**3GPP TSG-RAN WG4 Meeting #116 Draft R4-2512529**

**Bengaluru, India, 25th – 29th August 2025**

**Agenda item:** 7.21.1

**Source:** Charter Communications, Inc.

**Title:** Way Forward on UE-UE CLI problem statement and potential solutions

**Document for:** Approval

**Background:**

This document is provided to summarize a way forward because of the analysis on intra-operator adjacent-channel inter-cell UE-to UE CLI and solutions in thread [306] on Rel-19 work item on evolution of NR duplex operation (SBFD) for general aspect and for SBFD in RAN4#116.

Co-Existence assumptions and analysis for UE-To-UE CLI problem from WF in RAN4 #115

|  |
| --- |
| * [Background] UE-to-UE CLI problem statement:
	+ The scenario to be considered:
		- Intra-operator adjacent-channel inter-cell (i.e., both channels belong to a single operator)
			* Use Urban Hotspot -> Urban Hotspot Scenario 2 as reference
				+ FFS non-located assumption is always valid or not
				+ detailed description provided in TR38.858
	+ The case to be considered:
		- SBFD-aware UE (aggressor) UL transmission to NR TDD UE (victim) DL reception
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| * WF-1: Companies are encouraged to provided analysis on the above UE-to-UE CLI problem:
	+ The purpose is to identify whether the above-mentioned UE-to-UE CLI problem exists or not in the practical deployment
	+ One evaluation method is to re-perform RAN4 Rel-18 co-existence study on the above scenario/case
		- Parameters agreed in Rel-18 will be reused unless difference identified
		- FFS impact from different grid shift values
		- FFS impact from ACLR model
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| * WF-2: Companies are encouraged to identify potential solution(s) to the above UE-to-UE CLI problem:
	+ Solution-1: Reduced p-max for SBFD-aware UE TX power by X dB.
		- the reduced p-max is configurable per-UE
		- FFS X dB is a single value or a configurable value or a configurable range
	+ Solution-2: SBFD configuration is set by using DUD (40%, 20%, 40%), or DU (by putting UL subband away from victim channel)
	+ Solution-3: Avoid scheduling the aggressor UE, up to BS implementation.
	+ Solution-4: Configure the aggressor UE fallback to TDD operation, up to BS implementation.
	+ Other new solutions (including the combination of the above-mentioned solutions) are encouraged to be provided, if any.
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| * WF-3: Companies are encouraged to provide analysis on solutions, by at least considering the following aspects:
	+ Benefit(s):
		- At least for Solution-1, one evaluation method is to perform RAN4 co-existence study on the above scenario/case, by using XdB lower maximum UE power for aggressor UE(s)
			* FFS how to determine one SBFD-aware UE is aggressor UE
			* The value of X can be chosen from the range of [1, 5] and other values may not be precluded.
			* How to determine the value of X or the range can be FFS
			* Baseline to be compared to is Rel-18 coexistence study re-performed in WF-1
			* Detailed parameters can be further discussed by conference call and/or email discussion before RAN4#116.
		- Other methods are not precluded
	+ Limitation(s), e.g., decreased coverage for certain SBFD-aware UE, etc.
	+ Expected RAN4 requirement impact, including
		- the impact to TS 38.104
		- the impact to TS 38.101 series, e.g., Pcmax, etc.
	+ Expected RAN2 requirement impact:
		- whether new or changed RAN2 signaling(s) is required:
	+ Expected RAN3 requirement impact:
		- whether new or changed RAN3 signaling(s) is required:
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**WF1 and WF2 Solution 1**

Simulation Results (five companies)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company  | Simulation Assumptions | ACLR/ ACS | Pmax Reduction | TP degradation |
| Charter Comm. | Baseline (flat model) | Flat aclr 30 db acs 33 db | 0 db5.5 db | 27.67%5% |
| Step Size | Aclr 43 Db acs 33.6 db | 0 dB3.5 dB | 11.58%5% |
| Samsung | Step Size | Aclr 50 db acs 33.6 db | 0 db3 db | 11.63%2.92% |
| Optional assumptions (wall) | WoodConcrete | 0 db0 db | 7.6%2.92% |
| Ericsson | Baseline case | Aclr 30 db acs33,6 db | 0 db8 db | 31.49%13% |
| Step size | Aclr 43 db acs 33.6 db | 0 db8 db | 19.6%9% |
| Nokia | Baseline | Aclr 30db acs 33db | 0 db6 db | 50.84%35% |
| Step size | Aclr 50 db acs 33.6 db | 0 db6 dB | 38.64%22.24% |

Table summary:

* flat models (Rel-18 assumptions) present worst-case scenarios
* Step size model (new assumptions) improves the performance but still shows TP degradation at UE max power
* Step size models with reduced Pmax values fixes or improves TP degradation

**Conclusions**

* UE-to-UE CLI for intra-operator adjacent-channel inter-cell UE-to UE CLI where one UE is legacy TDD, and the other UE is SBFD causes TP degradation
* Reducing the power of the SBFD UE reduces the TP degradation
* Propose for RAN4 to consider SBFD aggressor Pmax reduction for SBFD UE-to-UE CLI once other WG’s decide to address this issue in future releases

**WF1 WF2 Solution 2**

DUD SBFD configuration

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Assumptions | DUD configuration | results |
| Qualcomm | Acir/aclr/acs 30 db/33 db/28 db | 40%/20%/40% | TP degradation is reduced |
|  |  |  |  |

**Conclusions**

* UE-to-UE CLI for intra-operator adjacent-channel inter-cell UE-to UE CLI where one UE is legacy TDD, and the other UE is SBFD causes TP degradation
* Limiting SBFD configurations provide guard bands and reduces UE-to-ue CLI, but it cannot be enforced through Standards

 ISSDU have proposed several SBFD configurations to mitigate UE-to-ue CLI.

Four deployment configurations that satisfy the DL–DL boundary requirement:

* UD / DU
* UD / DUD
* DUD / DU
* DUD / DUD

RAN4 to restrict the frequency allocations of the third-party operator on both adjacent sides in the UD / DU scenario.

RAN4 to restrict the frequency allocations of the third-party operator on the left adjacent side in the UD / DUD scenario.

RAN4 to restrict the frequency allocations of the third-party operator on the right adjacent side in the DUD / DU scenario.

RAN4 to specify that no uplink restrictions from third-party adjacent-band operators are required in the DUD / DUD scenario.

**Conclusions:**

* UE-to-UE CLI for intra-operator adjacent-channel inter-cell UE-to UE CLI where one UE is legacy TDD, and the other UE is SBFD causes TP degradation
* Deployment configurations mitigate UE-To-UE CLI but will restrict SBFD operation
	+ This proposal is not enforceable through Standards

**WF1 WF2 Solution 3**

Network scheduling

|  |  |  |
| --- | --- | --- |
| Company | Assumptions | Results |
| Qualcomm |  BS Network 1 schedules UE to SBFDBS Network 2 schedules ue as legacy TDD | TP degradation observedTP degradation avoided |

**Conclusions**

* UE-to-UE CLI for intra-operator adjacent-channel inter-cell UE-to UE CLI where one UE is legacy TDD, and the other UE is SBFD causes TP degradation
* Scheduling UEs between networks can avoid TP degradation because of scheduling SBFD UE’s away from legacy TDD UE’s.
	+ This scheduling cannot be enforced through standards

**WF1 WF2 Solution 4**

* Configure the aggressor UE fallback to TDD operation (Nokia)

**Conclusions**

* UE-to-UE CLI for intra-operator adjacent-channel inter-cell UE-to UE CLI where one UE is legacy TDD, and the other UE is SBFD causes TP degradation
	+ Configuring the aggressor UE fallback to TDD operation fixes TP degradation but this solution cannot be enforced through standards

**WF Summary**

* UE-to-UE CLI for intra-operator adjacent-channel inter-cell UE-to UE CLI where one UE is legacy TDD, and the other UE is SBFD causes TP degradation
	+ Reducing the power of the SBFD UE reduces the TP degradation
		- Propose for RAN4 to consider SBFD aggressor Pmax reduction for SBFD UE-to-UE CLI once other WG’s decide to address this issue in future releases
	+ Other solutions to mitigate UE-to-UE CLI reduces the TP degradation but cannot be enforceable through Standards
		- Limiting SBFD configurations to provide guard bands
		- Scheduling UEs between networks can avoid TP degradation because of scheduling SBFD UE’s away from legacy TDD UE’s.
		- Configuring the aggressor UE fallback to TDD operation cannot be enforced through standards