

**Agenda Item:** 8  
**Source:** InterDigital  
**Title:** UE Simultaneous Physical Channel Combinations for TDD  
**Document For:** Decision

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### Introduction:

The UE simultaneous physical channel combinations for FDD are provided in two tables, one for uplink and one for downlink, in TS25.302, Services Provided by the Physical Layer. It is proposed that similar tables describing the TDD combinations in uplink and downlink be added to that specification. Minor editorial updates to support the inclusion of the tables are also proposed.

UL channels needed to support DL channels, DL channels needed to support UL channels, the possibility to multiplex PCH and one or more FACH on one or more CCTrCHs, and allowed combinations of physical channels of different type in the same time slot are denoted herein as FFS. These issues will be addressed in future contributions.

### Proposed Changes to the Services Provided by the Physical Layer Specification (25.302):

## 8 UE Simultaneous Physical Channels combinations

This section describes the requirements from the UE to send and receive on multiple Transport Channels which are mapped on different physical channels simultaneously depending on the service capabilities and requirements. The section will describe the impacts on the support for multiple services (e.g. speech call and SMS-CB) depending on the UE capabilities.

*EDITOR'S NOTE: The following tables have been completed for FDD, the TDD operation will be addressed later.*

### 8.1 FDD Uplink

The table describes the possible combinations of FDD physical channels that can be supported in the uplink by one UE at any one time.

### 8.2 FDD Downlink

The table describes the possible combinations of FDD physical channels that can be supported in the downlink by one UE at any one time.

### 8.3 TDD Uplink

The table describes the possible combinations of TDD physical channels that can be supported in the uplink by one UE in any one 10ms frame, where a TDD physical channel corresponds to one code, one timeslot, one frequency and is mapped to one resource unit (RU).

This table addresses combinations of uplink physical channels in the same 10ms frame. Combinations of physical channels of different types in the same timeslot is FFS. Requirements for DL channel(s) which must be present for each combination, if any, is FFS.

	<u>Physical Channel Combination</u>	<u>Transport Channel Combination</u>	<u>Baseline Capability or Service Dependent</u>	<u>Comment</u>
1	<u>PRACH</u>	<u>RACH</u>	<u>Baseline</u>	<u>One RACH transport channel maps to one PRACH physical channel.</u>
2	<u>One or more DPCH</u>	<u>One or more DCH coded into one or more CCTrCH</u>	<u>Service dependent</u>	<u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.</u>
3	<u>PRACH + one or more DPCH</u>	<u>RACH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependent</u>	<u>One RACH transport channel maps to one PRACH physical channel</u>  <u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.</u>
4	<u>One or more PUSCH</u>	<u>USCH</u>	<u>Service dependent</u>	<u>Shared channels are FFS.</u>  <u>It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.</u>  <u>USCH requires a control channel (RACH or DCH); however, it is not required to be in the same 10ms frame as the USCH.</u>
5	<u>PRACH + one or more PUSCH</u>	<u>RACH + USCH</u>	<u>Service dependent</u>	<u>One RACH transport channel maps to one PRACH physical channel.</u>  <u>Shared channels are FFS.</u>  <u>It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.</u>
6	<u>One or more PUSCH + one or more DPCH</u>	<u>USCH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependent</u>	<u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.</u>  <u>Shared channels are FFS.</u>  <u>It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.</u>
7	<u>PRACH + one or more PUSCH + one or more DPCH</u>	<u>RACH + USCH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependent</u>	<u>One RACH transport channel maps to one PRACH physical channel.</u>  <u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.</u>  <u>Shared channels are FFS.</u>  <u>It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.</u>

## 8.4 TDD Downlink

The table describes the possible combinations of TDD physical channels that can be supported in the downlink by one UE in any one 10ms frame, where a TDD physical channel corresponds to one code, one timeslot, one frequency and is mapped to one resource unit (RU).

This table addresses combinations of downlink physical channels in the same 10ms frame. Combinations of physical channels of different types in the same timeslot is FFS. Requirements for UL channel(s) which must be present for each combination, if any, is FFS. Example: DL DPCH requires closed loop power control to be provided on an UL channel.

	<b><u>Physical Channel Combination</u></b>	<b><u>Transport Channel Combination</u></b>	<b><u>Baseline Capability or Service dependent</u></b>	<b><u>Comment</u></b>
1	<u>One or two PSCH</u>	<u>SCH</u>	<u>Baseline</u>	<u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)</u>
2	<u>One or more CCPCH</u>	<u>BCH</u> <u>Or</u> <u>PCH</u> <u>Or</u> <u>one or more FACH</u> <u>Or</u> <u>BCH + PCH</u> <u>Or</u> <u>BCH + one or more FACH</u> <u>Or</u> <u>PCH + one or more FACH</u> <u>Or</u> <u>BCH + PCH + one or more FACH</u>	<u>Baseline</u>	<u>BCH can map to multiple CCPCH in a frame.</u> <u>FACH can map to multiple CCPCH in a frame.</u> <u>PCH can map to multiple CCPCH in a frame.</u>  <u>See note 2.</u>
3	<u>One or two PSCH + one or more CCPCH</u>	<u>SCH + BCH</u> <u>Or</u> <u>SCH + PCH</u> <u>Or</u> <u>SCH + one or more FACH</u> <u>Or</u> <u>SCH + BCH + PCH</u> <u>Or</u> <u>SCH + BCH + one or more FACH</u> <u>Or</u> <u>SCH + PCH + one or more FACH</u> <u>Or</u> <u>SCH + BCH + PCH + one or more FACH</u>	<u>Baseline</u>	<u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1).</u>  <u>BCH can map to multiple CCPCH in a frame.</u> <u>FACH can map to multiple CCPCH in a frame.</u> <u>PCH can map to multiple CCPCH in a frame.</u>  <u>See note 2.</u>

4	<u>One or more DPCH</u>	<u>One or more DCH coded into one or more CCTrCH</u>	<u>Service dependant</u>	<u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability</u>
5	<u>One or two PSCH + one or more DPCH</u>	<u>SCH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependant</u>	<u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)</u>  <u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability</u>
6	<u>One or more CCPCH + one or more DPCH</u>	<u>BCH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>one or more FACH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>BCH + one or more FACH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependant</u>	<u>The number of DCHs and the maximum channel bit rate are dependent on the UE Service Capability.</u>  <u>BCH can map to multiple CCPCH in a frame.</u> <u>FACH can map to multiple CCPCH in a frame.</u>  <u>See note 2.</u>
7	<u>One or two PSCH + one or more CCPCH + one or more DPCH</u>	<u>SCH + BCH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>SCH + one or more FACH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>SCH + BCH + one or more FACH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependant</u>	<u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)</u>  <u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability</u>  <u>BCH can map to multiple CCPCH in a frame.</u> <u>FACH can map to multiple CCPCH in a frame.</u>  <u>See note 2.</u>
8	<u>One or more PDSCH</u>	<u>DSCH</u>	<u>Service dependant</u>	<u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u>  <u>DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH.</u>

9	<u>One or two PSCH + one or more PDSCH</u>	<u>SCH + DSCH</u>	<u>Service dependant</u>	<p><u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)</u></p> <p><u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u></p> <p><u>DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH.</u></p>
10	<u>One or more PDSCH + one or more CCPCH</u>	<u>DSCH + BCH</u> <u>Or</u> <u>DSCH + one or more FACH</u> <u>Or</u> <u>DSCH + BCH + one or more FACH</u>	<u>Service dependant</u>	<p><u>BCH can map to multiple CCPCH in a frame.</u> <u>Each FACH can map to multiple CCPCH in a frame.</u></p> <p><u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u></p> <p><u>For the case of DSCH + BCH, DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH.</u></p> <p><u>See note 2.</u></p>
11	<u>One or two PSCH + one or more PDSCH + one or more CCPCH</u>	<u>SCH + DSCH + BCH</u> <u>Or</u> <u>SCH + DSCH + one or more FACH</u> <u>Or</u> <u>SCH + DSCH + BCH + one or more FACH</u>	<u>Service dependant</u>	<p><u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)</u></p> <p><u>BCH can map to multiple CCPCH in a frame.</u> <u>Each FACH can map to multiple CCPCH in a frame.</u></p> <p><u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u></p> <p><u>For the case of SCH + DSCH + BCH, DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH.</u></p> <p><u>See note 2.</u></p>
12	<u>One or more PDSCH + one or more DPCH</u>	<u>DSCH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependant</u>	<p><u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability</u></p> <p><u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u></p>

13	<u>One or two PSCH + one or more PDSCH + one or more DPCH</u>	<u>SCH + DSCH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependent</u>	<p><u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)</u></p> <p><u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability</u></p> <p><u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u></p>
14	<u>One or more PDSCH + one or more CCPCH + one or more DPCH</u>	<u>DSCH + BCH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>DSCH + one or more FACH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>DSCH + BCH + one or more FACH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependent</u>	<p><u>BCH can map to multiple CCPCH in a frame. Each FACH can map to multiple CCPCH in a frame.</u></p> <p><u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability</u></p> <p><u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u></p> <p><u>See note 2.</u></p>
15	<u>One or two PSCH + one or more PDSCH + one or more CCPCH + one or more DPCH</u>	<u>SCH + DSCH + BCH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>SCH + DSCH + one or more FACH + one or more DCH coded into one or more CCTrCH</u> <u>Or</u> <u>SCH + DSCH + BCH + one or more FACH + one or more DCH coded into one or more CCTrCH</u>	<u>Service dependent</u>	<p><u>SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)</u></p> <p><u>BCH can map to multiple CCPCH in a frame. Each FACH can map to multiple CCPCH in a frame.</u></p> <p><u>The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability</u></p> <p><u>Shared channels are FFS.</u> <u>It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.</u></p> <p><u>See note 2.</u></p>

**Notes:**

- 1. Reference: TS25.221: Physical Channels and Mapping of Transport Channels Onto Physical Channels (TDD).**
- 2. The possibility to multiplex PCH and one or more FACH on one or more CCTrCHs is FFS.**