

3GPP TS 38.202 V19.0.0 (2025-09)

Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
NR;
Services provided by the physical layer
(Release 19)**



1、该技术规范的主要内容：（无 NTN 的具体规范）

物理层如何为上层（如 MAC 层、RLC 层等）提供数据传输和其他通信服务

物理层通过传输信道与 MAC 子层进行交互，传输块（Transport Blocks）是物理层与上层之间交换的数据单元。

2、规范中描述的物理层的关键功能：（指出了哪些功能由高层配置）

错误检测与上报。

前向错误纠正（FEC）编码和解码。

混合 ARQ（自动重传请求）软合并。

速率匹配和物理信道映射。

功率加权、调制解调、同步。

MIMO 天线处理和射频处理。

无线电特性测量，并报告给上层。

3、UE 的物理层模型

物理层模型捕捉了物理层与高层之间的数据传递和配置方式，以及高层通过配置控制物理层的方式。

描述了物理层如何处理上行、下行和侧链的不同信道，如：

上行共享信道（PUSCH）：支持多个天线、调制、信道映射等。

下行共享信道（PDSCH）：包括数据传输、调制、错误指示等。

广播信道（PBCH）和寻呼信道（PCH）：分别用于广播系统信息和接收寻呼消息。

随机接入信道（PRACH）：用于设备的随机接入过程。

侧链模型：

侧链通信是 5G NR 的一个重要功能，支持设备间的直接通信。

物理层模型支持多种侧链信道（如 SL-SCH、SL-BCH 等）的传输和接收，包括支持多个侧链资源池。

4、物理信道的并发传输和接收（详见第六章）

物理层支持上行、下行和侧链信道的并发传输和接收，具体支持的组合取决于设备的能力。

文档提供了不同信道和物理信号的组合，定义了每种组合在设备能力支持下的可用情况。例如，UE 可以在上行链路中同时传输 PRACH、PUSCH 和 SRS 等信号；在下行链路中接收多个信道。

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Foreword

This Technical Specification 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;
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- 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.

1 Scope

The present document is a technical specification of the services provided by the physical layer of 5G-NR to upper layers.

2 References

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

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"
 - [2] 3GPP TS 38.201: "NR; Physical Layer – General Description"
 - [3] 3GPP TS 38.211: "NR; Physical channels and modulation"
 - [4] 3GPP TS 38.212: "NR; Multiplexing and channel coding"
 - [5] 3GPP TS 38.213: "NR; Physical layer procedures for control"
 - [6] 3GPP TS 38.214: "NR; Physical layer procedures for data"
 - [7] 3GPP TS 38.215: "NR; Physical layer measurements"
 - [8] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities"
-

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

3.2 Symbols

For the purposes of the present document, the following symbols apply:

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] 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].

For the purposes of the present document, the following abbreviations apply:

ARQ	Automatic Repeat Request
BCH	Broadcast Channel
CA	Carrier Aggregation
CRC	Cyclic Redundancy Check
DC	Dual Connectivity
DL	Downlink
FEC	Forward Error Correction
GF	Grant-Free
MAC	Medium Access Control
MIMO	Multiple Input Multiple Output
PBCH	Physical Broadcast Channel
PCH	Paging Channel
PDCCH	Physical Downlink Control Channel

PDSCH	Physical Downlink Shared Channel
PRACH	Physical Random Access Channel
PUCCH	Physical Uplink Control Channel
PUSCH	Physical Uplink Shared Channel
RACH	Random Access Channel
RF	Radio Frequency
RNTI	Radio Network Temporary Identifier
SCH	Shared Channel
SI	System Information
SPS	Semi-Persistent Scheduling
SRS	Sounding Reference Signal
TPC	Transmit Power Control
UL	Uplink

4 Services and functions of the physical layer

4.1 General

The physical layer offers data transport services to higher layers.

The access to these services is through the use of transport channels via the MAC sub-layer.

A transport block is defined as the data delivered by MAC layer to the physical layer and vice versa.

物理层为高层提供数据传输服务。

访问这些服务是通过使用传输信道通过 MAC 子层实现的。

传输块定义为 MAC 层与物理层之间的数据。

MAC 层传递给物理层的数据以及物理层传递给 MAC 层的数据。

4.2 Overview of L1 functions

As mentioned in [2, TS 38.201], the physical layer is expected to perform the following functions to provide the data transport service:

- Error detection on the transport channel and indication to higher layers;
- FEC encoding/decoding of the transport channel;
- Hybrid ARQ soft-combining;
- Rate matching of the coded transport channel to physical channels;
- Mapping of the coded transport channel onto physical channels;
- Power weighting of physical channels;
- Modulation and demodulation of physical channels;
- Frequency and time synchronisation;
- Radio characteristics measurements and indication to higher layers;
- Multiple Input Multiple Output (MIMO) antenna processing;
- RF processing.

L1 functions are modelled for each transport channel in clause 5.

如[2, TS 38.201]中所述，物理层需要执行以下功能以提供数据传输服务：

- 对传输信道进行错误检测并向高层指示；
- 传输信道的 FEC 编码/解码；
- 混合 ARQ 软合并；
- 对编码后的传输信道进行速率匹配到物理信道；
- 将编码后的传输信道映射到物理信道；
- 物理信道的功率加权；
- 物理信道的调制和解调；
- 频率和时间同步；
- 无线特性测量并向高层指示；
- 多输入多输出（MIMO）天线处理；
- 射频处理。

L1 功能在第 5 节中为每个传输信道进行了建模。

5 Model of physical layer of the UE

The 5G-NR physical-layer model captures those characteristics of the 5G-NR physical-layer that are relevant from the point-of-view of higher layers. More specifically, the physical-layer model captures:

- The structure of higher-layer data being passed down to or up from the physical layer;
- The means by which higher layers can configure the physical layer;
- The different indications (error indications, channel-quality indications, etc.) that are provided by the physical layer to higher layers.

5G-NR 物理层模型捕捉了从高层角度来看与 5G-NR 物理层相关的特性。更具体地说，物理层模型捕捉了以下内容：

- 传递到物理层或从物理层传递到高层的数据结构；
- 高层配置物理层的方式；
- 物理层向高层提供的不同指示（错误指示、信道质量指示等）。

5.1 Uplink model

5.1.1 Uplink shared channel

The physical-layer model for Uplink Shared Channel transmission is described based on the corresponding PUSCH physical-layer-processing chain, see Figure 5.1.1-1. Processing steps that are relevant for the physical-layer model, e.g. in the sense that they are configurable by higher layers, are highlighted in blue.

- Higher-layer data passed to/from the physical layer
- CRC and transport-block-error indication
- FEC and rate matching

- Data modulation
- Mapping to physical resource
- Multi-antenna processing
- Support of L1 control and Hybrid-ARQ-related signalling

上行共享信道（PUSCH）传输的物理层模型是基于相应的 PUSCH 物理层处理链描述的，见图 5.1.1-1。与物理层模型相关的处理步骤，例如那些可以由高层配置的步骤，用蓝色突出显示。

- 传递到/从物理层的高层数据
- CRC 和传输块错误指示
- FEC 和速率匹配
- 数据调制
- 映射到物理资源
- 多天线处理
- 支持 L1 控制和混合 ARQ 相关信令

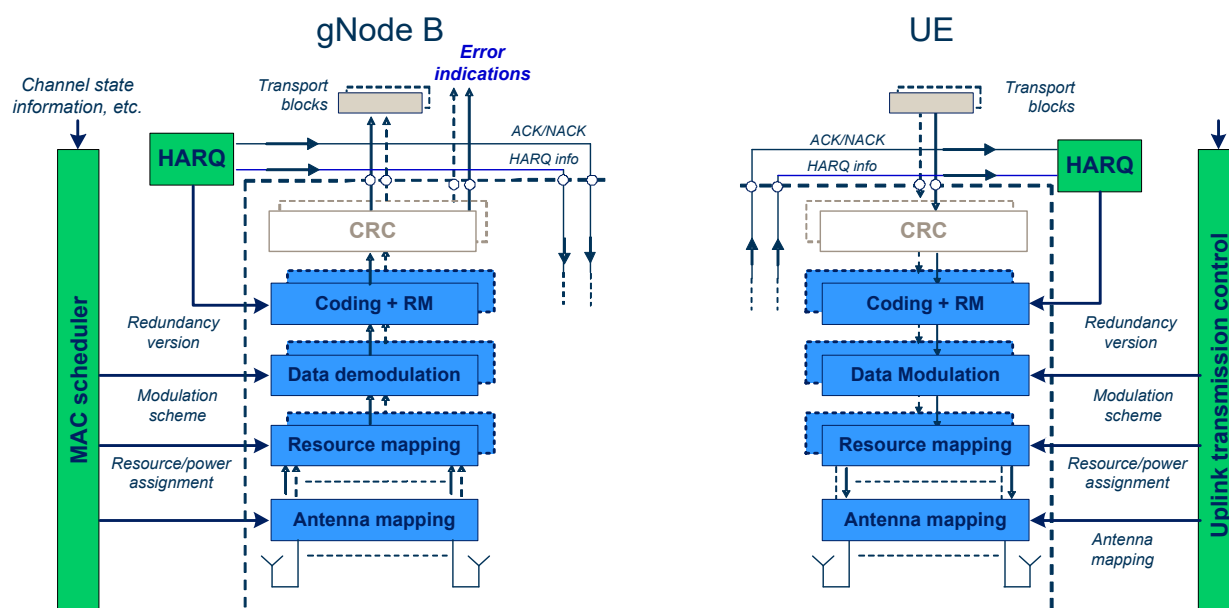


Figure 5.1.1-1: Physical-layer model for UL-SCH transmission

5.1.2 Random access channel

The physical-layer model for RACH transmission is characterized by a PRACH preamble format that consists of a cyclic prefix, a preamble, and a guard time during which nothing is transmitted.

RACH 传输的物理层模型以 PRACH 前导码格式为特征，该格式由循环前缀、前导码和一个保护时间组成，在此期间没有任何数据传输。

5.2 Downlink model

5.2.1 Downlink shared channel

The physical-layer model for Downlink Shared Channel transmission is described based on the corresponding PDSCH physical-layer-processing chain, see Figure 5.2.1-1. Processing steps that are relevant for the physical-layer model, e.g. in the sense that they are configurable by higher layers, are highlighted in blue.

- Higher-layer data passed to/from the physical layer;
- CRC and transport-block-error indication;
- FEC and rate matching;
- Data modulation;
- Mapping to physical resource;
- Multi-antenna processing;
- Support of L1 control and Hybrid-ARQ-related signalling.

下行共享信道（PDSCH）传输的物理层模型是基于相应的 PDSCH 物理层处理链描述的，见图 5.2.1-1。与物理层模型相关的处理步骤，例如那些可以由高层配置的步骤，用蓝色突出显示。

- 传递到/从物理层的高层数据；
- CRC 和传输块错误指示；
- FEC 和速率匹配；
- 数据调制；
- 映射到物理资源；
- 多天线处理；
- 支持 L1 控制和混合 ARQ 相关信令。

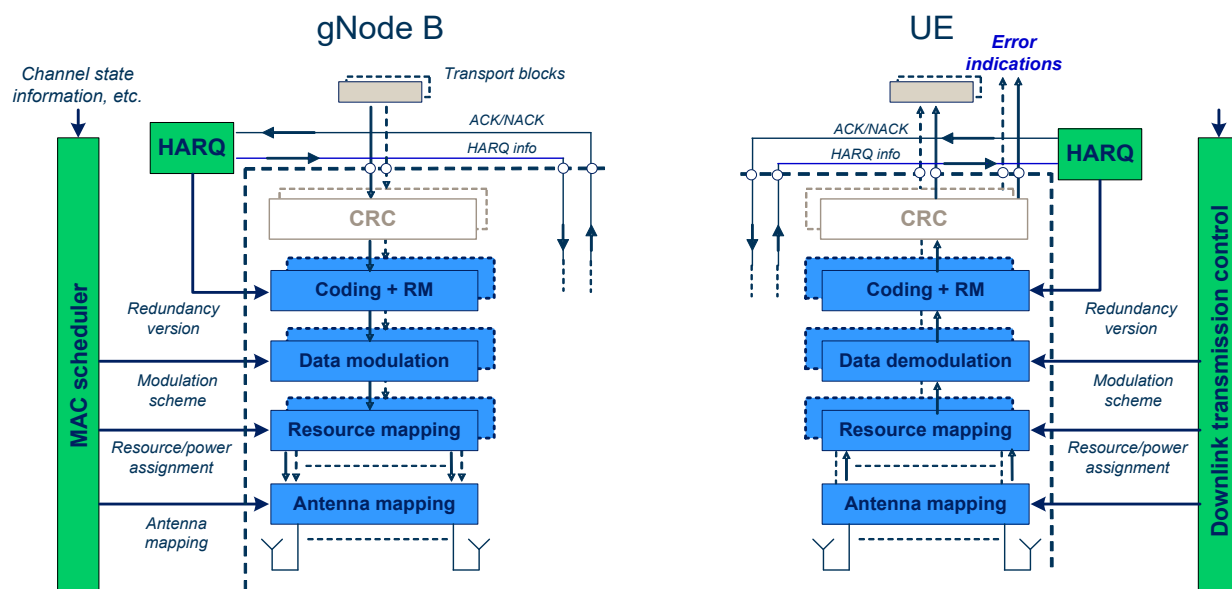


Figure 5.2.1-1: Physical-layer model for DL-SCH transmission

5.2.2 Broadcast channel

The physical-layer model for BCH transmission is characterized by a fixed pre-defined transport format. There is one transport block for the BCH every 80ms. The BCH physical-layer model is described based on the corresponding PBCH physical-layer-processing chain, see Figure 5.2.2-1:

- Higher-layer data passed to/from the physical layer;
- CRC and transport-block-error indication;
- FEC and rate matching;
- Data modulation;
- Mapping to physical resource;
- Multi-antenna processing.

BCH 传输的物理层模型以固定的预定义传输格式为特征。每 80 毫秒有一个 BCH 传输块。BCH 物理层模型是基于相应的 PBCH 物理层处理链描述的，见图 5.2.2-1：

- 传递到/从物理层的高层数据；
- CRC 和传输块错误指示；
- FEC 和速率匹配；
- 数据调制；
- 映射到物理资源；
- 多天线处理。

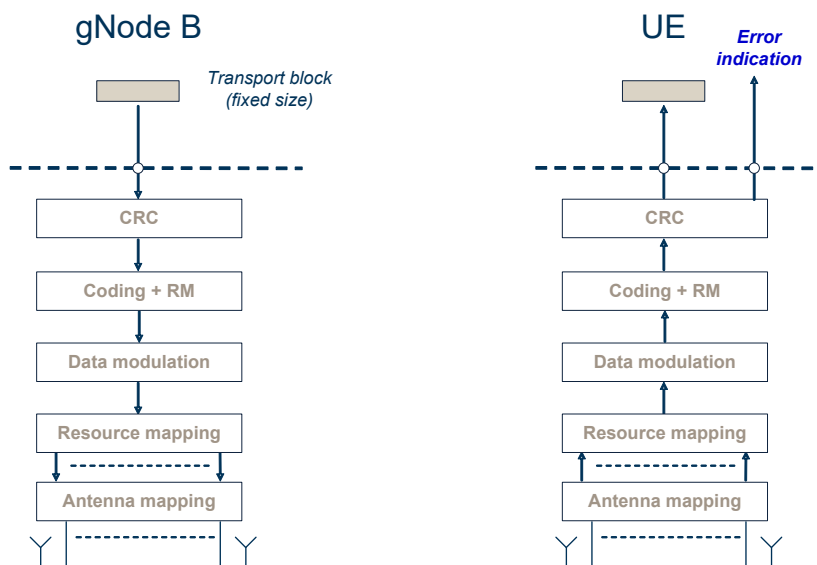


Figure 5.2.2-1: Physical-layer model for BCH transmission

5.2.3 Paging channel

The physical-layer model for PCH transmission is described based on the corresponding physical-layer-processing chain, see Figure 5.2.3-1. The PCH is carried on PDSCH. Processing steps that are relevant for the physical-layer model, e.g. in the sense that they are configurable by higher layers, are highlighted in blue.

- Higher-layer data passed to/from the physical layer;
- CRC and transport-block-error indication;
- FEC and rate matching;
- Data modulation;
- Mapping to physical resource;
- Multi-antenna processing.

PCH 传输的物理层模型是基于相应的物理层处理链描述的，见图 5.2.3-1。PCH 通过 PDSCH 承载。与物理层模型相关的处理步骤，例如那些可以由高层配置的步骤，用蓝色突出显示。

- 传递到/从物理层的高层数据；
- CRC 和传输块错误指示；
- FEC 和速率匹配；
- 数据调制；
- 映射到物理资源；
- 多天线处理。

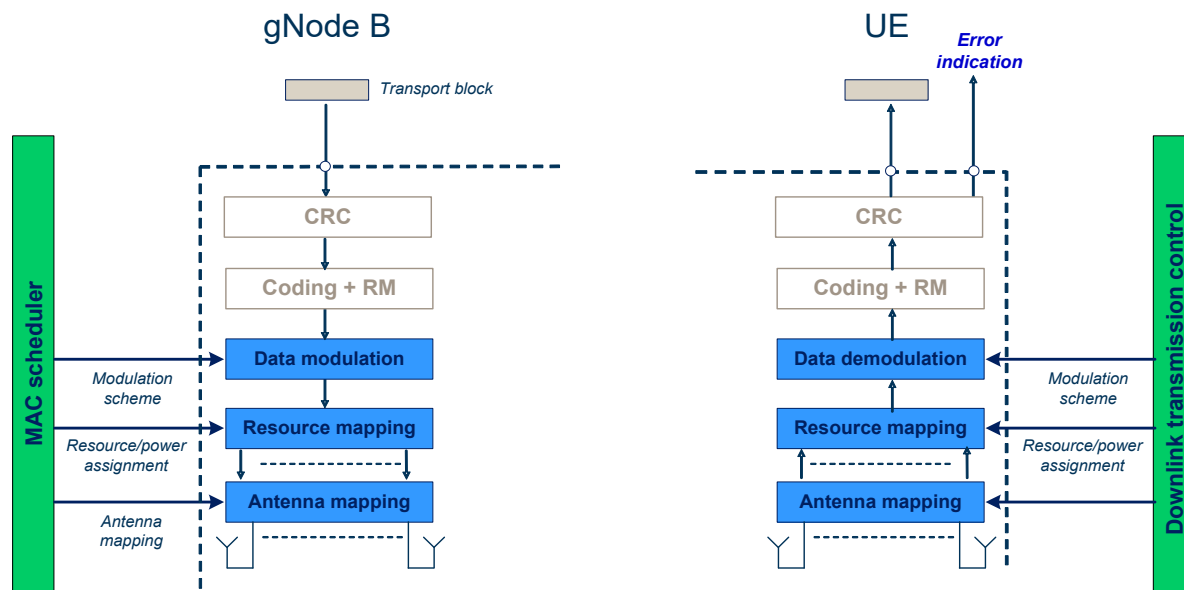


Figure 5.2.3-1: Physical-layer model for PCH transmission

5.3 Sidelink model

5.3.1 Sidelink shared channel

The physical-layer model for Sidelink Shared Channel transmission is described based on the corresponding SL-SCH physical-layer-processing chain, see Figure 5.3.1-1. Processing steps that are relevant for the physical-layer model, e.g. in the sense that they are configurable by higher layers, are highlighted in blue.

- Higher-layer data passed to/from the physical layer;
- CRC and transport-block-error indication;
- FEC and rate matching;
- Data modulation;
- Mapping to physical resource;
- Multi-antenna processing;
- Support of L1 control and Hybrid-ARQ-related signalling.

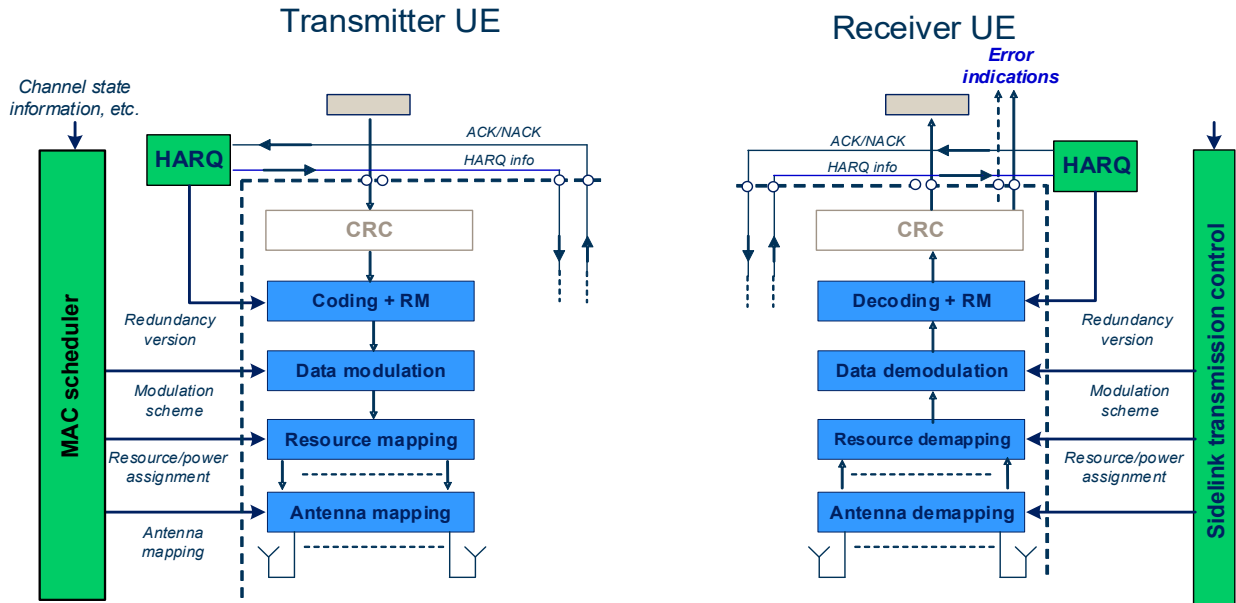


Figure 5.3.1-1: Physical-layer model for SL-SCH transmission

5.3.2 Broadcast channel

The physical-layer model for Sidelink Broadcast Channel transmission is characterized by a fixed pre-defined transport format. There is one transport block for every slot in which the UE transmits SL-BCH, if the UE is configured to transmit on SL-BCH. The SL-BCH physical-layer model is described based on the corresponding SL-BCH physical-layer-processing chain, see Figure 5.3.2-1:

- Higher-layer data passed to/from the physical layer;
- CRC and transport-block-error indication;
- FEC and rate matching;
- Data modulation;
- Mapping to physical resource;
- Multi-antenna processing.

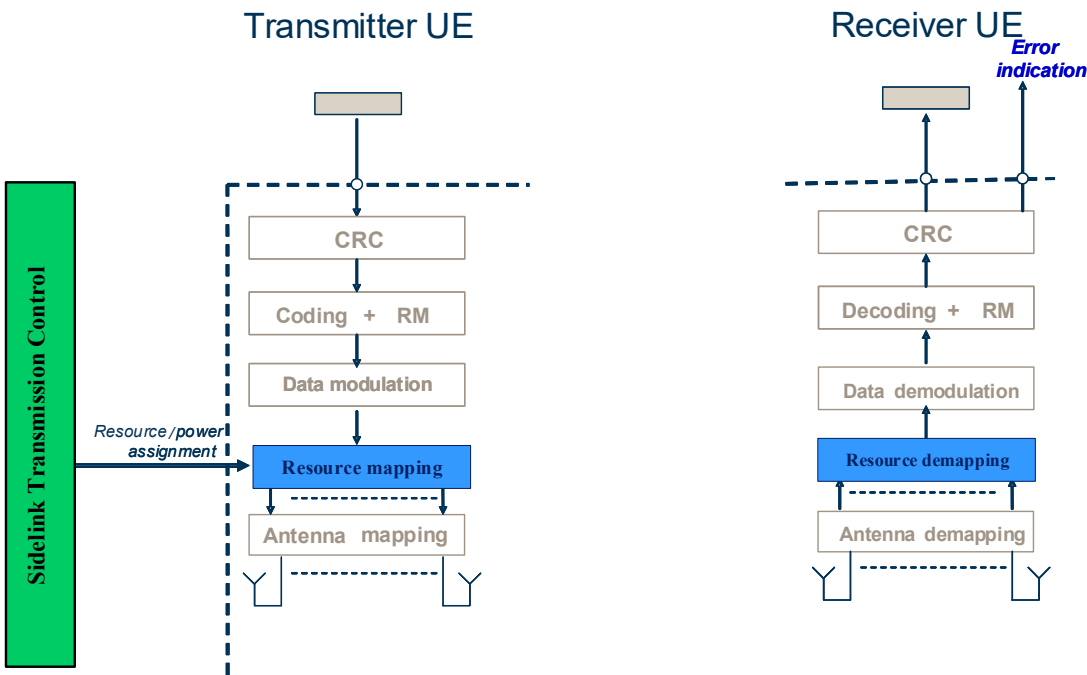


Figure 5.3.2-1: Physical-layer model for SL-BCH transmission

6

Simultaneous transmission and reception of physical channels and physical signals

This clause describes the requirements from the UE to send and receive multiple physical channels and physical signals simultaneously depending on the capabilities and service requirements. The following notation is used between both the uplink and downlink clauses below.

- p is the number of uplink carriers configured for the UE on which physical channels can be transmitted
- p' is the number of uplink carriers configured for the UE on which SRS can be transmitted
- q is the number of downlink carriers configured for the UE
- j is the number of cell groups configured for the UE.
- k is the number of PUCCH groups configured for the UE.

6.1

Uplink

The tables 6.1-1 and 6.1-2 describe the possible combinations of physical channels and SRS that can be sent in simultaneously in the uplink by one UE. Table 6.1-1 introduces notation for a "Transmission Type" which represents a physical channel or sounding reference signal, and any associated transport channel. Table 6.1-2 describes the combinations of these "Transmission Types" which are supported by the UE depending on capabilities [8, TS 38.306], and enumerates how many of each can be transmitted simultaneously.

Table 6.1-1: Uplink "Transmission Types"

"Transmission Type"	Physical Channel or SRS	Associated Transport Channel	Comment
A	PRACH	RACH	Note 1, Note 3
B	PUCCH	N/A	
C	PUSCH	UL-SCH	Note 2, Note 3
D	SRS	N/A	
Note 1: RACH corresponds to contention based.			
Note 2: UCI on PUSCH without UL-SCH is possible.			
Note 3: For SCell, MsgA PRACH and MsgA PUSCH is not supported.			

Table 6.1-2: Uplink "Transmission Type" combinations

Supported Combinations	Comment
$j \times A$	Note 1
$k \times B$	Note 2
$(\sum_{i=1}^p m_i) \times C$	Note 3, Note 4, Note 10
$p' \times D$	Note 3, Note 5
$\tilde{j} \times A + \tilde{k} \times B$	Note 6
$\tilde{j} \times A + (\sum_{i=1}^{\tilde{p}} \tilde{m}_i) \times C$	Note 6, Note 10
$\tilde{j} \times A + \tilde{p}' \times D$	Note 6
$\tilde{k} \times B + (\sum_{i=1}^{\tilde{p}} \tilde{m}_i) \times C$	Note 8, Note 10
$B + (\sum_{i=1}^{\tilde{p}'} \tilde{m}_i') \times C$	Note 9, Note 10
$\tilde{k} \times B + \tilde{p}' \times D$	Note 7
$(\sum_{i=1}^{\tilde{p}} \tilde{m}_i) \times C + \tilde{p}' \times D$	Note 7, Note 10
<p>Note 1: The number of cell groups j in the supported combination is subject to UE capability.</p> <p>Note 2: The number of PUCCH groups k in the supported combination is subject to UE capability.</p> <p>Note 3: The number of carriers p, and p' in the supported combinations are subject to UE capability.</p> <p>Note 4: In the case there is one SUL carrier, then $p-1$ would be supported.</p> <p>Note 5: UE may be configured with p' but may also have capability to simultaneously sound less than this number.</p> <p>Note 6: Simultaneous PRACH with PUCCH (or PUSCH or SRS) is supported only in the case of inter-band CA, with $\tilde{j} \leq j$, $\tilde{k} \leq k$, $\tilde{p} \leq p$, and $\tilde{p}' \leq p'$ depending on the configuration, and subject to UE capability for parallel transmission.</p> <p>Note 7: Simultaneous SRS with PUCCH (or PUSCH) is supported only in the case of inter-band CA, with $\tilde{k} \leq k$, $\tilde{p} \leq p$, and $\tilde{p}' \leq p'$ depending on the configuration, and subject to UE capability for parallel transmission.</p> <p>Note 8: Simultaneous PUCCH and PUSCH(s) for the case that multiple PUCCH groups are configured and the respective PUCCH and PUSCH(s) are transmitted in the different PUCCH groups, with $\tilde{k} < k$ and $\tilde{p} \leq p$. k and p are subject to UE capability for supported number of PUCCH groups and UL carriers, respectively. \tilde{k} and \tilde{p} depend on configuration.</p> <p>Note 9: Simultaneous PUCCH and PUSCH(s) within the same PUCCH group in the case of inter-band CA, \tilde{p}' depending on the configuration, and subject to UE capability for parallel transmission of PUCCH and PUSCH within the same PUCCH group.</p> <p>Note 10: Simultaneous transmission of up to 2 PUSCHs within the same active UL BWP, with $p, \tilde{p}, \hat{p}, \hat{p}'$ depending on the configuration, $m_i, \tilde{m}_i, \hat{m}_i, \hat{m}_i'$ equal to 1 or 2, subject to UE capability for parallel transmission of PUSCH and PUSCH within the same active UL BWP.</p>	

6.2 Downlink

The tables 6.2-1, 6.2-2 describe the possible combinations of physical channels that can be received simultaneously in the downlink by one UE. Table 6.2-1 introduces notation for a "Reception Type" which represents a physical channel and any associated transport channel. Table 6.2-2 describes the combinations of these "Reception Types" which are supported by the UE depending on capabilities [8, TS 38.306], and enumerates how many of each can be received simultaneously. The UE shall be able to receive all TBs according to the indication on PDCCH. Any subset of the combinations specified in table 6.2-2 is also supported.

Table 6.2-1: Downlink "Reception Types"

"Reception Type"	Physical Channel(s)	Monitored RNTI	Associated Transport Channel	Comment
A	PBCH	N/A	BCH	
B	PDCCH+PDSCH	SI-RNTI	DL-SCH	Note 1
C0	PDCCH	P-RNTI	N/A	Note 1, Note 2
C1	PDCCH+PDSCH	P-RNTI	PCH	Note 1
D0	PDCCH+PDSCH	RA-RNTI or Temporary C-RNTI or MsgB-RNTI	DL-SCH	Note 3
D1	PDCCH+PDSCH	C-RNTI, CS-RNTI, MCS-C-RNTI	DL-SCH	
D2	PDCCH	C-RNTI, CS-RNTI, MCS-C-RNTI	DL-SCH	
D3	PDCCH+PDSCH	G-RNTI, G-CS-RNTI	DL-SCH	Note 6
D4	PDCCH	G-CS-RNTI	N/A	Note 7
D5	PDCCH+PDSCH	MCCH-RNTI	DL-SCH	Note 8
D6	PDCCH+PDSCH	G-RNTI	DL-SCH	Note 9
D7	PDCCH+PDSCH	C-RNTI	DL-SCH	Note 10
D8	PDCCH+PDSCH	Multicast MCCH-RNTI	DL-SCH	Note 11
E	PDCCH	C-RNTI	N/A	Note 4
F0	PDCCH	Temporary C-RNTI	UL-SCH	Note 3
F1	PDCCH	C-RNTI, CS-RNTI, MCS-C-RNTI	UL-SCH	
F2	PDCCH	C-RNTI, CS-RNTI	UL-SCH	Note 10
G	PDCCH	SFI-RNTI	N/A	
H	PDCCH	INT-RNTI	N/A	
J0	PDCCH	TPC-PUSCH-RNTI	N/A	
J1	PDCCH	TPC-PUCCH-RNTI	N/A	
J2	PDCCH	TPC-SRS-RNTI	N/A	
K	PDCCH	SP-CSI-RNTI	N/A	
L0	PDCCH	SL-RNTI	SL-SCH	
L1	PDCCH	SL-CS-RNTI	SL-SCH	
M	PDCCH	SL Semi-Persistent Scheduling V-RNTI	SL-SCH	Note 5
N	PDCCH	PS-RNTI	N/A	
O	PDCCH	AI-RNTI	N/A	
P	PDCCH	CI-RNTI	N/A	
Q	PDCCH	PEI-RNTI	N/A	Note 1

Note 1: These are received from PCell only.

Note 2: In some cases UE is only required to monitor the short message within the DCI for P-RNTI.

Note 3: These are received from PCell or PSCell.

Note 4: This corresponds to PDCCH-ordered PRACH.

Note 5: This corresponds to PDCCH scheduling LTE PC5.

Note 6: This is for multicast in RRC connected state.

Note 7: This corresponds to DL Semi-Persistent Scheduling release for multicast in RRC connected state.

Note 8: This is for broadcast MCCH.

Note 9: This is for broadcast MTCH. UE is not required to decode more than one PDSCH for MTCH simultaneously.

Note 10: This is for small data transmission in RRC inactive state.

Note 11: This is for multicast MCCH in RRC inactive state.

Table 6.2-2: Downlink "Reception Type" combinations

Supported Combinations			Comment
PCell	PSCell	SCell	
1. RRC_IDLE			
1.1 All UEs			
A + (B and/or (C1 or Q) and/or D0) + F0			Note 1
1.2 UEs supporting MBS broadcast reception_			
A+D5			
2. RRC_INACTIVE			
2.1 All UEs			
A + (B and/or (C0 or C1 or Q) and/or (D0 or D7)) + (F0 or F2)			Note 1
2.2 UEs supporting MBS broadcast reception_			
A+D5			
2.3 UE supporting MBS multicast reception			
A+D8			
3. RRC_CONNECTED			
(A + ((C0 + (B and/or (D0 or (m1*D1+m2*D2+((m3*D3+m4*D4) or m5*(D5 or D6)))))) + E + F0 + n*F1 + G + H + J0 + J1 + J2 + K + O + L0 + L1 + M + N + P) or D5))	(A + (D0 or (m1*D1+m2*D2)) + E + F0 + n*F1 + G + H + J0 + J1 + J2 + K + O + N + P)	m1*D1 + m2*D2 + ((m3*D3+m4*D4) or m5*(D5 or D6)) + E + n*F1 + G + H + J0 + J1 + J2 + K + O + L0 + L1 + M + P	Note 2, Note 3, Note 4, Note 5, Note 6, Note 7, Note 8, Note 9, Note 10, Note 11, Note 12, Note 13, Note 14
Note 1:	UE is not required to decode more than two PDSCH simultaneously, and decoding prioritization when more than two are received is up to UE implementation.		
Note 2:	For PCell, UE is not required to decode SI-RNTI PDSCH simultaneously with C-RNTI PDSCH, unless in FR1.		
Note 3:	Supported combinations are subject to UE capabilities for dual connectivity, carrier aggregation, receiving of group TPC commands, pre-emption indication and dynamic SFI monitoring.		
Note 4:	The values of m2 ≥ 0 and n ≥ 0 in the supported combinations are subject to the UE capability.		
Note 5:	Support of monitoring PDCCH with SL-RNTI, SL-CS-RNTI, SL Semi-Persistent Scheduling V-RNTI are subject to UE capability.		
Note 6:	The values of m1 ≥ 1 in the supported combinations are subject to the UE capability.		
Note 7:	In Active time, a UE is not expected to monitor the DCI format for the PDCCH scrambled by PS-RNTI.		
Note 8:	The PDCCH scrambled by PS-RNTI can only be configured on the PCell and PSCell.		
Note 9:	For a UE supporting MBS multicast reception, the values of 1 ≥ m3 ≥ 0 and m4 ≥ 0 are subject to UE capability and applicable to RRC connected UEs. If m3 = 1, then m1 ≤ 1.		
Note 10:	For a UE supporting MBS multicast or broadcast reception, the UE is not expected to be configured simultaneously with more than one component carrier for multicast or broadcast reception.		
Note 11:	For a UE supporting MBS broadcast reception, the values of 1≥m5 ≥ 0 are subject to UE capability and applicable to RRC connected UEs. If m5=1, then m1≤1.		
Note 12:	For a UE supporting MBS broadcast reception in RRC_CONNECTED state, it is required to support reception of FDMed MCCH PDSCH and PBCH in Pcell.		
Note 13:	For a UE supporting MBS multicast or broadcast reception in RRC_CONNECTED state, it is not required to support reception of FDMed MCCH PDSCH/broadcast MTCH PDSCH/multicast MTCH PDSCH and SIB PDSCH in PCell.		
Note 14:	For a UE supporting MBS multicast or broadcast reception in RRC_CONNECTED state, it is not required to support reception of FDMed broadcast MTCH PDSCH/multicast MTCH PDSCH and PBCH in PCell.		

6.3 Sidelink

The tables 6.3-1 and 6.3-2 describe the possible combinations of physical channels that can be sent simultaneously in the sidelink by a UE. Table 6.3-1 introduces notation for a sidelink "Transmission Type" which represents a physical channel, and any associated transport channel. Table 6.3-2 describes the combinations of these "Transmission Types"

which are supported by the UE depending on capabilities [8, TS 38.306], and enumerates how many of each can be transmitted simultaneously.

Table 6.3-1: Sidelink "Transmission Types"

"Transmission Type"	Physical Channel	Associated Transport Channel	Comment
A	PSBCH	SL-BCH	
B	PSSCH	SL-SCH	
C	PSCCH	SL-SCH	
D	PSFCH	N/A	
E	SL PRS	N/A	

Table 6.3-2: Sidelink "Transmission Type" combinations

Supported Combinations	Comment
A	Note 2
B	Note 2
C	Note 2
E	Note 4
E	Note 5
$N \times D$	Note 2
B+C	Note 2
<p>Note 1: Depending on the UE capability, the UE may be able to perform simultaneous Uplink and Sidelink transmissions. If the simultaneous transmission of Sidelink and Uplink is beyond the UE capability, the one not prioritized can be dropped according to [TS 38.321].</p> <p>Note 2: Depending on the UE capability, the UE may be able to perform simultaneous sidelink communication transmissions of the same sidelink "Transmission Type" combinations across multiple SL carriers.</p> <p>Note 3: Simultaneous transmissions over multiple SL carriers with one or more UL carriers is left up to UE implementation.</p> <p>Note 4: Depending on the UE capability, the UE may be able to perform simultaneous SL PRS transmission and PSSCH transmission(s) for a shared SL PRS resource pool across multiple SL carriers.</p> <p>Note 5: Depending on the UE capability, applicable for a dedicated SL PRS resource pool across multiple SL carriers.</p>	

The tables 6.3-3 and 6.3-4 describe the possible combinations of physical channels that can be received simultaneously in the sidelink by a UE. Table 6.3-3 introduces notation for a sidelink "Reception Type" which represents a physical channel, and any associated transport channel. Table 6.3-4 describes the combinations of these "Reception Types" which are supported by the UE depending on capabilities [8, TS 38.306], and enumerates how many of each can be received simultaneously.

Table 6.3-3: Sidelink "Reception Types"

"Reception Type"	Physical Channel	Associated Transport Channel	Comment
A	PSBCH	SL-BCH	
B	PSSCH	SL-SCH	
C	PSCCH	SL-SCH	
D	PSFCH	N/A	
E	SL PRS	N/A	

Table 6.3-4: Sidelink "Reception Type" combinations

Supported Combinations	Comment
A	
B	Note 1, Note 2
C	Note 1, Note 2
E	Note 3, Note 5
$M_1 \times E$	Note 4
$M \times D$	Note 2
B+C	Note 1, Note 2
Note 1: Corresponds to simultaneous reception within one sub-channel	
Note 2: Depending on the UE capability, the UE may be able to perform simultaneous sidelink communication receptions of the same sidelink "Reception Type" combinations across multiple SL carriers.	
Note 3: Applicable for a shared SL PRS resource pool. Corresponds to simultaneous reception within one sub-channel.	
Note 4: Applicable for a dedicated SL PRS resource pool with $M_1 \geq 1$. Corresponds to simultaneous reception within one dedicated SL PRS resource pool.	
Note 5: For a shared SL PRS resource pool, depending on the UE capability, the reception(s) of SL-PRS in a single SL carrier can be simultaneously received with PSSCH in other one or more SL carrier(s).	

7

Measurements provided by the physical layer

7.1

UE measurements

The list and detailed definition of UE measurements is provided in [7, TS 38.215].

Annex A (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-05	RAN1#89	R1-1712013				Draft skeleton	0.0.0
2017-07	AH_1706	R1-1712013				Update for agreements from meetings up to RAN1 NR AH2	0.0.1
2017-08	RAN1#90	R1-1713371				Update for agreements from meetings up to RAN1 NR AH2	0.0.2
2017-08	RAN1#90	R1-1714655				Update with change marks removed for RAN1 #90 endorsement	0.1.0
2017-09	RAN1#90	R1-1715320				Updated with minor editorial changes for review after RAN1 #90	0.1.1
2017-09	RAN#77	RP-172006				For information to plenary	1.0.0
2017-10	RAN1#90b	R1-1719229				Updated for agreements from meetings up to RAN1 #90b	1.0.1
2017-11	RAN1#91	R1-1721047				Updated after email discussion	1.1.0
2017-12	RAN1#91	R1-1721340				Updated to reflect agreements from RAN1 #91	1.2.0
2017-12	RAN#78	RP-172630				Endorsed version for approval by plenary	2.0.0
2017-12	RAN#78					Approved by plenary – Rel-15 spec under change control	15.0.0
2018-03	RAN#79	RP-180200	0001	-	F	CR capturing the Jan18 ad-hoc and RAN1#92 meeting agreements	15.1.0
2018-06	RAN#80	RP-181172	0002	1	F	CR to 38.202 capturing the RAN1#92bis and RAN1#93 meeting agreements	15.2.0
2018-06	RAN#80	RP-181257	0003	-	B	CR to 38.202 capturing the RAN1#92bis and RAN1#93 meeting agreements related to URLLC	15.2.0
2018-09	RAN#81	RP-181789	0004	-	B	CR to 38.202 capturing RAN1#94 meeting agreements	15.3.0
2018-12	RAN#82	RP-182523	0005	-	F	CR to 38.202 capturing RAN1#95 meeting agreements	15.4.0
2019-06	RAN#84	RP-191277	0006	-	F	Correction to simultaneous reception of DL Channels	15.5.0
2019-06	RAN#84	RP-191277	0007	-	F	CR on inclusion of TC-RNTI for monitored RNTI for UL-SCH and inclusion of monitoring PDCCH ordering PRACH on SCell	15.5.0
2019-12	RAN#86	RP-192623	0008	1	F	CR on simultaneous transmission of UL channels	15.6.0
2019-12	RAN#86	RP-192635	0009	-	B	Introduction of two-step RACH	16.0.0
2019-12	RAN#86	RP-192637	0010	-	B	Introduction of integrated access and backhaul for NR	16.0.0
2019-12	RAN#86	RP-192638	0011	-	B	Introduction of V2X	16.0.0
2019-12	RAN#86	RP-192639	0012	-	B	Introduction of Physical Layer Enhancements for URLLC	16.0.0
2019-12	RAN#86	RP-192641	0013	-	B	Introduction of MIMO enhancements	16.0.0
2019-12	RAN#86	RP-192642	0014	-	B	Introduction of UE Power Savings	16.0.0
2020-06	RAN#88-e	RP-200692	0015	-	F	Corrections to MIMO enhancements	16.1.0
2020-09	RAN#89-e	RP-201810	0017	-	F	DL Channel Combination associated with DCI format 2_6 monitoring	16.2.0
2020-09	RAN#89-e	RP-201807	0018	-	F	Corrections on 5G V2X sidelink features	16.2.0
2021-12	RAN#94-e	RP-212960	0019	-	F	Alignment CR for TS 38.202	16.3.0
2021-12	RAN#94-e	RP-212968	0020	-	B	Introduction of IIoT/URLLC enhancements in NR	17.0.0
2021-12	RAN#94-e	RP-212979	0021	-	B	Introduction of multicast and broadcast services	17.0.0
2022-03	RAN#95-e	RP-220263	0022	-	F	Corrections to NR support of multicast and broadcast services	17.1.0
2022-03	RAN#95-e	RP-220256	0023	-	F	Corrections on NR UE Power Saving Enhancements	17.1.0
2022-06	RAN#96	RP-221612	0024	-	F	Corrections to NR support of multicast and broadcast services	17.2.0
2022-12	RAN#98-e	RP-222864	0025	-	F	CR on the MBS reception type combinations to TS 38.202	17.3.0
2023-09	RAN#101	RP-232450	0026	-	F	Correction on simultaneous reception of SDT and other channels in TS 38.202	17.4.0
2023-09	RAN#101	RP-232458	0027	-	B	Release 18 TS38.202 Editor CR for MIMO	18.0.0
2023-09	RAN#101	RP-232469	0028	-	B	Release 18 TS38.202 Editor CR for NR sidelink evolution	18.0.0
2023-12	RAN#102	RP-233723	0031	1	A	Correction on NR Sidelink	18.1.0
2023-12	RAN#102	RP-233733	0032	-	B	Release 18 TS38.202 Editor CR for multicast in RRC_INACTIVE state	18.1.0
2023-12	RAN#102	RP-233719	0033	-	F	Release 18 TS38.202 Editor CR for SL-PRS transmission and Reception	18.1.0

2024-03	RAN#103	RP-240528	0034	-	F	Release 18 TS38.202 Editor CR for simultaneous SL-PRS transmission and Reception	18.2.0
2024-06	RAN#104	RP-241061	0035	-	F	Correction to 38.202 on support of combination of SL CA and SL positioning	18.3.0
2024-09	RAN#105	RP-242204	0036	-	F	Rel-18 Editorial Corrections for TS 38.202	18.4.0
2025-09	SA#109	-	-	-	-	Update to Rel-19 version (MCC)	19.0.0