

# SRM-3006

## 5G Code Selective Measurement

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Measuring principle of code-selective measurement at 5G.
- › **SRM based implementation**  
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# Measurement concept

## Measurement

The measurement method is based on the determination of the radiated field produced by the Secondary Synchronization Signal (SSS) or the Primary Synchronization Signal (PSS) of the downlink of the Physical Broadcast Channel (PBCH).

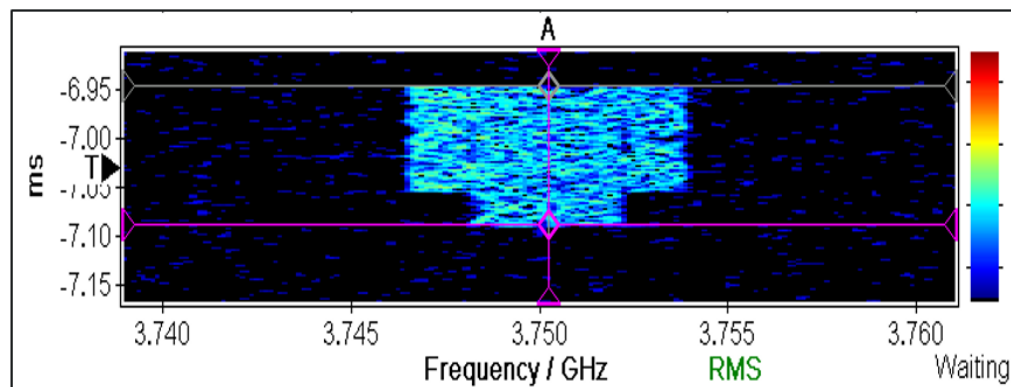
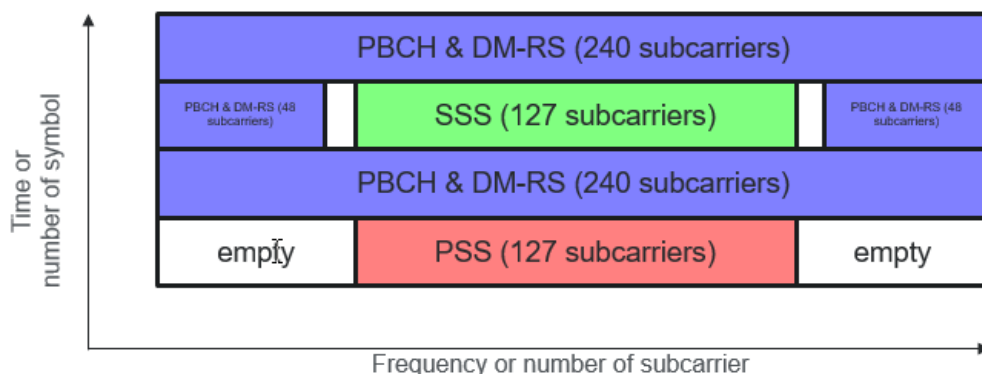
Advantages of the code selective measurement:

- › It is independent of traffic situation
- › It also works with beamforming
- › It can distinguish between different cells
- › It does not react on signals emitted by mobile phone (important in TDD systems, 5G NR will be mainly used in TDD mode)

## Structure of SS/PBCH block

PSS (red) and SSS (green) are signals inside the physical broadcast channel (SS/PBCH) block

- › The entire block is 240 subcarriers broad and 4 symbols long
- › PSS and SSS are 127 subcarriers broad and 1 symbol long



### Measurement Bandwidths

The bandwidth of the SS/PBCH block and the SSS/PSS signal are defined as follows:

- › SS/PBCH block has a bandwidth of  $240 \times \Delta f$
- › The SSS/PSS signal bandwidth is  $127 \times \Delta f$

The subcarrier spacing of the PBCH block “ $\Delta f$ ” can have the following values for carrier frequencies  $\leq 6$  GHz:

- › 15 kHz, 30 kHz, 60 kHz

This results in the following bandwidths:

$\Delta f$	0,015 MHz	0,030 MHz	0,060 MHz
SS/PBCH	3,600 MHz	7,200 MHz	14,400 MHz
SSS	1,905 MHz	3,810 MHz	7,620 MHz
PSS	1,905 MHz	3,810 MHz	7,620 MHz

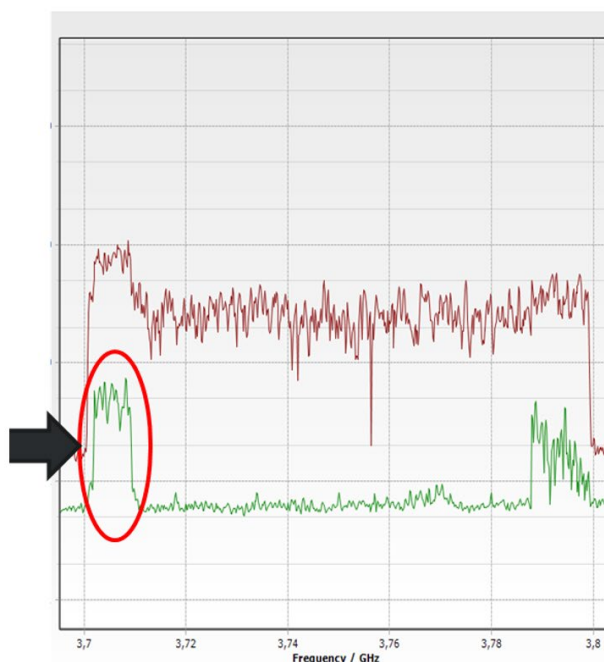
Note:

5G signals above 6 GHz require significantly larger measurement bandwidths. Thus SRM can only perform frequency-selective measurements in these higher frequency bands.

### SS/PBCH Frequency

In contrast to 4G, 5G synchronization SS/PBCH can be shifted individually by the operator inside the frequency band. If frequency of the synchronization is unknown, it has to be located by a spectrum measurement or automatically by the measurement device.

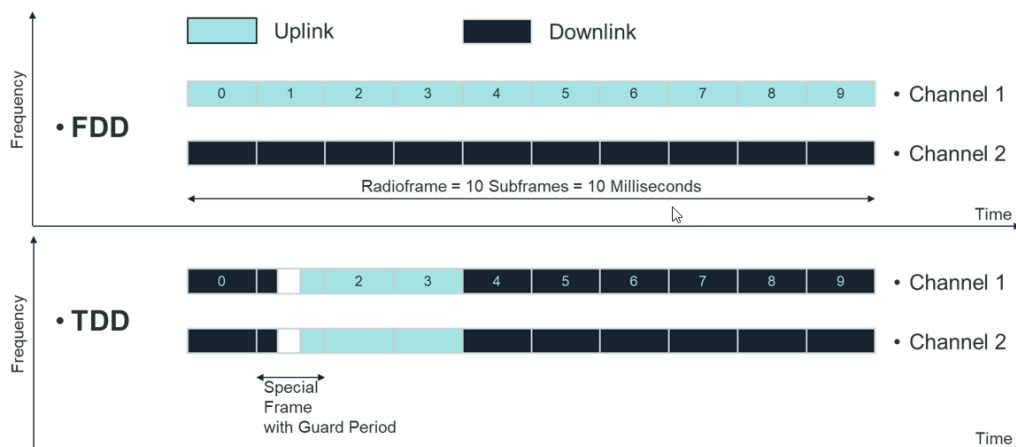
E.g.: 100 MHz bandwidth system with synchronization at lower edge of spectrum



### TDD vs. FDD

Most base stations are expected to use TDD, in which uplink and downlink are multiplexed over time slots.

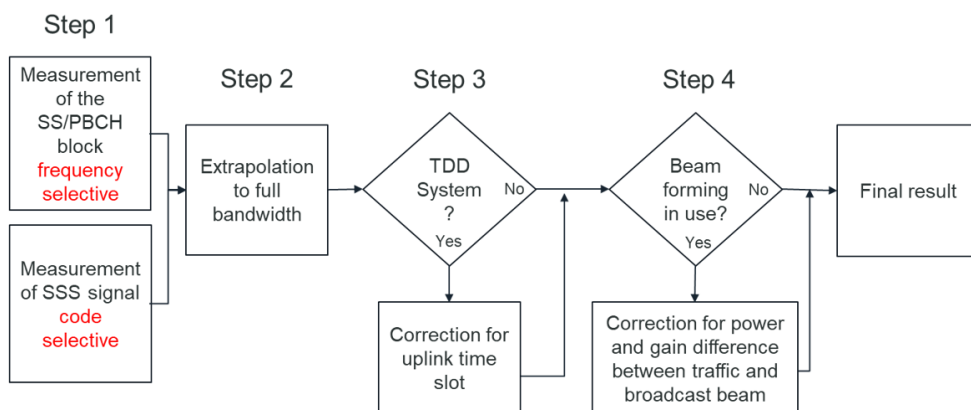
- › This improves the utilization of the available frequency spectrum.
- › Since often more data is required for the downlink than for the uplink, TDD allows additionally the data rate to be adjusted accordingly via the number of timeslots.
- ›



### Extrapolation

For the extrapolation of 5G signals several parameters have to be considered due to the use of TDD and beam forming.

Even though there will be different extrapolation methods depending on the country, which differ slightly from each other, the basic principle can be described as follows:

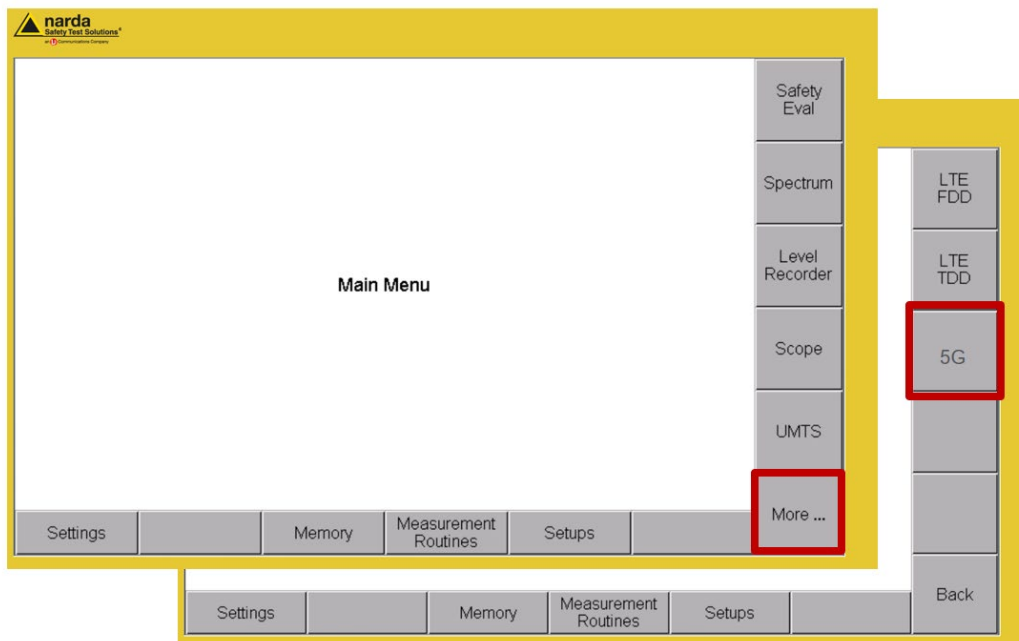


# SRM based implementation

## SRM 5G Measurement Mode

The measurement mode can be accessed via the "More" button.

TDD/FDD will be set via a parameter within the mode.



## SRM 5G Version 1

At the moment two to three different 5G extrapolation methods are being discussed and evaluated in the standardization committees.

- › The SRM in expansion stage 1 will initially support:
  - › Code selective measurement of the SSS/PSS values
  - › A calculation of the summed and maximum SSS/PSS value.
  - › Excel table with which selected extrapolation methods can be realized.

## SRM 5G Version 2

- › This version will include one or two extrapolation methods to display the extrapolated values directly\*.
- › The extrapolation could also be offered as post-processing function in the SRM-TS software\*.

\*Availability depending on the evaluated measurement guidelines

# Availabilities

## SRM 5G Code Selective Measurement - Firmware Option

Article-Nr.:	3701/08
Description:	Option, 5G NR
Pre-order Date:	End of November 2020
Estimated delivery date of preliminary <b>beta version</b> *: If the preliminary version was purchased, the final functions will be delivered with the next firmware update.	December 2020
Delivery of full featured version:	June 2021
Compatibility:	all SRM-3006

\*Beta Version: First running without system test. Most parameters must be set manually.

## SRM 5G Code Selective Measurement – SRM TS 1.5.0

Article-Nr.:	3006/93.10
Description:	Software, SRM-3006 TS
Estimated delivery date: Supports the processing and display of 5G code selective measurement results.	August 2021
Compatibility:	all SRM-3006

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