 | 13.2 | 8.0 | 11.8 | 9.2 |  | 24.5 | 20.5 | 17.6 | 0.0 | 16.1 |  |  |
| ZTE | MIL (dB) | 139.8 | 140.5 | 134.5 | 139.0 | 139.3 |  | 157.5 | 153.1 | 152.3 | 134.3 | 152.3 |  | 134.3 |
| Margin (dB) | 5.5 | 6.2 | 0.2 | 4.6 | 4.9 |  | 23.1 | 18.8 | 18.0 | 0.0 | 18.0 |  |  |
| OPPO | MIL (dB) | 145.9 | 145.9 | 142.9 | 144.6 | 144.2 |  | 160.0 | 159.7 | 160.0 | 141.9 | 160.2 |  | 141.9 |
| Margin (dB) | 4.0 | 4.0 | 1.0 | 2.8 | 2.3 |  | 18.2 | 17.8 | 18.1 | 0.0 | 18.4 |  |  |
| vivo | MIL (dB) | 135.5 | 140.5 | 136.0 | 133.7 | 135.1 | 139.8 | 153.9 | 152.3 | 149.0 | 131.4 | 142.8 | 142.6 | 131.4 |
| Margin (dB) | 4.1 | 9.1 | 4.6 | 2.3 | 3.8 | 8.4 | 22.6 | 20.9 | 17.6 | 0.0 | 11.4 | 11.2 |  |
| Nokia | MIL (dB) | 142.5 | 142.5 | 139.3 | 144.9 | 144.1 |  | 160.5 |  | 158.9 | 144.9 | 153.1 | 157.5 | 139.3 |
| Margin (dB) | 3.3 | 3.3 | 0.0 | 5.6 | 4.8 |  | 21.2 |  | 19.6 | 5.6 | 13.8 | 18.2 |  |
| DOCOMO | MIL (dB) | 148.6 | 148.6 | 143.0 | 143.3 | 142.0 |  | 158.6 | 164.0 |  | 147.3 | 160.3 |  | 142.0 |
| Margin (dB) | 6.6 | 6.6 | 1.0 | 1.3 | 0.0 |  | 16.6 | 22.0 |  | 5.4 | 18.3 |  |  |
| Ericsson | MIL (dB) | 132.1 | 133.1 | 128.4 | 128.2 | 128.0 | 134.3 | 150.5 | 150.9 | 148.4 | 138.7 | 146.3 | 149.1 | 128.0 |
| Margin (dB) | 4.1 | 5.1 | 0.4 | 0.2 | 0.0 | 6.3 | 22.5 | 22.9 | 20.4 | 10.7 | 18.3 | 21.1 |  |
| InterDigital | MIL (dB) | 147.3 | 147.3 | 142.67 | 143.32 | 142.47 |  | 166.3 |  | 160.7 | 143.4 | 159.35 |  | 142.47 |
| Margin (dB) | 4.8 | 4.8 | 0.2 | 0.85 | 0.0 |  | 23.83 |  | 18.2 | 0.9 | 16.88 |  |  |
| Qualcomm | MIL (dB) | 143.4 | 149.4 | 141.9 | 143.9 | 147.3 | 153.0 | 170.8 | 164.7 | 162.2 | 138.8 | 147.4 | 163.4 | 138.8 |
| Margin (dB) | 4.6 | 10.6 | 3.1 | 5.1 | 8.5 | 14.1 | 32.0 | 25.8 | 23.3 | 0.0 | 8.6 | 24.6 |  |
| Intel | MIL (dB) | 139.2 | 140.0 | 132.1 | 140.5 | 137.6 | 142.3 | 157.0 | 157.3 | 154.2 | 137.4 | 150.9 | 150.9 | 132.1 |
| Margin (dB) | 1.8 | 2.6 | 0 | 3.1 | 0.2 | 4.9 | 19.6 | 19.9 | 16.8 | 5.3 | 13.5 | 13.5 |  |

Note: Sourcing companies Samsung and Vivo use max TRP 12 dBm and other companies use max TRP 23 dBm

Table C.4-2: Link budget performance (MIL) for the RedCap UE (100MHz BW, 1Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Indoor, 28GHz, 100MHz, 1Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 142.3 | 142.4 | 136.4 | 139.5 | 137.2 |  | 157.5 | 153.9 | 150.4 | 133.3 | 149.4 |  | 133.3 |
| Margin (dB) | 9.0 | 9.1 | 3.1 | 6.2 | 3.9 |  | 24.2 | 20.6 | 17.1 | 0.0 | 16.1 |  |  |
| ZTE | MIL (dB) | 136.5 | 137.2 | 129.2 | 134.1 | 134.7 |  | 157.5 | 153.1 | 152.3 | 134.3 | 152.3 |  | 134.3 |
| Margin (dB) | 2.1 | 2.8 | -5.2 | -0.2 | 0.3 |  | 23.1 | 18.8 | 18.0 | 0.0 | 18.0 |  |  |
| OPPO | MIL (dB) | 141.0 | 141.0 | 138.8 | 140.1 | 139.4 |  | 160.0 | 159.7 | 160.0 | 141.9 | 160.2 |  | 141.9 |
| Margin (dB) | -0.9 | -0.9 | -3.1 | -1.7 | -2.5 |  | 18.2 | 17.8 | 18.1 | 0.0 | 18.4 |  |  |
| vivo | MIL (dB) | 131.8 | 136.8 | 130.8 | 127.3 | 130.5 | 134.3 | 153.9 | 152.3 | 149.0 | 131.4 | 142.8 | 142.6 | 131.4 |
| Margin (dB) | 0.4 | 5.4 | -0.6 | -4.0 | -0.8 | 2.9 | 22.6 | 20.9 | 17.6 | 0.0 | 11.4 | 11.2 |  |
| Nokia | MIL (dB) | 139.5 | 139.3 | 136.0 | 142.5 | 141.5 |  | 160.5 |  | 158.9 | 144.9 | 153.1 | 157.5 | 139.3 |
| Margin (dB) | 0.3 | 0.0 | -3.3 | 3.2 | 2.2 |  | 21.2 |  | 19.6 | 5.6 | 13.8 | 18.2 |  |
| DOCOMO | MIL (dB) | 144.9 | 144.9 | 138.4 | 137.1 | 137.0 |  | 158.6 | 164.0 |  | 147.3 | 160.3 |  | 142.0 |
| Margin (dB) | 2.9 | 2.9 | -3.5 | -4.8 | -5.0 |  | 16.6 | 22.0 |  | 5.4 | 18.3 |  |  |
| Ericsson | MIL (dB) | 128.2 | 129.2 | 124.4 | 124.8 | 123.5 | 130.6 | 150.5 | 150.5 | 148.1 | 138.7 | 146.3 | 149.1 | 128.0 |
| Margin (dB) | 0.2 | 1.2 | -3.6 | -3.2 | -4.5 | 2.6 | 22.5 | 22.6 | 20.1 | 10.7 | 18.3 | 21.1 |  |
| InterDigital | MIL (dB) | 143.5 | 143.5 | 138.56 | 138.0 | 137.90 |  | 166.3 |  | 160.7 | 143.4 | 159.35 |  | 142.47 |
| Margin (dB) | 1.0 | 1.0 | -3.9 | -4.47 | -4.57 |  | 23.9 |  | 18.2 | 0.9 | 16.88 |  |  |
| Qualcomm | MIL (dB) | 140.1 | 146.1 | 137.7 | 138.5 | 143.8 | 149.7 | 170.8 | 164.7 | 162.2 | 138.8 | 147.4 | 163.4 | 138.8 |
| Margin (dB) | 1.3 | 7.3 | -1.2 | -0.4 | 5.0 | 10.8 | 32.0 | 25.8 | 23.3 | 0.0 | 8.6 | 24.6 |  |
| Intel | MIL (dB) | 135.1 | 135.9 | 128.0 | 137.1 | 134.0 | 137.8 | 157.0 | 157.3 | 154.2 | 137.4 | 150.9 | 150.9 | 132.1 |
| Margin (dB) | 3.0 | 3.8 | -4.1 | 5.0 | 1.9 | 5.7 | 24.9 | 25.2 | 22.1 | 5.3 | 18.8 | 18.7 |  |

Note: Sourcing companies Samsung and Vivo use max TRP 12 dBm and other companies use max TRP 23 dBm

Table C.4-3: Link budget performance (MIL) for the RedCap UE (50MHz BW, 2Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Indoor, 28GHz, 50MHz, 2Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 146.0 | 145.9 | 137.0 | 145.1 | 142.5 |  | 157.5 | 153.9 | 150.4 | 133.3 | 149.4 |  | 133.3 |
| Margin (dB) | 12.7 | 12.6 | 3.7 | 11.8 | 9.2 |  | 24.2 | 20.6 | 17.1 | 0.0 | 16.1 |  |  |
| OPPO | MIL (dB) | 145.7 | 145.7 | 137.2 | 144.6 | 144.2 |  | 160.0 | 159.7 | 160.0 | 144.8 | 160.2 |  | 141.9 |
| Margin (dB) | 3.9 | 3.9 | -4.6 | 2.8 | 2.3 |  | 18.2 | 17.8 | 18.1 | 3.0 | 18.4 |  |  |
| DOCOMO | MIL (dB) | 144.8 | 144.8 | 137.4 | 143.3 | 142.0 |  | 158.6 | 164.0 |  | 145.9 | 160.3 |  | 142.0 |
| Margin (dB) | 2.9 | 2.9 | -4.6 | 1.3 | 0.0 |  | 16.6 | 22.0 |  | 4.0 | 18.3 |  |  |
| Ericsson | MIL (dB) | 130.2 | 131.2 | 124.8 | 129.2 | 128.0 | 134.3 | 150.5 | 150.5 | 148.1 | 143.6 | 146.3 | 149.1 | 128.0 |
| Margin (dB) | 2.2 | 3.2 | -3.2 | 1.2 | 0.0 | 6.3 | 22.5 | 22.6 | 20.1 | 15.7 | 18.3 | 21.1 |  |
| Qualcomm | MIL (dB) |  |  | 138.4 | 143.9 | 144.2 | 152.9 | 170.8 | 164.7 | 162.2 | 138.9 | 147.4 | 163.4 | 138.8 |
| Margin (dB) |  |  | -0.4 | 5.1 | 5.4 | 14.1 | 32.0 | 25.8 | 23.3 | 0.1 | 8.6 | 24.6 |  |

Note: Sourcing companies Samsung and Vivo use max TRP 12 dBm and other companies use max TRP 23 dBm

Table C.4-4: Link budget performance (MIL) for the RedCap UE (50MHz BW, 1Rx)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Indoor, 28GHz, 50MHz, 1Rx RedCap UE** | | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 | Target /Option3 |
| Samsung | MIL (dB) | 141.6 | 141.6 | 130.9 | 139.5 | 137.2 |  | 157.5 | 153.9 | 150.4 | 133.3 | 149.4 |  | 133.3 |
| Margin (dB) | 8.3 | 8.3 | -2.4 | 6.2 | 3.9 |  | 24.2 | 20.6 | 17.1 | 0.0 | 16.1 |  |  |
| OPPO | MIL (dB) | 140.9 | 140.9 | 131.8 | 140.1 | 139.4 |  | 160.0 | 159.7 | 160.0 | 144.8 | 160.2 |  | 141.9 |
| Margin (dB) | -1.0 | -1.0 | -10.1 | -1.7 | -2.5 |  | 18.2 | 17.8 | 18.1 | 3.0 | 18.4 |  |  |
| DOCOMO | MIL (dB) | 140.3 | 140.3 | 131.3 | 137.1 | 137.0 |  | 158.6 | 164.0 |  | 145.9 | 160.3 |  | 142.0 |
| Margin (dB) | -1.7 | -1.7 | -10.7 | -4.8 | -5.0 |  | 16.6 | 22.0 |  | 4.0 | 18.3 |  |  |
| Ericsson | MIL (dB) | 126.1 | 127.1 | 120.1 | 124.8 | 123.5 | 130.6 | 150.5 | 150.5 | 148.1 | 143.6 | 146.3 | 149.1 | 128.0 |
| Margin (dB) | -1.9 | -0.9 | -7.9 | -3.2 | -4.5 | 2.6 | 22.5 | 22.6 | 20.1 | 15.7 | 18.3 | 21.1 |  |
| Qualcomm | MIL (dB) |  |  | 133.4 | 138.5 | 140.2 | 149.9 | 170.8 | 164.7 | 162.2 | 138.9 | 147.4 | 163.4 | 138.8 |
| Margin (dB) |  |  | -5.4 | -0.4 | 1.4 | 11.1 | 32.0 | 25.8 | 23.3 | 0.1 | 8.6 | 24.6 |  |

Note: Sourcing companies Samsung and Vivo use max TRP 12 dBm and other companies use max TRP 23 dBm

Table C.4-5: MPL (dB) results for Indoor 28 GHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Indoor, 28GHz** | | | | | | | | | | | | | |
|  |  | PDCCH CSS | PDCCH USS | PDSCH | Msg2 | Msg4 | PBCH | PUCCH 2bits | PUCCH 11 bits | PUCCH 22bits | PUSCH | Msg3 | PRACH B4 |
| Samsung | Ref UE, 100MHz BW, 2Rx | 146.5 | 146.5 | 141.3 | 145.1 | 142.5 |  | 157.8 | 153.8 | 150.9 | 133.3 | 149.4 |  |
| RedCap, 100MHz BW, 1Rx | 142.3 | 142.4 | 136.4 | 139.5 | 137.2 |  | 157.8 | 153.8 | 150.9 | 133.3 | 149.4 |  |
| RedCap, 50MHz BW, 2Rx | 146.0 | 145.9 | 137.0 | 145.1 | 142.5 |  | 157.5 | 153.9 | 150.4 | 133.2 | 149.4 |  |
| RedCap, 50MHz BW, 1Rx | 141.6 | 141.6 | 130.9 | 139.5 | 137.2 |  | 157.5 | 153.9 | 150.4 | 133.2 | 149.4 |  |
| ZTE | Ref UE, 100MHz BW, 2Rx | 139.8 | 140.5 | 134.5 | 139.0 | 139.3 |  | 157.5 | 153.1 | 152.3 | 134.3 | 152.3 |  |
| RedCap, 100MHz BW, 1Rx | 136.5 | 137.2 | 129.2 | 134.1 | 134.7 |  | 157.5 | 153.1 | 152.3 | 134.3 | 152.3 |  |
| OPPO | Ref UE, 100MHz BW, 2Rx | 145.9 | 145.9 | 142.9 | 144.6 | 144.2 |  | 160.0 | 159.7 | 160.0 | 141.9 | 160.2 |  |
| RedCap, 100MHz BW, 1Rx | 141.0 | 141.0 | 138.8 | 140.1 | 139.4 |  | 160.0 | 159.7 | 160.0 | 141.9 | 160.2 |  |
| RedCap, 50MHz BW, 2Rx | 145.7 | 145.7 | 137.2 | 144.6 | 144.2 |  | 160.0 | 159.7 | 160.0 | 144.8 | 160.2 |  |
| RedCap, 50MHz BW, 1Rx | 140.9 | 140.9 | 131.8 | 140.1 | 139.4 |  | 160.0 | 159.7 | 160.0 | 144.8 | 160.2 |  |
| vivo | Ref UE, 100MHz BW, 2Rx | 127.0 | 132.0 | 130.8 | 128.5 | 129.9 | 131.3 | 145.4 | 143.8 | 140.5 | 126.2 | 137.6 | 134.1 |
| RedCap, 100MHz BW, 1Rx | 123.3 | 128.3 | 125.6 | 122.1 | 125.3 | 125.8 | 145.4 | 143.8 | 140.5 | 126.2 | 137.6 | 134.1 |
| Nokia | Ref UE, 100MHz BW, 2Rx | 134.1 | 134.1 | 134.1 | 139.7 | 144.1 |  | 152.0 |  | 150.4 | 139.7 | 147.9 | 152.3 |
| RedCap, 100MHz BW, 1Rx | 131.1 | 130.8 | 130.8 | 137.3 | 141.5 |  | 152.0 |  | 150.4 | 139.7 | 147.9 | 152.3 |
| DOCOMO | Ref UE, 100MHz BW, 2Rx | 148.6 | 148.6 | 143.0 | 143.3 | 142.0 |  | 158.6 | 164.0 |  | 147.3 | 160.3 |  |
| RedCap, 100MHz BW, 1Rx | 144.9 | 144.9 | 138.4 | 137.1 | 137.0 |  | 158.6 | 164.0 |  | 147.3 | 160.3 |  |
| RedCap, 50MHz BW, 2Rx | 144.8 | 144.8 | 137.4 | 143.3 | 142.0 |  | 158.6 | 164.0 |  | 145.9 | 160.3 |  |
| RedCap, 50MHz BW, 1Rx | 140.3 | 140.3 | 131.3 | 137.1 | 137.0 |  | 158.6 | 164.0 |  | 145.9 | 160.3 |  |
| Ericsson | Ref UE, 100MHz BW, 2Rx | 132.1 | 133.1 | 128.4 | 129.2 | 128.0 | 134.3 | 150.5 | 150.9 | 148.4 | 138.7 | 146.3 | 149.1 |
| RedCap, 100MHz BW, 1Rx | 128.2 | 129.2 | 124.4 | 124.8 | 123.5 | 130.6 | 150.5 | 150.5 | 148.4 | 138.7 | 146.3 | 149.1 |
| RedCap, 50MHz BW, 2Rx | 130.2 | 131.2 | 124.8 | 129.2 | 128.0 | 134.3 | 150.5 | 150.9 | 148.1 | 143.6 | 146.3 | 149.1 |
| RedCap, 50MHz BW, 1Rx | 126.1 | 127.1 | 120.1 | 124.8 | 123.5 | 130.6 | 150.5 | 150.5 | 148.1 | 143.6 | 146.3 | 149.1 |
| InterDigital | Ref UE, 100MHz BW, 2Rx | 138.8 | 138.8 | 142.7 | 143.3 | 142.5 |  | 166.3 |  | 160.7 | 143.4 | 159.3 |  |
| RedCap, 100MHz BW, 1Rx | 135.0 | 135.0 | 138.6 | 138.0 | 137.9 |  | 166.3 |  | 160.7 | 143.4 | 159.3 |  |
| Qualcomm | Ref UE, 100MHz BW, 2Rx | 143.4 | 149.4 | 141.9 | 143.9 | 147.3 | 153.0 | 170.8 | 164.7 | 162.2 | 138.8 | 147.4 | 163.4 |
| RedCap, 100MHz BW, 1Rx | 140.1 | 146.1 | 137.7 | 138.5 | 143.8 | 149.7 | 170.8 | 164.7 | 162.2 | 138.8 | 147.4 | 163.4 |
| RedCap, 50MHz BW, 2Rx |  |  | 138.4 | 143.9 | 144.2 | 152.9 | 170.8 | 164.7 | 162.2 | 138.9 | 147.4 | 163.4 |
| RedCap, 50MHz BW, 1Rx |  |  | 133.4 | 138.5 | 140.2 | 149.9 | 170.8 | 164.7 | 162.2 | 138.9 | 147.4 | 163.4 |
| Intel | Ref UE, 100MHz BW, 2Rx | 139.2 | 140.0 | 132.1 | 140.5 | 137.6 | 142.3 | 157.0 | 157.3 | 154.2 | 137.4 | 150.9 | 150.9 |
| RedCap, 100MHz BW, 1Rx | 135.1 | 135.9 | 128.0 | 137.1 | 134.0 | 137.8 | 157.0 | 157.3 | 154.2 | 137.4 | 150.9 | 150.9 |

Note: Sourcing companies Samsung and Vivo use max TRP 12 dBm and other companies use max TRP 23 dBm.

Annex D: System-level simulation evaluation results

Based on the latest available evaluation results in [3], the system-level simulation (SLS) evaluations of the impact of complexity reduction and antenna inefficiency to network capacity are summarized in Table D-1 to D-25. Table D-1 lists additional evaluation assumptions for capacity and spectral efficiency evaluation. Results for burst traffic are summarized in Table D-2 – Table D-19, for various deployment scenarios (Urban at 2.6 GHz, Urban at 4 GHz, and Indoor at 28 GHz), various loads (low and medium), and various RedCap UE complexity reduction options (2 Rx branches and 1 Rx branch). Both downlink and uplink results are summarized. Additionally, results for full-buffer traffic are summarized in Table D-22 – Table D-25.

Table D-1: Additional evaluation assumptions for capacity and spectral efficiency evaluation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Traffic model | Scheduled BW | Modulation order | Options for UE modelling (Note) | Antenna efficiency loss for RedCap UE |
| Source 1  (Ericsson) | FTP mode 3 (0.5MB payload every 200ms) for eMBB UE  IM model (0.1 MB payload every 2s) for RedCap UE | Max 100MHz for eMBB UE and 20 MHz for RedCap UE | Max 256 QAM in DL and 64 QAM in UL for eMBB UE  Max 64QAM in DL and 16 QAM in UL for RedCap UE | Option 1 | SLS results do not account for antenna efficiency loss |
| Source 2 (Huawei) | FTP model 3 for both eMBB and RedCap UEs. In each 20MHz frequency block within 100MHz bandwidth, packet size is 0.125 Mbytes for DL and 0.05 MB for UL and mean inter-arrival time is 200 ms | 100MHz system bandwidth comprises five frequency blocks of 20MHz. Scheduled within one frequency block for both eMBB UE and RedCap UE | Max 256 QAM in DL and 64 QAM in UL for eMBB UE  Max 64QAM in DL and 16 QAM in UL for RedCap UE | Option 2  For DL, a total number of UEs per cell is 4 for low-loading and 8 for medium loading  For UL, a total number of UEs per cells is 2 for low-loading and 4 for medium loading |  |
| Source 3 (vivo) | FTP model 3 (0.5MB payload every 200ms) for eMBB UE  IM traffic (0.1 MB payload every 2s) for RedCap UE | Max 100MHz for eMBB UE and 20 MHz for RedCap UE | Max 256 QAM in DL and 64 QAM in UL for eMBB UE  Max 64QAM in DL and 16 QAM in UL for RedCap UE | Option 1  For DL, 8 eMBB UE and 0/3/8 RedCap UE based on ratios for low loading; 12 eMBB UE and 0/4/12 RedCap UE based on ratios for medium loading  For UL, 3 eMBB UE and 0/1/3 RedCap UE based on ratios for low loading; 5 eMBB UE and 0/2/5 RedCap UE based on ratios for medium loading | 3dB antenna efficiency loss is modelled for all FR1 scenarios |
| Source 4 (MediaTek) | FTP model 3 for both eMBB and RedCap UEs.  Packet size is 0.5 Mbytes and mean inter-arrival time 200 ms | Max 100MHz for eMBB UE and 20 MHz for RedCap UE | Max 256 QAM in DL for eMBB UE  Max 64QAM in DL for RedCap UE |  | 3dB antenna efficiency loss is modelled for all FR1 scenarios |
| Source 5 (Qualcomm) | FTP model 3 for eMBB UE (packet size is 0.5MB and the mean inter-arrival time changed with different RedCap UE ratios)  IM model (0.1 MB payload every 2s) for RedCap UE | Max 100MHz for eMBB UE and 20 MHz for RedCap UE | Max 256 QAM in DL for eMBB UE  Max 64QAM in DL for RedCap UE | Option 2 with a total 8 UEs per cell for DL | SLS results do not account for antenna efficiency loss |
| Source 6 (Nokia) | FTP model 3 for both eMBB and RedCap UEs (packet size is fixed, and packet arrival rate adapted to target RU) | Max 100MHz for eMBB UE and 20 MHz for RedCap UE | Max 256 QAM in DL and 64 QAM in UL for eMBB UE  Max 64QAM in DL and 16 QAM in UL for RedCap UE | Option 2 with an average of 10 UEs per cell including both RedCap and reference NR UEs. The number of RedCap UEs in the entire system is based on the agreed percentages. |  |
| Note: For burst traffic evaluation, the number of UEs including both eMBB and RedCap UEs can be based on the following options.  - Option 1: The number of UEs can be different for different RedCap UE ratios in the cell (e.g. using the target RU to determine the number of UEs for each RedCap UE ratio independently)  - Option 2: With respect to a target RU, the total number of UEs is same for all the RedCap UE ratios in the cell (e.g. firstly determine the number of UEs assuming 0% RedCap UE ratio for a target RU and use the same total number to other RedCap UE ratios) | | | | | |

Table D-2: Downlink capacity evaluation for burst traffic (2.6GHz, low loading, 2Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2.6GHz, DL, 2Rx RedCap, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 634.00 | 636.00 | 630.00 | \ | 317.00 | 315.00 | 313.00 | \ | 6.30 |  |  | \ |
| RedCap UE | \ | 86.00 | 85.00 | 83.00 | \ | 38.00 | 37.00 | 37.00 | \ |  |  | 4.10 |
| All UEs | 634.00 | 634.00 | 625.00 | 83.00 | 317.00 | 306.00 | 272.00 | 37.00 | 6.30 | 6.30 | 6.20 | 4.10 |
| Huawei | eMBB UE | 86.96 | 58.82 | 39.22 | \ | 33.33 | 21.98 | 16.95 | \ | 5.76 | 5.68 | 4.87 | \ |
| RedCap UE | \ | 29.41 | 30.77 | 46.51 | \ | 10.93 | 9.09 | 14.81 | \ | 3.20 | 3.17 | 2.87 |
| All UEs | 86.96 | 50.41 | 35.72 | 46.51 | 33.33 | 19.22 | 14.02 | 14.81 | 5.76 | 5.44 | 3.65 | 2.87 |
| vivo | eMBB UE | 464.86 | 470.23 | 465.56 |  | 164.03 | 162.74 | 164.62 |  | 5.47 | 5.49 | 5.49 |  |
| RedCap UE | \ | 39.00 | 38.13 |  | \ | 16.03 | 15.34 |  | \ | 2.64 | 2.61 |  |
| All UEs | 464.86 | 456.49 | 431.54 |  | 164.03 | 98.10 | 37.44 |  | 5.47 | 5.45 | 5.37 |  |
| MediaTek | eMBB UE | 365.00 |  |  | \ | 176.00 |  |  | \ | 6.15 |  |  | \ |
| RedCap UE | \ |  |  | 30.00 | \ |  |  | 1.00 | \ |  |  | 3.47 |
| All UEs | 365.00 |  |  | 30.00 | 176.00 |  |  | 1.00 | 6.15 |  |  | 3.47 |
| Qualcomm | eMBB UE | 168.12 | 176.74 | 204.66 | \ | 57.05 | 67.20 | 87.43 | \ | 8.98 | 9.22 | 9.70 | \ |
| RedCap UE | \ | 46.72 | 43.41 | 71.02 | \ | 4.04 | 2.14 | 5.68 | \ | 6.75 | 5.19 | 8.47 |
| All UEs | 168.12 | 134.86 | 84.85 | 71.02 | 57.05 | 14.64 | 5.31 | 5.68 | 8.98 | 8.60 | 7.44 | 8.47 |
| Nokia | eMBB UE | 402.48 | 447.58 | 569.93 | \ | 188.97 | 219.51 | 311.09 | \ | 4.79 | 5.31 | 6.43 | \ |
| RedCap UE | \ | 21.52 | 52.06 | 52.05 | \ | 3.94 | 19.81 | 18.97 | \ | 1.32 | 2.40 | 2.40 |
| All UEs | 402.48 | 377.15 | 133.94 | 52.05 | 188.97 | 9.80 | 26.79 | 18.97 | 4.79 | 4.31 | 4.42 | 2.40 |

Table D-3: Downlink capacity evaluation for burst traffic (2.6GHz, low loading, 1Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2.6GHz, DL, 1Rx RedCap, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 634.00 | 634.00 | 632.00 | \ | 317.00 | 315.00 | 314.00 | \ | 6.30 |  |  | \ |
| RedCap UE | \ | 63.00 | 63.00 | 63.00 | \ | 30.00 | 29.00 | 27.00 | \ |  |  | 2.90 |
| All UEs | 634.00 | 632.00 | 627.00 | 63.00 | 317.00 | 302.00 | 268.00 | 27.00 | 6.30 | 5.90 | 6.10 | 2.90 |
| Huawei | eMBB UE | 86.96 | 42.55 | 25.98 | \ | 33.33 | 15.38 | 8.89 | \ | 5.76 | 5.22 | 4.99 | \ |
| RedCap UE | \ | 19.05 | 21.05 | 25.32 | \ | 7.41 | 7.38 | 7.25 | \ | 2.34 | 2.19 | 2.10 |
| All UEs | 86.96 | 36.00 | 23.31 | 25.32 | 33.33 | 13.59 | 8.24 | 7.25 | 5.76 | 4.25 | 2.98 | 2.10 |
| vivo | eMBB UE | 488.09 | 471.06 | 471.38 |  | 177.71 | 162.54 | 165.98 |  | 5.75 | 5.49 | 5.53 |  |
| RedCap UE | \ | 36.39 | 35.20 |  | \ | 13.54 | 13.80 |  | \ | 2.35 | 2.38 |  |
| All UEs | 488.09 | 456.73 | 436.73 |  | 177.71 | 95.10 | 34.73 |  | 5.75 | 5.43 | 5.39 |  |
| MediaTek | eMBB UE | 365.00 |  |  | \ | 176.00 |  |  | \ | 6.15 |  |  | \ |
| RedCap UE | \ |  |  | 16.00 | \ |  |  | 2.00 | \ |  |  | 2.50 |
| All UEs | 365.00 |  |  | 16.00 | 176.00 |  |  | 2.00 | 6.15 |  |  | 2.50 |
| Qualcomm | eMBB UE | 168.12 | 176.95 | 212.95 | \ | 57.05 | 71.71 | 98.93 | \ | 8.98 | 8.95 | 9.63 | \ |
| RedCap UE | \ | 36.20 | 31.15 | 41.79 | \ | 1.13 | 0.92 | 2.28 | \ | 3.95 | 3.13 | 3.98 |
| All UEs | 168.12 | 132.78 | 61.29 | 41.79 | 57.05 | 10.61 | 2.48 | 2.28 | 8.98 | 7.70 | 6.38 | 3.98 |
| Nokia | eMBB UE | 402.48 | 447.58 | 569.93 | \ | 188.97 | 219.51 | 311.09 | \ | 4.79 | 5.31 | 6.43 | \ |
| RedCap UE | \ | 18.93 | 41.51 | 41.51 | \ | 3.88 | 14.47 | 14.73 | \ | 1.19 | 1.72 | 1.72 |
| All UEs | 402.48 | 377.17 | 133.97 | 41.51 | 188.97 | 7.72 | 18.24 | 14.73 | 4.79 | 4.28 | 4.08 | 1.72 |

Table D-4: Downlink capacity evaluation for burst traffic (2.6GHz, medium loading, 2Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2.6GHz, DL, 2Rx RedCap, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 512.00 | 518.00 | 521.00 | \ | 227.00 | 233.00 | 237.00 | \ | 6.00 |  |  | \ |
| RedCap UE | \ | 67.00 | 67.00 | 64.00 | \ | 29.00 | 28.00 | 27.00 | \ |  |  | 3.80 |
| All UEs | 512.00 | 516.00 | 515.00 | 64.00 | 227.00 | 224.00 | 206.00 | 27.00 | 6.00 | 5.90 | 5.80 | 3.80 |
| Huawei | eMBB UE | 64.52 | 41.67 | 28.57 | \ | 20.10 | 12.20 | 8.70 | \ | 5.33 | 5.45 | 4.90 | \ |
| RedCap UE | \ | 22.22 | 19.23 | 28.57 | \ | 6.92 | 4.38 | 7.25 | \ | 3.85 | 3.83 | 3.58 |
| All UEs | 64.52 | 38.61 | 26.23 | 28.57 | 20.10 | 10.88 | 4.66 | 7.25 | 5.33 | 4.64 | 4.34 | 3.58 |
| Vivo | eMBB UE | 388.54 | 392.09 | 397.28 |  | 97.68 | 94.44 | 97.61 |  | 5.13 | 5.09 | 5.14 |  |
| RedCap UE | \ | 27.10 | 27.56 |  | \ | 7.82 | 7.74 |  | \ | 2.53 | 2.61 |  |
| All UEs | 388.54 | 378.54 | 356.91 |  | 97.68 | 59.23 | 25.42 |  | 5.13 | 5.06 | 5.04 |  |
| MediaTek | eMBB UE | 258.00 |  |  | \ | 90.00 |  |  | \ | 5.80 |  |  | \ |
| RedCap UE | \ |  |  | 18.00 | \ |  |  | 0.50 | \ |  |  | 2.40 |
| All UEs | 258.00 |  |  | 18.00 | 90.00 |  |  | 0.50 | 5.80 |  |  | 2.40 |
| Qualcomm | eMBB UE | 139.30 | 152.74 | 187.06 | \ | 51.80 | 61.85 | 84.05 | \ | 7.99 | 8.26 | 9.09 | \ |
| RedCap UE | \ | 43.72 | 37.23 | 71.02 | \ | 1.75 | 1.71 | 5.68 | \ | 5.50 | 4.82 | 8.47 |
| All UEs | 139.30 | 117.80 | 80.72 | 71.02 | 51.80 | 11.51 | 4.08 | 5.68 | 7.99 | 7.57 | 6.95 | 8.47 |
| Nokia | eMBB UE | 300.05 | 407.42 | 413.37 | \ | 105.19 | 190.68 | 193.98 | \ | 3.68 | 4.79 | 4.79 | \ |
| RedCap UE | \ | 18.92 | 18.15 | 22.28 | \ | 2.73 | 2.34 | 3.83 | \ | 1.27 | 1.27 | 1.32 |
| All UEs | 300.05 | 330.63 | 106.32 | 22.28 | 105.19 | 7.50 | 3.77 | 3.83 | 3.68 | 3.91 | 3.03 | 1.32 |

Table D-5: Downlink capacity evaluation for burst traffic (2.6GHz, medium loading, 1Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2.6GHz, DL, 1Rx RedCap, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 511.00 | 515.00 | 511.00 | \ | 227.00 | 236.00 | 231.00 | \ | 6.00 |  |  | \ |
| RedCap UE | \ | 52.00 | 52.00 | 51.00 | \ | 20.00 | 20.00 | 19.00 | \ |  |  | 2.80 |
| All UEs | 511.00 | 512.00 | 504.00 | 51.00 | 227.00 | 224.00 | 200.00 | 19.00 | 6.00 | 5.90 | 5.60 | 2.80 |
| Huawei | eMBB UE | 64.52 | 27.78 | 18.18 | \ | 20.10 | 7.25 | 4.52 | \ | 5.33 | 5.25 | 5.23 | \ |
| RedCap UE | \ | 14.49 | 13.70 | 16.13 | \ | 4.03 | 2.44 | 2.73 | \ | 2.41 | 2.72 | 2.96 |
| All UEs | 64.52 | 26.07 | 16.86 | 16.13 | 20.10 | 6.55 | 3.67 | 2.73 | 5.33 | 3.75 | 3.32 | 2.96 |
| vivo | eMBB UE | 396.74 | 392.38 | 387.63 |  | 102.39 | 97.20 | 95.89 |  | 5.22 | 5.13 | 5.09 |  |
| RedCap UE | \ | 25.54 | 24.37 |  | \ | 7.73 | 7.24 |  | \ | 2.36 | 2.31 |  |
| All UEs | 396.74 | 379.11 | 347.19 |  | 102.39 | 59.83 | 22.79 |  | 5.22 | 5.09 | 4.98 |  |
| MediaTek | eMBB UE | 258.00 |  |  | \ | 90.00 |  |  | \ | 5.80 |  |  | \ |
| RedCap UE | \ |  |  | 2.00 | \ |  |  | 0.30 | \ |  |  | 2.00 |
| All UEs | 258.00 |  |  | 2.00 | 90.00 |  |  | 0.30 | 5.80 |  |  | 2.00 |
| Qualcomm | eMBB UE | 139.30 | 154.16 | 186.99 | \ | 51.80 | 61.23 | 90.52 | \ | 7.99 | 8.07 | 8.86 | \ |
| RedCap UE | \ | 31.78 | 27.43 | 41.79 | \ | 0.79 | 0.78 | 2.28 | \ | 3.24 | 2.96 | 3.98 |
| All UEs | 139.30 | 112.21 | 61.16 | 41.79 | 51.80 | 8.90 | 1.80 | 2.28 | 7.99 | 6.86 | 5.91 | 3.98 |
| Nokia | eMBB UE | 300.05 | 407.42 | 413.37 | \ | 105.19 | 190.68 | 193.98 | \ | 3.68 | 4.79 | 4.79 | \ |
| RedCap UE | \ | 17.18 | 16.19 | 26.67 | \ | 2.70 | 2.55 | 5.84 | \ | 1.20 | 1.20 | 1.29 |
| All UEs | 300.05 | 330.64 | 77.96 | 26.67 | 105.19 | 6.01 | 3.60 | 5.84 | 3.68 | 3.89 | 2.99 | 1.29 |

Table D-6: Uplink capacity evaluation for burst traffic (2.6GHz, low loading)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2.6GHz, UL, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 47.000 | 47.000 | 47.000 | \ | 3.000 | 3.000 | 3.000 | \ | 0.40 |  |  | \ |
| RedCap UE | \ | 12.000 | 12.000 | 11.000 | \ | 2.700 | 2.700 | 2.400 | \ |  |  | 0.40 |
| All UEs | 47.000 | 46.000 | 46.000 | 11.000 | 3.000 | 3.000 | 3.000 | 2.400 | 0.40 | 0.40 | 0.40 | 0.40 |
| Huawei | eMBB UE | 8.420 |  | 3.430 | \ | 0.220 |  | 0.220 | \ | 1.66 |  | 1.65 | \ |
| RedCap UE | \ |  | 1.940 | 4.300 | \ |  | 0.210 | 0.230 | \ |  | 0.84 | 0.82 |
| All UEs | 8.420 |  | 2.880 | 4.300 | 0.220 |  | 0.220 | 0.230 | 1.66 |  | 1.16 | 0.82 |
| vivo | eMBB UE | 21.400 | 22.811 | 23.444 |  | 0.063 | 0.061 | 0.059 |  | 1.01 | 1.01 | 1.01 |  |
| RedCap UE | \ | 0.556 | 0.473 |  | \ | 0.070 | 0.004 |  | \ | 0.24 | 0.24 |  |
| All UEs | 21.400 | 8.695 | 4.489 |  | 0.063 | 0.062 | 0.058 |  | 1.01 | 0.96 | 0.88 |  |
| MediaTek | eMBB UE | 82.000 |  |  | \ | 14.000 |  |  | \ | 0.60 |  |  | \ |
| RedCap UE | \ |  |  | 7.000 | \ |  |  | 4.000 | \ |  |  | 0.40 |
| All UEs | 82.000 |  |  | 7.000 | 14.000 |  |  | 4.000 | 0.60 |  |  | 0.40 |
| Nokia | eMBB UE | 45.974 | 46.240 | 46.967 | \ | 18.319 | 18.518 | 17.608 | \ | 0.52 | 0.52 | 0.52 | \ |
| RedCap UE | \ | 7.427 | 7.435 | 7.435 | \ | 4.991 | 5.008 | 5.000 | \ | 0.40 | 0.40 | 0.40 |
| All UEs | 45.974 | 36.354 | 11.072 | 7.435 | 18.319 | 6.946 | 6.025 | 5.000 | 0.52 | 0.49 | 0.46 | 0.40 |

Table D-7: Uplink capacity evaluation for burst traffic (2.6GHz, medium loading)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2.6GHz, UL, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 37.000 | 37.000 | 37.000 | \ | 1.700 | 1.700 | 1.600 | \ | 0.40 |  |  | \ |
| RedCap UE | \ | 11.000 | 11.000 | 11.000 | \ | 1.500 | 1.600 | 1.400 | \ |  |  | 0.50 |
| All UEs | 37.000 | 37.000 | 36.000 | 11.000 | 1.700 | 1.700 | 1.600 | 1.400 | 0.40 | 0.40 | 0.40 | 0.50 |
| Huawei | eMBB UE | 7.340 | 5.230 | 3.400 | \ | 0.220 | 0.220 | 0.230 | \ | 2.04 | 2.20 | 2.22 | \ |
| RedCap UE | \ | 2.470 | 2.010 | 3.600 | \ | 0.190 | 0.220 | 0.240 | \ | 0.73 | 0.97 | 1.34 |
| All UEs | 7.340 | 4.410 | 2.900 | 3.600 | 0.220 | 0.200 | 0.220 | 0.240 | 2.04 | 1.82 | 1.59 | 1.34 |
| vivo | eMBB UE | 19.929 | 19.877 | 18.060 |  | 0.065 | 0.064 | 0.061 |  | 1.01 | 1.01 | 1.01 |  |
| RedCap UE | \ | 0.328 | 0.398 |  | \ | 0.034 | 0.032 |  | \ | 0.25 | 0.25 |  |
| All UEs | 19.929 | 14.120 | 2.791 |  | 0.065 | 0.062 | 0.056 |  | 1.01 | 0.96 | 0.90 |  |
| MediaTek | eMBB UE | 63.000 |  |  | \ | 9.000 |  |  | \ | 0.56 |  |  | \ |
| RedCap UE | \ |  |  | 7.000 | \ |  |  | 2.500 | \ |  |  | 0.40 |
| All UEs | 63.000 |  |  | 7.000 | 9.000 |  |  | 2.500 | 0.56 |  |  | 0.40 |
| Nokia | eMBB UE | 35.769 | 35.710 | 36.162 | \ | 11.898 | 11.898 | 11.163 | \ | 0.49 | 0.49 | 0.49 | \ |
| RedCap UE | \ | 6.968 | 7.079 | 7.150 | \ | 3.514 | 3.289 | 3.313 | \ | 0.39 | 0.39 | 0.39 |
| All UEs | 35.769 | 29.122 | 7.783 | 7.150 | 11.898 | 5.171 | 4.040 | 3.313 | 0.49 | 0.47 | 0.44 | 0.39 |

Table D-8: Downlink capacity evaluation for burst traffic (4GHz, low loading, 2Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **4 GHz, DL, 2Rx RedCap, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 506.00 | 507.00 | 504.00 | \ | 152.00 | 153.00 | 153.00 | \ | 3.80 |  |  | \ |
| RedCap UE | \ | 64.00 | 63.00 | 64.00 | \ | 16.00 | 15.00 | 15.00 | \ |  |  | 2.30 |
| All UEs | 506.00 | 506.00 | 497.00 | 64.00 | 152.00 | 129.00 | 98.00 | 15.00 | 3.80 | 3.80 | 3.70 | 2.30 |
| Huawei | eMBB UE | 62.50 | 41.17 | 27.56 | \ | 19.05 | 12.09 | 9.63 | \ | 5.02 | 4.95 | 4.63 | \ |
| RedCap UE | \ | 19.16 | 16.93 | 30.57 | \ | 6.01 | 5.09 | 8.77 | \ | 3.85 | 2.96 | 3.15 |
| All UEs | 62.50 | 35.29 | 23.35 | 30.57 | 19.05 | 10.27 | 7.58 | 8.77 | 5.02 | 4.63 | 3.86 | 3.15 |
| vivo | eMBB UE | 419.32 | 426.57 | 422.85 |  | 143.05 | 149.96 | 152.43 |  | 4.35 | 4.54 | 4.68 |  |
| RedCap UE | \ | 33.70 | 33.33 |  | \ | 9.71 | 12.22 |  | \ | 1.86 | 1.95 |  |
| All UEs | 419.32 | 415.80 | 393.03 |  | 143.05 | 99.24 | 33.11 |  | 4.35 | 4.50 | 4.55 |  |
| Qualcomm | eMBB UE | 118.95 | 155.56 | 189.03 | \ | 44.27 | 52.85 | 77.25 | \ | 7.62 | 8.54 | 9.30 | \ |
| RedCap UE | \ | 20.64 | 28.90 | 34.61 | \ | 1.63 | 1.51 | 1.81 | \ | 5.55 | 5.19 | 8.47 |
| All UEs | 118.95 | 118.55 | 82.69 | 34.61 | 44.27 | 5.85 | 2.29 | 1.81 | 7.62 | 7.46 | 7.02 | 8.47 |
| Nokia | eMBB UE | 371.06 | 488.87 | 494.21 | \ | 173.15 | 255.53 | 273.74 | \ | 4.34 | 5.50 | 5.50 | \ |
| RedCap UE | \ | 44.28 | 44.76 | 44.36 | \ | 15.36 | 17.94 | 16.79 | \ | 2.07 | 2.07 | 2.07 |
| All UEs | 371.06 | 431.70 | 95.22 | 44.36 | 173.15 | 28.19 | 22.97 | 16.79 | 4.34 | 4.64 | 3.79 | 2.07 |

Table D-9: Downlink capacity evaluation for burst traffic (4GHz, low loading, 1Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **4 GHz, DL, 1Rx RedCap, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 507.00 | 505.00 | 516.00 | \ | 151.00 | 154.00 | 156.00 | \ | 3.80 |  |  | \ |
| RedCap UE | \ | 49.00 | 50.00 | 50.00 | \ | 10.00 | 11.00 | 11.00 | \ |  |  | 1.60 |
| All UEs | 507.00 | 503.00 | 511.00 | 50.00 | 151.00 | 132.00 | 95.00 | 11.00 | 3.80 | 3.80 | 3.70 | 1.60 |
| Huawei | eMBB UE | 62.50 | 30.85 | 18.67 | \ | 19.05 | 8.71 | 5.08 | \ | 5.02 | 4.56 | 4.34 | \ |
| RedCap UE | \ | 9.59 | 10.59 | 12.74 | \ | 2.54 | 2.53 | 2.49 | \ | 2.24 | 1.94 | 1.86 |
| All UEs | 62.50 | 25.65 | 14.82 | 12.74 | 19.05 | 7.26 | 3.95 | 2.49 | 5.02 | 3.98 | 3.19 | 1.86 |
| vivo | eMBB UE | 422.64 | 420.15 | 413.95 |  | 146.07 | 141.29 | 150.78 |  | 4.51 | 4.50 | 4.45 |  |
| RedCap UE | \ | 31.52 | 30.67 |  | \ | 10.15 | 10.62 |  | \ | 1.75 | 1.70 |  |
| All UEs | 422.64 | 409.41 | 383.94 |  | 146.07 | 84.44 | 29.75 |  | 4.51 | 4.45 | 4.31 |  |
| Qualcomm | eMBB UE | 118.95 | 167.35 | 197.97 | \ | 44.27 | 60.54 | 80.16 | \ | 7.62 | 8.69 | 9.53 | \ |
| RedCap UE | \ | 15.22 | 15.84 | 19.22 | \ | 0.62 | 0.66 | 0.76 | \ | 2.59 | 2.74 | 3.07 |
| All UEs | 118.95 | 120.11 | 58.11 | 19.22 | 44.27 | 2.45 | 1.05 | 0.76 | 7.62 | 7.16 | 6.14 | 3.07 |
| Nokia | eMBB UE | 371.06 | 488.87 | 494.21 | \ | 173.15 | 255.53 | 273.74 | \ | 4.34 | 5.50 | 5.50 | \ |
| RedCap UE | \ | 35.20 | 34.83 | 34.78 | \ | 11.57 | 11.57 | 11.94 | \ | 1.48 | 1.48 | 1.48 |
| All UEs | 371.06 | 431.72 | 47.61 | 34.78 | 173.15 | 20.44 | 14.92 | 11.94 | 4.34 | 4.49 | 3.49 | 1.48 |

Table D-10: Downlink capacity evaluation for burst traffic (4GHz, medium loading, 2Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **4 GHz, DL, 2Rx RedCap, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 404.00 | 393.00 | 417.00 | \ | 109.00 | 114.00 | 116.00 | \ | 3.80 |  |  | \ |
| RedCap UE | \ | 49.00 | 50.00 | 48.00 | \ | 11.00 | 12.00 | 9.00 | \ |  |  | 2.10 |
| All UEs | 404.00 | 409.00 | 414.00 | 48.00 | 109.00 | 104.00 | 84.00 | 9.00 | 3.80 | 3.70 | 3.60 | 2.10 |
| Huawei | eMBB UE | 43.48 | 50.00 | 20.13 | \ | 11.30 | 6.81 | 4.88 | \ | 5.14 | 5.04 | 4.61 | \ |
| RedCap UE | \ | 407.00 | 13.57 | 18.69 | \ | 3.81 | 2.51 | 3.88 | \ | 3.57 | 3.60 | 3.86 |
| All UEs | 43.48 | 26.43 | 16.93 | 18.69 | 11.30 | 6.25 | 3.75 | 3.88 | 5.14 | 4.58 | 4.12 | 3.86 |
| vivo | eMBB UE | 336.94 | 337.24 | 339.47 |  | 78.86 | 82.85 | 82.10 |  | 4.12 | 4.24 | 4.25 |  |
| RedCap UE | \ | 22.91 | 21.69 |  | \ | 5.95 | 5.59 |  | \ | 1.95 | 1.82 |  |
| All UEs | 336.94 | 323.63 | 305.21 |  | 78.86 | 45.98 | 20.18 |  | 4.12 | 4.20 | 4.14 |  |
| Qualcomm | eMBB UE |  | 132.23 | 166.67 | \ |  | 46.88 | 67.67 | \ |  | 7.61 | 8.24 | \ |
| RedCap UE |  | 16.41 | 22.80 | 34.61 |  | 1.21 | 1.20 | 1.81 |  | 3.81 | 4.23 | 8.47 |
| All UEs |  | 100.31 | 74.07 | 34.61 |  | 3.97 | 1.87 | 1.81 |  | 6.66 | 6.24 | 8.47 |
| Nokia | eMBB UE | 159.15 | 319.16 | 371.27 | \ | 28.26 | 137.36 | 174.61 | \ | 2.68 | 3.82 | 4.34 | \ |
| RedCap UE | \ | 15.60 | 18.75 | 19.66 | \ | 2.32 | 3.15 | 3.35 | \ | 1.21 | 1.25 | 1.25 |
| All UEs | 159.15 | 249.19 | 95.10 | 19.66 | 28.26 | 6.38 | 4.97 | 3.35 | 2.68 | 3.17 | 2.80 | 1.25 |

Table D-11: Downlink capacity evaluation for burst traffic (4GHz, medium loading, 1Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **4 GHz, DL, 1Rx RedCap, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 404.00 | 408.00 | 412.00 | \ | 109.00 | 112.00 | 110.00 | \ | 3.80 |  |  | \ |
| RedCap UE | \ | 39.00 | 39.00 | 38.00 | \ | 7.00 | 8.00 | 7.00 | \ |  |  | 1.70 |
| All UEs | 404.00 | 407.00 | 406.00 | 38.00 | 109.00 | 102.00 | 74.00 | 7.00 | 3.80 | 3.60 | 3.50 | 1.70 |
| Huawei | eMBB UE | 43.48 | 18.72 | 12.25 | \ | 11.30 | 4.08 | 2.54 | \ | 5.14 | 5.06 | 5.04 | \ |
| RedCap UE | \ | 9.82 | 9.28 | 10.93 | \ | 2.45 | 1.48 | 1.66 | \ | 2.33 | 2.96 | 3.22 |
| All UEs | 43.48 | 16.60 | 10.51 | 10.93 | 11.30 | 3.68 | 1.90 | 1.66 | 5.14 | 4.20 | 3.67 | 3.22 |
| vivo | eMBB UE | 343.43 | 337.71 | 341.72 |  | 83.67 | 79.37 | 81.73 |  | 4.32 | 4.15 | 4.25 |  |
| RedCap UE | \ | 20.95 | 20.12 |  | \ | 4.64 | 4.73 |  | \ | 1.59 | 1.67 |  |
| All UEs | 343.43 | 324.09 | 306.91 |  | 83.67 | 42.09 | 18.41 |  | 4.32 | 4.09 | 4.13 |  |
| Qualcomm | eMBB UE |  | 137.93 | 170.21 | \ |  | 52.77 | 69.00 | \ |  | 7.59 | 8.42 | \ |
| RedCap UE |  | 12.64 | 13.12 | 19.22 |  | 0.58 | 0.59 | 0.76 |  | 2.45 | 2.53 | 3.07 |
| All UEs |  | 102.89 | 55.35 | 19.22 |  | 1.75 | 0.67 | 0.76 |  | 6.31 | 5.47 | 3.07 |
| Nokia | eMBB UE | 159.15 | 319.16 | 371.27 | \ | 28.26 | 137.36 | 174.61 | \ | 2.68 | 3.82 | 4.34 | \ |
| RedCap UE | \ | 13.51 | 17.46 | 22.20 | \ | 1.89 | 2.92 | 4.73 | \ | 1.12 | 1.12 | 1.16 |
| All UEs | 159.15 | 249.20 | 95.10 | 22.20 | 28.26 | 4.36 | 4.04 | 4.73 | 2.68 | 3.15 | 2.73 | 1.16 |

Table D-12: Uplink capacity evaluation for burst traffic (4GHz, low loading)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **4 GHz, UL, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 52.000 | 52.000 | 52.000 | \ | 0.900 | 0.900 | 0.900 | \ | 0.40 |  |  | \ |
| RedCap UE | \ | 16.000 | 16.000 | 16.000 | \ | 0.800 | 0.900 | 0.700 | \ |  |  | 0.50 |
| All UEs | 52.000 | 52.000 | 51.000 | 16.000 | 0.900 | 0.900 | 0.900 | 0.700 | 0.40 | 0.40 | 0.40 | 0.50 |
| Huawei | eMBB UE | 9.850 |  | 4.240 | \ | 0.210 |  | 0.240 | \ | 1.48 |  | 1.45 | \ |
| RedCap UE | \ |  | 2.330 | 5.110 | \ |  | 0.200 | 0.240 | \ |  | 0.75 | 0.78 |
| All UEs | 9.850 |  | 3.290 | 5.110 | 0.210 |  | 0.200 | 0.240 | 1.48 |  | 1.07 | 0.78 |
| vivo | eMBB UE | 12.845 | 12.574 | 12.369 |  | 0.058 | 0.057 | 0.057 |  | 1.34 | 1.34 | 1.34 |  |
| RedCap UE | \ | 0.582 | 0.635 |  | \ | 0.065 | 0.070 |  | \ | 0.32 | 0.32 |  |
| All UEs | 12.845 | 1.325 | 2.544 |  | 0.058 | 0.057 | 0.058 |  | 1.34 | 1.26 | 1.16 |  |
| Nokia | eMBB UE | 63.987 | 61.527 | 63.484 | \ | 11.134 | 27.863 | 28.981 | \ | 0.73 | 0.72 | 0.73 | \ |
| RedCap UE | \ | 11.065 | 11.141 | 9.399 | \ | 7.803 | 8.291 | 7.987 | \ | 0.58 | 0.59 | 0.59 |
| All UEs | 63.987 | 51.601 | 13.084 | 9.399 | 11.134 | 9.623 | 8.852 | 7.987 | 0.73 | 0.69 | 0.66 | 0.59 |

Table D-13: Uplink capacity evaluation for burst traffic (4GHz, medium loading)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **4 GHz, UL, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 43.000 | 43.000 | 43.000 | \ | 0.600 | 0.600 | 0.600 | \ | 0.60 |  |  | \ |
| RedCap UE | \ | 15.000 | 15.000 | 15.000 | \ | 0.500 | 0.500 | 0.500 | \ |  |  | 0.60 |
| All UEs | 43.000 | 42.000 | 41.000 | 15.000 | 0.600 | 0.600 | 0.600 | 0.500 | 0.60 | 0.60 | 0.60 | 0.60 |
| Huawei | eMBB UE | 8.450 | 6.110 | 4.070 | \ | 0.200 | 0.220 | 0.220 | \ | 1.86 | 2.20 | 2.05 | \ |
| RedCap UE | \ | 2.840 | 2.410 | 3.790 | \ | 0.200 | 0.200 | 0.220 | \ | 0.73 | 0.89 | 1.25 |
| All UEs | 8.450 | 5.220 | 3.260 | 3.790 | 0.200 | 0.200 | 0.200 | 0.220 | 1.86 | 1.67 | 1.42 | 1.25 |
| vivo | eMBB UE | 5.265 | 5.894 | 4.805 |  | 0.058 | 0.058 | 0.058 |  | 1.34 | 1.34 | 1.32 |  |
| RedCap UE | \ | 0.505 | 0.513 |  | \ | 0.034 | 0.037 |  | \ | 0.32 | 0.32 |  |
| All UEs | 5.265 | 2.976 | 1.217 |  | 0.058 | 0.057 | 0.056 |  | 1.34 | 1.27 | 1.17 |  |
| Nokia | eMBB UE | 54.438 | 54.020 | 53.324 | \ | 22.083 | 20.970 | 20.970 | \ | 0.70 | 0.70 | 0.70 | \ |
| RedCap UE | \ | 10.469 | 10.527 | 10.538 | \ | 5.873 | 6.004 | 5.873 | \ | 0.58 | 0.58 | 0.58 |
| All UEs | 54.438 | 42.751 | 12.042 | 10.538 | 22.083 | 8.429 | 7.260 | 5.873 | 0.70 | 0.67 | 0.64 | 0.58 |

Table D-14: Downlink capacity evaluation for burst traffic (28 GHz, low loading, 2Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28 GHz, DL, 2Rx RedCap, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 441.00 | 444.00 | 442.00 | \ | 192.00 | 199.00 | 198.00 | \ | 8.80 |  |  | \ |
| RedCap UE | \ | 338.00 | 336.00 | 356.00 | \ | 153.00 | 146.00 | 155.00 | \ |  |  | 7.00 |
| All UEs | 441.00 | 442.00 | 440.00 | 356.00 | 192.00 | 199.00 | 195.00 | 155.00 | 8.80 | 8.70 | 8.60 | 7.00 |
| MediaTek | eMBB UE | 103 |  |  | \ | 51 |  |  | \ | 4.14 |  |  | \ |
| RedCap UE | \ |  |  | 64.00 | \ |  |  | 44.00 | \ |  |  | 2.70 |
| All UEs | 103 |  |  | 64.00 | 51 |  |  | 44.00 | 4.14 |  |  | 2.70 |
| Qualcomm | eMBB UE | 322.50 | 334.80 | 323.00 | \ | 286.30 | 313.20 | 290.30 | 318.60 | 6.90 | 6.90 | 6.90 | \ |
| RedCap UE | \ | 312.90 | 306.80 | 328.70 | \ | 267.50 | 266.00 | \ | \ | 6.80 | 6.90 | 6.90 |
| All UEs | 322.50 | 327.30 | 316.50 | 328.70 | 286.30 | 285.70 | 277.40 | 318.60 | 6.90 | 6.90 | 6.90 | 6.90 |

Table D-15: Downlink capacity evaluation for burst traffic (28 GHz, low loading, 1Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28 GHz, DL, 1Rx RedCap, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 441.00 | 445.00 | 437.00 | \ | 192.00 | 202.00 | 196.00 | \ | 8.80 |  |  | \ |
| RedCap UE | \ | 215.00 | 213.00 | 213.00 | \ | 103.00 | 100.00 | 98.00 | \ |  |  | 4.40 |
| All UEs | 441.00 | 444.00 | 434.00 | 213.00 | 192.00 | 199.00 | 189.00 | 98.00 | 8.80 | 8.70 | 8.40 | 4.40 |
| MediaTek | eMBB UE | 103.00 |  |  | \ | 51.00 |  |  | \ | 4.14 |  |  | \ |
| RedCap UE | \ |  |  | 48.00 | \ |  |  | 22.00 | \ |  |  | 2.2 |
| All UEs | 103.00 |  |  | 48.00 | 51.00 |  |  | 22.00 | 4.14 |  |  | 2.2 |
| Qualcomm | eMBB UE |  |  |  | \ |  |  |  | \ |  |  |  | \ |
| RedCap UE |  |  |  | 177.30 |  |  |  | 172.00 |  |  |  | 3.50 |
| All UEs |  |  |  | 177.30 |  |  |  | 172.00 |  |  |  | 3.50 |

Table D-16: Downlink capacity evaluation for burst traffic (28 GHz, medium loading, 2Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28 GHz, DL, 2Rx RedCap, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 322.00 | 344.00 | 347.00 | \ | 109.00 | 133.00 | 134.00 | \ | 8.60 |  |  | \ |
| RedCap UE | \ | 244.00 | 244.00 | 238.00 | \ | 89.00 | 91.00 | 79.00 | \ |  |  | 6.30 |
| All UEs | 322.00 | 344.00 | 344.00 | 238.00 | 109.00 | 133.00 | 133.00 | 79.00 | 8.60 | 8.50 | 8.20 | 6.30 |
| MediaTek | eMBB UE | 84 |  |  | \ | 38.00 |  |  | \ | 3.75 |  |  | \ |
| RedCap UE | \ |  |  | 54.00 | \ |  |  | 32.00 | \ |  |  | 2.60 |
| All UEs | 84 |  |  | 54.00 | 38.00 |  |  | 32.00 | 3.75 |  |  | 2.60 |
| Qualcomm | eMBB UE | 249.50 | 284.00 | 237.80 |  | 207.70 | 238.10 | 189.00 |  | 6.80 | 6.80 | 6.70 |  |
| RedCap UE | \ | 272.20 | 228.60 |  | \ | 237.00 | 156.90 |  | \ | 6.80 | 6.60 |  |
| All UEs | 249.50 | 283.00 | 234.80 |  | 207.70 | 238.60 | 167.40 |  | 6.80 | 6.80 | 6.60 |  |

Table D-17: Downlink capacity evaluation for burst traffic (28 GHz, medium loading, 1Rx RedCap UE)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28 GHz, DL, 1Rx RedCap, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 322.00 | 343.00 | 346.00 | \ | 109.00 | 130.00 | 132.00 | \ | 8.60 |  |  | \ |
| RedCap UE | \ | 172.00 | 171.00 | 173.00 | \ | 64.00 | 63.00 | 65.00 | \ |  |  | 4.40 |
| All UEs | 322.00 | 342.00 | 342.00 | 173.00 | 109.00 | 128.00 | 128.00 | 65.00 | 8.60 | 8.40 | 8.00 | 4.40 |
| MediaTek | eMBB UE | 84.00 |  |  | \ | 38.00 |  |  | \ | 3.75 |  |  | \ |
| RedCap UE | \ |  |  | 35.00 | \ |  |  | 11.00 | \ |  |  | 1.90 |
| All UEs | 84.00 |  |  | 35.00 | 38.00 |  |  | 11.00 | 3.75 |  |  | 1.90 |

Table D-18: Uplink capacity evaluation for burst traffic (28 GHz, low loading)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28 GHz, UL, low loading (RU<30%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 62.00 | 62.00 | 61.00 | \ | 16.00 | 16.00 | 16.00 | \ | 1.10 |  |  | \ |
| RedCap UE | \ | 54.00 | 53.00 | 49.00 | \ | 14.00 | 14.00 | 10.00 | \ |  |  | 0.90 |
| All UEs | 62.00 | 62.00 | 61.00 | 49.00 | 16.00 | 16.00 | 16.00 | 10.00 | 1.10 | 1.10 | 1.00 | 0.90 |
| MediaTek | eMBB UE | 72.00 |  |  | \ | 47.00 |  |  | \ | 0.82 |  |  | \ |
| RedCap UE | \ |  |  | 31.00 | \ |  |  | 20.00 | \ |  |  | 0.40 |
| All UEs | 72.00 |  |  | 31.00 | 47.00 |  |  | 20.00 | 0.82 |  |  | 0.40 |

Table D-19: Uplink capacity evaluation for burst traffic (28 GHz, medium loading)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28 GHz, UL, medium loading (30%<RU<50%)** | | | | | | | | | | | | | |
|  |  | 50% UPT (Mbps) | | | | 5% UPT (Mbps) | | | | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% | 0 | 25% | 50% | 100% |
| Ericsson | eMBB UE | 31.00 | 31.00 | 31.00 | \ | 0.60 | 0.60 | 0.60 | \ | 1.10 |  |  | \ |
| RedCap UE | \ | 27.00 | 27.00 | 18.00 | \ | 0.50 | 0.50 | 0.10 | \ |  |  | 0.80 |
| All UEs | 31.00 | 31.00 | 31.00 | 18.00 | 0.60 | 0.60 | 0.60 | 0.10 | 1.10 | 1.00 | 1.00 | 0.80 |
| MediaTek | eMBB UE | 53.00 |  |  | \ | 38.00 |  |  | \ | 0.80 |  |  | \ |
| RedCap UE | \ |  |  | 22.50 | \ |  |  | 8.50 | \ |  |  | 0.40 |
| All UEs | 53.00 |  |  | 22.50 | 38.00 |  |  | 8.50 | 0.80 |  |  | 0.40 |

Table D-20: Downlink capacity evaluation for full buffer traffic (2.6 GHz, 2Rx RedCap UE)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **2.6GHz, DL, 2Rx RedCap, full buffer, total 10 UEs/cell** | | | | | |
|  |  | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 20% | 50% | 100% |
| Huawei | eMBB UE | 15.10 | 14.92 | 14.48 | \ |
| RedCap UE | \ | 9.63 | 9.84 | 10.50 |
| All UEs | 15.10 | 14.18 | 12.80 | 10.50 |
| Nokia | eMBB UE | 4.49 | 4.47 | 4.43 | \ |
| RedCap UE | \ | 2.67 | 2.77 | 2.84 |
| All UEs | 4.49 | 4.11 | 3.60 | 2.84 |

Table D-21: Downlink capacity evaluation for full buffer traffic (2.6 GHz, 1Rx RedCap UE)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **2.6 GHz, DL, 1Rx RedCap, full buffer, total 10 UEs/cell** | | | | | |
|  |  | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 20% | 50% | 100% |
| Huawei | eMBB UE | 15.10 | 15.03 | 14.87 | \ |
| RedCap UE | \ | 7.68 | 7.80 | 7.87 |
| All UEs | 15.10 | 13.65 | 11.49 | 7.87 |
| Nokia | eMBB UE | 4.49 | 4.47 | 4.43 | \ |
| RedCap UE | \ | 2.09 | 2.17 | 2.21 |
| All UEs | 4.49 | 3.99 | 3.30 | 2.21 |

Table D-22: Uplink capacity evaluation for full buffer traffic (2.6 GHz)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **2.6 GHz, UL, full buffer, total 10 UEs/cell** | | | | | |
|  |  | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 20% | 50% | 100% |
| Huawei | eMBB UE | 2.73 | 2.70 | 2.61 | \ |
| RedCap UE | \ | 1.41 | 1.49 | 1.54 |
| All UEs | 2.73 | 2.47 | 2.14 | 1.54 |
| Nokia | eMBB UE | 2.03 | 2.01 | 2.00 | \ |
| RedCap UE | \ | 1.79 | 1.78 | 1.79 |
| All UEs | 2.03 | 1.97 | 1.89 | 1.79 |

Table D-23: Downlink capacity evaluation for full buffer traffic (4 GHz, 2Rx RedCap UE)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **4 GHz, DL, 2Rx RedCap, full buffer, total 10 UEs/cell** | | | | | |
|  |  | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 20% | 50% | 100% |
| Huawei | eMBB UE | 14.02 | 13.96 | 13.66 | \ |
| RedCap UE | \ | 9.14 | 9.43 | 9.68 |
| All UEs | 14.02 | 14.18 | 12.80 | 9.68 |
| Nokia | eMBB UE | 4.74 | 4.73 | 4.75 | \ |
| RedCap UE | \ | 2.98 | 2.89 | 2.89 |
| All UEs | 4.74 | 4.38 | 3.82 | 2.89 |

Table D-24: Downlink capacity evaluation for full buffer traffic (4 GHz, 1Rx RedCap UE)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **2.6GHz, DL, 1Rx RedCap, full buffer, total 10 UEs/cell** | | | | | |
|  |  | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 20% | 50% | 100% |
| Huawei | eMBB UE | 14.02 | 13.88 | 13.65 | \ |
| RedCap UE | \ | 6.76 | 6.92 | 7.14 |
| All UEs | 14.02 | 12.91 | 10.75 | 7.14 |
| Nokia | eMBB UE | 4.74 | 4.73 | 4.75 | \ |
| RedCap UE | \ | 2.25 | 2.20 | 2.21 |
| All UEs | 4.74 | 4.23 | 3.47 | 2.21 |

Table D-25: Uplink capacity evaluation for full buffer traffic (4 GHz)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **2.6GHz, UL, full buffer, total 10 UEs/cell** | | | | | |
|  |  | Cell avg. SE (bps/Hz) | | | |
|  | RedCap UE ratio | 0 | 20% | 50% | 100% |
| Huawei | eMBB UE | 2.54 | 2.49 | 2.41 | \ |
| RedCap UE | \ | 1.35 | 1.41 | 1.47 |
| All UEs | 2.54 | 2.47 | 2.14 | 1.47 |
| Nokia | eMBB UE | 1.94 | 1.93 | 1.93 | \ |
| RedCap UE | \ | 1.76 | 1.76 | 1.75 |
| All UEs | 1.94 | 1.90 | 1.84 | 1.75 |

Annex E: Company inputs to power saving evaluation in RAN2

# E.1 Extended DRX for RRC Inactive and/or Idle

## E.1.1 Power saving evaluation in [8]

In order to evaluate the additional power savings that could be achieved by introducing eDRX in NR compared to legacy I-DRX, we use a model based on TR 38.840, scaled to 20MHz for Idle mode operation. We consider two scenarios: 1) High SINR, and 2) Low SINR, as illustrated below:



Figure E.1.1-1: Timeline for I-DRX with high SINR



Figure E.1.1-2: Timeline for I-DRX with high SINR

Relative power during various states can be modelled as below:

Table E.1.1-1: Power state modelling for I-DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component Description** | **Power notation** | **Relative power** | **Time notation** | **Time (ms)** |
| SSB processing |  | 50 |  | 2/4 |
| Intra-frequency neighbor cell measurement |  | 60 |  | 2 |
| Paging occasion reception |  | 50/120 (without/ with PDSCH) |  | 1/4 (high/ low SINR) |
| Inter-frequency neighbor cell  measurement |  | 60 |  | 5 |
| Micro sleep |  | 31 |  | (\*) |
| Light sleep |  | 18 |  | (\*) |
| Deep sleep |  | 0.8 |  | (\*) |

(\*) The value depends on the power saving scenario adopted

We also define the following energy consumption for the state transition.

|  |  |  |  |
| --- | --- | --- | --- |
| **Component Description** | **Energy notation** | **Energy** | **Occurrence notation** |
| Micro sleep transition |  | 0 |  |
| Light sleep transition |  | 100 |  |
| Deep sleep transition |  | 450 |  |

Based on the above timeline and power model, the power consumption for I-DRX with high SINR is given by:

For low SINR, it is given by:

For eDRX, if we consider the UE to be in deep sleep outside of PTW and consuming power PIDRX (in the formula above) during PTW, the formula for eDRX power consumption becomes:

Where, LPTW is the PTW length.

Some example power savings by introducing eDRX, with different eDRX/I-DRX configurations are summarised in the table below:

Table E.1.1-2: Example power savings that can be achieved with eDRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scenario** | **TI-DRX (ms)** | **TeDRX (ms)** | **PTW length (ms)** | **% Savings with eDRX compared to I-DRX** |
| High SINR | 2560 | 10,485,760 | 2560 | 33.83 |
| High SINR | 1280 | 10,485,760 | 1280 | 50.56 |
| High SINR | 320 | 10,485,760 | 320 | 80.36 |
| Low SINR | 2560 | 10,485,760 | 2560 | 56.08 |
| Low SINR | 1280 | 10,485,760 | 1280 | 71.86 |
| Low SINR | 320 | 10,485,760 | 320 | 91.08 |

From the evaluation above, it is clear that eDRX brings significant improvements to power consumption, and it is also clear that eDRX concepts and mechanisms such as PTW and extension of paging cycles to hyper-frames that were introduced for LTE/NB-IoT should be re-used in RedCap.

## E.1.2 Power saving evaluation in [9]

**Assumptions**

To evaluate the power saving functionality for RedCap, we used assumptions based on the agreements made in RAN1 WG1 meeting#101e and #102e, see SID status report in RP-201676. We considered the power saving model described in TR 38.840 section 8. We considered 20 MHz bandwidth in FR1. We assumed half-duplex RedCap devices that have 1 TX and 2 RX antennas with one MIMO layer in UL where MCS 0 is considered for MSG3 and MSG4. We assumed that the RedCap device is powered with 2 AA batteries (capacity is about 2x2000mAh depending on size current discharge) where self-discharging is negligible. It is assumed that the PDCCH monitoring periodicity is 1 ms. No power consumption due to RRM measurements was considered in the evaluation. Also, no coverage recovery is considered in the evaluation. We assumed the SSB synchronization time, i.e. if the sleep between two wakeup periods is extensively long, so there should be some power consumption accounted for to synchronize. We have taken an optimistic approach in determining the SSB period, MIB and SIB acquisition times, and average synchronization time, assuming the power consumption defined in 8.1.1 and 8.1.3 of TR 38.840 for SSB based synchronization tracking. We considered the packet inter-arrival time to model data traffic generation. In addition to the IAT specified in RP-201676, we have also evaluated battery lifetime for a number of IATs. The Inter-arrival rate is considered for uplink traffic.

**Results**

The evaluation results are shown in figure E.1.2-1. Figure E.1.2-1 shows the battery lifetime gain for different eDRX cycles and different inter-arrival times. The inter-arrival time in this figure is represented in the order of minutes. If one looks at the inter-arrival time of 1 min, when the eDRX cycle goes beyond 64 min, further extension of the eDRX cycle lengths does not significantly increase the lifetime. It is worth to note that the length of the eDRX cycle extension gain largely depends on the packet inter-arrival time. The IAT above 300 minutes also has nominal battery lifetime gain. Looking at the result, regardless of the payload’s inter-arrival time, one can see that with a DRX cycle up to 10.24s a battery lifetime of around 6 to 8 months can be achieved for a device in RRC\_IDLE. With an eDRX cycle above 10.24s, RRC\_INACTIVE has 25% higher gain than the RRC\_IDLE state due to the reduced signalling load between gNB and UE. It is worth to note that the presented power saving gains may be optimistic due to the simplistic assumptions made during the evaluation.

Chart

Description automatically generated

Figure E.1.2-1: RedCap UE battery lifetime in RRC\_INACTIVE and RRC\_IDLE state.

In the SID use case with Industrial Wireless Sensor Network (IWSN), the UE battery is expected to last at least a few years. From our result, one can see that eDRX longer than 10.24s is required to have a UE battery life of “at least a few years” for both RRC\_IDLE and RRC\_INACTIVE cases. Based on the results, we recommend RAN2 to extend the eDRX cycle for both RRC\_IDLE and RRC\_INACTIVE beyond 10.24 seconds.

**Analysis**

**Length of extension for eDRX in RRC\_IDLE**

From the results we can see that it is reasonable to extend the eDRX duty cycle to 64 minutes (1.06 hours). In LTE a 10-bit H-SFN is defined in SI for eDRX. If we adopt the LTE-M mechanism for NR then the H-SFN signalling in SIB1 limits the eDRX cycle length to 10845.76 seconds or 2.91 hours, see table E.1.2-1.

Following agreement was made in RAN2#111-e,

*For RRC\_IDLE and/or RRC\_INACTIVE, if the NR DRX cycle range is extended beyond 10.24s, the LTE ‎eDRX mechanism beyond 10.24s (e.g., PTW, PH, etc.) is used as baseline when NR eDRX cycle is configured beyond 10.24s.*

Table E.1.2-1: SFN and H-SFN bit mapping

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Range | Synchronization Method | Max Time in sec |
| SFN | 0~1023 | MIB(PBCH)r | 10.24 |
| H-SFN | 0~1023 | SIB1 | 10485.76  (=2.91 hour) |

Hence, it is likely to introduce 10 H-SFN bits for NR RedCap as well. In this case, even if the exact use cases would be fine with eDRX extension up to 64 minutes. Unless there is a good technical reason, we should not limit the configuration possibility.

**Length of extension for eDRX in RRC\_INACTIVE**

During the state transition RRC\_INACTIVE state can reduce control signalling by 57%~63% compared to RRC\_IDLE. In case the state transition occurs in a new gNB with in an assigned paging area then there is ~88% lower signalling cost with RRC\_INACTIVE compared to RRC\_IDLE (Hailu, Sofonias, Mikko Saily, and Olav Tirkkonen. "RRC State handling for 5G." IEEE Communications Magazine 57.1 (2018): 106-113). On top of that introducing eDRX in RRC\_INACTIVE state can be very effective from battery lifetime perspective. As currently specified, RRC\_INACTIVE with short DRX cycle cannot be considered as a good state if the UE wants to save power e.g., for some RedCap use cases such as IWSN. Moreover, the eDRX cycle length extension for RRC\_INACTIVE beyond 10.24s may bring value for other WIs such as Small data enhancement and future WIs like LPWAN in NR. Hence, we should support the extension of the DRX cycle for RRC\_INACTIVE mode.

Table E.1.2-2: RRC\_INACTIVE battery life gain in different use cases.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Use case | Mean IAT | Payload Size | RRC\_IDLE Battery Lifetime gain above 10.24s | RRC\_INACTIVE Battery lifetime gain above 10.24s |
| Video Surveillance | ≤1s | 250 Bytes | up to 3.5% | up to 7% |
| Wearables | ≤2s | 72 Bytes | up to 7% | up to 16% |
| Industrial Wireless Sensor | 100ms | 72 Bytes | up to 0.38% | up to 1% |
| 1 min | up to 180% | up to 297% |
| 5 min | up to 340% | up to 419% |

Table E.1.2-2 illustrates the battery life gain in RRC\_IDLE and RRC\_INACTIVE state, with 2 mins eDRX cycle compared to 10.24s eDRX, for the RedCap SID defined used cases and agreed traffic model in RP-201676. As shown in the table the battery life gain for eDRX above 10.24s in RRC\_INACTIVE shows significant gain compared to RRC\_INACTIVE with same eDRX cycle. For instance, in IWSN case, if we increase the IAT to 1 min up to 65% battery lifetime gain is possible in RRC\_INACTIVE in comparison of RRC\_IDLE with eDRX beyond 10.24s. Additionally, please note that IAT increment to 5 min also shows significantly better battery life gain in RRC\_INACTIVE compared to RRC\_IDLE.

# E.2 RRM relaxation for stationary devices

## E.2.1 RRM relaxation evaluation in [9]

Figure E.2.1-1 shows how the average device power consumption is reduced with increased interval between RRM measurements on neighbour cells. The power calculation is performed with the model in TR 38.840. At some point in time the effect of further Increase of the interval between measurements is insignificant. The red dashed line in Figure E.2.1-1 at one hour represents the condition where a device, which is not at cell edge and low mobility, may skip measurements for an hour. Note that even before an interval of one hour) the power consumption has almost reached its minimum. It is likely that the shape of the curve is not affected by UE’s RRC state, however, the Rel-16 functionality mentioned only refers to a device in RRC\_IDLE or RRC\_INACTIVE.

A picture containing graphical user interface

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Figure E.2.1-1: Effect of relaxation on average power consumption.

Annex F: Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2020-06 | RAN1#101-e | R1-2004962 |  |  |  | Skeleton | 0.0.1 |
| 2020-08 | RAN1#102-e | R1-2005233 |  |  |  | Updated skeleton with endorsed clauses 4 & 5 (R1-2005233) and RAN2-led changes (agreed in R2-2007366) | 0.0.2 |
| 2020-11 | RAN1#103-e | R1-2009490 |  |  |  | Updated skeleton with RAN1 endorsed changes (R1-2009490) | 0.0.3 |
| 2020-11 | RAN1#103-e | R1-2009850 |  |  |  | Updated with RAN1 endorsed changes (R1-2009850) | 0.1.0 |
| 2020-12 | RAN#90-e | RP-202705 |  |  |  | Presented to RAN#90-e (RP-202705) | 1.0.0 |