**3GPP TSG-RAN2 Meeting #131R2-250xxxx**

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

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **38.300** | **CR** | **1008** | **rev** | **1** | **Current version:** | **18.6.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Introduction of Rel-19 Evolution of NR duplex operation (SBFD) |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_duplex\_evo-Core |  | ***Date:*** | 2025-09-09 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | Introduction of the SBFD feature in TS38.300 |
|  |  |
| ***Summary of change:*** | 1. In subclause 3.1, introducing the abbreviation of SBFD.
2. Introducing the clauses of SBFD.

a). X.1 "General" describes SBFD operation, UE configuration, and Tx/Rx/measurement procedures for SBFD aware UEs; b). X.2 "SBFD Random Access" specifies Random Access procedures for SBFD operation. It defines supported RACH events, introduces two SBFD-specific RACH configuration options, and details PRACH occasion handling for both CFRA and CBRA.1. Merge the changes from RAN1 (R1-2505081), including:

a). in Clause 17.2: UE-to-UE CLI may also be present in case of SBFD operation; both L1-based and L3-based UE-to-UE CLI reporting are supported;b). in Clause 17.2: gNB-to-gNB CLI may be present when different TDD DL/UL patterns are used between neighbouring cells and in case of SBFD operation; UL resource muting can be configured to mitigate gNB-to-gNB CLI; c). in Clause X.1: a UE can be configured with SBFD sub-bands in downlink and flexible symbols provided by *tdd-UL-DL-ConfigurationCommon* and this UE is referred to as an SBFD-aware UE; the Tx/Rx/Measurement procedures for an SBFD-aware UE are described; refer to Clause 17.2 for CLI handling procedures.d). in Clause X.2: For CFRA triggered by PDCCH order, an SBFD aware UE can be explicitly indicated in the PDCCH order whether to use a PRACH occasion associated with either the first PRACH occasions or the second PRACH occasions, for the PRACH transmission that is initiated by the PDCCH order.1. Merge the changes from RAN3 (R3-255986): Cross-Link Interference Management for Sub-band full duplex (SBFD)
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| ***Consequences if not approved:*** | NG-RAN cannot support SBFD. |
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| ***Clauses affected:*** | 3, 17.2, X(new), X.1(new), X.2(new)  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.321 CR 2106TS 38.331 CR 5414TS 38.331 CR 5403TS 38.306 CR 1321 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Revision of R2-2505088 |

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# 3 Abbreviations and Definitions

## 3.1 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], in TS 36.300 [2] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1] and TS 36.300 [2].

5GC 5G Core Network

5GS 5G System

5QI 5G QoS Identifier

A2X Aircraft-to-Everything

A-CSI Aperiodic CSI

AGC Automatic Gain Control

AI Artificial Intelligence

AKA Authentication and Key Agreement

AMBR Aggregate Maximum Bit Rate

AMC Adaptive Modulation and Coding

AMF Access and Mobility Management Function

AR Augmented Reality

ARP Allocation and Retention Priority

ATG Air to Ground

BA Bandwidth Adaptation

BCCH Broadcast Control Channel

BCH Broadcast Channel

BFD Beam Failure Detection

BH Backhaul

BL Bandwidth reduced Low complexity

BPSK Binary Phase Shift Keying

BRID Broadcast Remote Identification

C-RNTI Cell RNTI

CAG Closed Access Group

CAPC Channel Access Priority Class

CBRA Contention Based Random Access

CCE Control Channel Element

CD-SSB Cell Defining SSB

cellDTRX-RNTI Cell Discontinuous Transmission and Reception RNTI

CFR Common Frequency Resource

CFRA Contention Free Random Access

CG Configured Grant

CHO Conditional Handover

CIoT Cellular Internet of Things

CLI Cross Link interference

CMAS Commercial Mobile Alert Service

CORESET Control Resource Set

CP Cyclic Prefix

CPA Conditional PSCell Addition

CPC Conditional PSCell Change

DAA Detect And Avoid

DAG Directed Acyclic Graph

DAPS Dual Active Protocol Stack

DFT Discrete Fourier Transform

DCI Downlink Control Information

DCP DCI with CRC scrambled by PS-RNTI

DCR Direct Communication Request

DL-AoD Downlink Angle-of-Departure

DL-SCH Downlink Shared Channel

DL-TDOA Downlink Time Difference Of Arrival

DMRS Demodulation Reference Signal

DRX Discontinuous Reception

DSR Delay Status Report

DTX Discontinuous Transmission

E-CID Enhanced Cell-ID (positioning method)

EC Energy Cost

EHC Ethernet Header Compression

ePWS enhancements of Public Warning System

ETWS Earthquake and Tsunami Warning System

FS Feature Set

FSA ID Frequency Selection Area Identity

G-CS-RNTI Group Configured Scheduling RNTI

G-RNTI Group RNTI

GFBR Guaranteed Flow Bit Rate

GIN Group ID for Network selection

GNSS Global Navigation Satellite System

GSO Geosynchronous Orbit

H-SFN Hyper System Frame Number

HAPS High Altitude Platform Station

HRNN Human-Readable Network Name

IAB Integrated Access and Backhaul

IFRI Intra Frequency Reselection Indication

I-RNTI Inactive RNTI

INT-RNTI Interruption RNTI

KPAS Korean Public Alarm System

L2 Layer-2

L3 Layer-3

LBT Listen Before Talk

LDPC Low Density Parity Check

LEO Low Earth Orbit

LTM L1/L2 Triggered Mobility

MBS Multicast/Broadcast Services

MCE Measurement Collection Entity

MCCH MBS Control Channel

MDBV Maximum Data Burst Volume

MEO Medium Earth Orbit

MIB Master Information Block

MICO Mobile Initiated Connection Only

MFBR Maximum Flow Bit Rate

ML Machine Learning

MMTEL Multimedia telephony

MNO Mobile Network Operator

MO-SDT Mobile Originated SDT

MP Multi-Path

MPE Maximum Permissible Exposure

MRB MBS Radio Bearer

MT Mobile Termination

MT-SDT Mobile Terminated SDT

MTCH MBS Traffic Channel

MTSI Multimedia Telephony Service for IMS

MU-MIMO Multi User MIMO

Multi-RTT Multi-Round Trip Time

MUSIM Multi-Universal Subscriber Identity Module

N3C Non-3GPP Connection

NB-IoT Narrow Band Internet of Things

NCD-SSB Non Cell Defining SSB

NCGI NR Cell Global Identifier

NCL Neighbour Cell List

NCR Neighbour Cell Relation

NCRT Neighbour Cell Relation Table

NES Network Energy Savings

NGAP NG Application Protocol

NGSO Non-Geosynchronous Orbit

NID Network Identifier

NPN Non-Public Network

NR NR Radio Access

NSAG Network Slice AS Group

NTN Non-Terrestrial Network

P-MPR Power Management Maximum Power Reduction

P-RNTI Paging RNTI

PCH Paging Channel

PCI Physical Cell Identifier

PDB Packet Delay Budget

PDC Propagation Delay Compensation

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PEI Paging Early Indication

PER Packet Error Rate

PH Paging Hyperframe

PLMN Public Land Mobile Network

PNI-NPN Public Network Integrated NPN

PO Paging Occasion

PQI PC5 5QI

PRACH Physical Random Access Channel

PRB Physical Resource Block

PRG Precoding Resource block Group

PRS Positioning Reference Signal

PS-RNTI Power Saving RNTI

PSDB PDU Set Delay Budget

PSER PDU Set Error Rate

PSI PDU Set Importance

PSIHI PDU Set Integrated Handling Information

PSS Primary Synchronisation Signal

PTM Point to Multipoint

PTP Point to Point

PTW Paging Time Window

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

PWS Public Warning System

QAM Quadrature Amplitude Modulation

QFI QoS Flow ID

QMC QoE Measurement Collection

QoE Quality of Experience

QPSK Quadrature Phase Shift Keying

RA Random Access

RA-RNTI Random Access RNTI

RACH Random Access Channel

RANAC RAN-based Notification Area Code

REG Resource Element Group

RIM Remote Interference Management

RLM Radio Link Monitoring

RMSI Remaining Minimum SI

RNA RAN-based Notification Area

RNAU RAN-based Notification Area Update

RNTI Radio Network Temporary Identifier

RQA Reflective QoS Attribute

RQoS Reflective Quality of Service

RS Reference Signal

RSRP Reference Signal Received Power

RSRQ Reference Signal Received Quality

RSSI Received Signal Strength Indicator

RSTD Reference Signal Time Difference

RTT Round Trip Time

RVQoE RAN visible QoE

SBFD Sub-Band Full Duplex

SCS SubCarrier Spacing

SD Slice Differentiator

SDAP Service Data Adaptation Protocol

SDT Small Data Transmission

SD-RSRP Sidelink Discovery RSRP

SFI-RNTI Slot Format Indication RNTI

SHR Successful Handover Report

SIB System Information Block

SI-RNTI System Information RNTI

SLA Service Level Agreement

SL-PRS Sidelink Positioning Reference Signal

SL-RSRP Sidelink RSRP

SMC Security Mode Command

SMF Session Management Function

SMTC SS/PBCH block Measurement Timing Configuration

S-NSSAI Single Network Slice Selection Assistance Information

SNPN Stand-alone Non-Public Network

SNPN ID Stand-alone Non-Public Network Identity

SpCell Special Cell

SPR Successful PSCell Addition/Change Report

SPS Semi-Persistent Scheduling

SR Scheduling Request

SRAP Sidelink Relay Adaptation Protocol

SRS Sounding Reference Signal

SRVCC Single Radio Voice Call Continuity

SS Synchronization Signal

SSB SS/PBCH block

SSS Secondary Synchronisation Signal

SSSG Search Space Set Group

SST Slice/Service Type

SU-MIMO Single User MIMO

SUL Supplementary Uplink

TA Timing Advance

TB Transport Block

TCE Trace Collection Entity

TNL Transport Network Layer

TPC Transmit Power Control

TRP Transmit/Receive Point

TRS Tracking Reference Signal

TSS Timing Synchronization Status

U2N UE-to-Network

U2U UE-to-UE

UAV Uncrewed Aerial Vehicle

UCI Uplink Control Information

UDC Uplink Data Compression

UDM Unified Data Management

UE-Slice-MBR UE Slice Maximum Bit Rate

UL-AoA Uplink Angles of Arrival

UL-RTOA Uplink Relative Time of Arrival

UL-SCH Uplink Shared Channel

UPF User Plane Function

URLLC Ultra-Reliable and Low Latency Communications

VR Virtual Reality

V2X Vehicle-to-Everything

Xn-C Xn-Control plane

Xn-U Xn-User plane

XnAP Xn Application Protocol

XR eXtended Reality

# 17 Interference Management

<Unchanged parts omitted>

## 17.2 Cross-Link Interference Management

When different TDD DL/UL patterns are used between neighbouring cells, UL transmission in one cell may interfere with DL reception in another cell: this is referred to as UE-to-UE Cross Link Interference (CLI). In case of Sub-Band Full Duplex (SBFD) operation, UE-to-UE CLI can be present either within the same cell or across different cells: UL transmission may interfere with simultaneous DL reception within one cell or in another cell.

To mitigate UE-to-UE CLI, gNBs can exchange and coordinate their intended TDD DL-UL configurations over Xn and F1 interfaces; and the victim UEs can be configured to perform UE-to-UE CLI measurements. There are two types of UE-to-UE CLI measurements:

- SRS-RSRP measurement in which the UE measures SRS-RSRP over SRS resources of aggressor UE(s);

- CLI-RSSI measurement in which the UE measures the total received power observed over RSSI resources.

A gNB serving victim UEs may request neighbour gNBs to report SRS resources. The neighbour gNB may signal to neighbour gNBs information concerning SRS resources potentially causing UE-to-UE CLI.

Two types of UE-to-UE CLI reporting are supported in case of Sub-Band Full Duplex (SBFD) operation: L1-based reporting and L3-based reporting. A UE is not expected to be configured with both L1 CLI measurement and reporting and L3 CLI measurement and reporting simultaneously.

For L3-based UE-to-UE CLI reporting, layer 3 filtering applies to CLI measurement results and both event triggered and periodic reporting are supported.

For L1-based UE-to-UE CLI reporting, the configuration is dependent on the reporting quantity:

- For SRS-RSRP, only aperiodic CSI reporting is supported.

- For CLI-RSSI, the CSI reporting can be periodic or aperiodic.

In addition to UE-to-UE CLI, gNB-to-gNB CLI may also be present when different TDD DL/UL patterns are used between neighbouring cells or when SBFD operation is configured: DL transmission in one cell may interfere with UL reception in another cell.

To mitigate gNB-to-gNB CLI, a victim gNB can report gNB-to-gNB CLI related information of its serving cells to neighbour gNBs. The neighbour gNB should evaluate the received information and it may take CLI mitigation actions when necessary. Additionally, a victim gNB can configure a UE with UL resource muting. When UL resource muting is applied in a symbol, either even or odd sub-carriers of the frequency resource of the PUSCH are available, and the other sub-carriers are not used for the PUSCH transmission.

<Unchanged parts omitted>

# X SBFD

## X.1 General

Sub-Band Full Duplex (SBFD) operation is supported for a TDD carrier, enabling simultaneous downlink transmission and uplink reception at the gNB on their non-overlapping respective sub-bands. From UE perspective, full duplex is not supported. The configurations of cell-specific SBFD time and frequency resources are provided through SIB1 or dedicated signalling.

A UE can be semi-statically configured with SBFD sub-bands in downlink symbols and flexible symbols provided by *tdd-UL-DL-ConfigurationCommon* and this UE is referred to as an SBFD aware UE. The maximum number of UL sub-bands for SBFD operation in an SBFD symbol within a TDD carrier is one. The maximum number of DL sub-bands for SBFD operation in an SBFD symbol within a TDD carrier is two.

In an SBFD symbol, except for cross-link interference measurements, a UE transmits or receives only in RBs that are both in the active UL BWP and in the UL sub-band, or both in the active DL BWP and the DL sub-band(s), respectively.

A UE can be configured to transmit or receive only in non-SBFD symbols, only in SBFD symbols, or across both SBFD symbols and non-SBFD symbols for multiple transmission or reception occasions.

## X.2 SBFD Random Access

Random access procedure in SBFD symbols is supported for all existing RACH trigger events as described in clause 9.2.6, except for the event of Request for Other SI and Early UL synchronization with an LTM candidate cell. For the event of RACH-based LTM cell switch, random access procedure in SBFD symbols is only supported for intra-DU case.

Both CBRA and CFRA can be supported on SBFD sub-bands. Only the 4-step RA type using SBFD RACH resources can be supported.

Two RACH configuration options are specified for SBFD RA operation in TS 38.331 [12]. A cell can configure only one RACH configuration option. This can be either: 1) A single RACH configuration that supports both non-SBFD RA operation and SBFD RA operation, or 2) A dual RACH configuration where a RACH configuration is used for non-SBFD RA operation and an additional RACH configuration is designated for SBFD RA operation, as specified in TS 38.331 [12]. An SBFD aware UE that supports the RACH configuration option configured in the cell applies the corresponding RACH configuration. Otherwise, the SBFD aware UE applies the non-SBFD RA operation.

For CFRA triggered by PDCCH order, an SBFD aware UE can be explicitly indicated in the PDCCH order whether to use eitherthe first PRACH occasions or the second PRACH occasions as specified in TS 38.213 [38], for the PRACH transmission. For CBRA, an SBFD aware UE is permitted to switch from the first PRACH occasions to the second PRACH occasions and vice versa as specified in TS 38.213 [38] during a random access procedure. However, no further switch of PRACH occasions type (the first or second PRACH occasions) is allowed in the same random access procedure.

If a fall-back from CFRA to CBRA occurs, an SBFD aware UE uses the CBRA resource associated with the same PRACH occasions type.

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