SC-FDMA Frame Structure

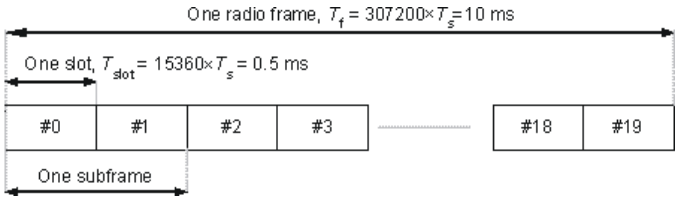
> Signal Studio for LTE/LTE-Advanced FDD currently supports only FDD and frame structure type 1.

Frame Structure Type 1

Figure 1 shows frame structure type 1, which can be used in either full-duplex or half-duplex FDD mode. It consists of a 10 ms radio frame divided into 20 slots, each with a duration of 0.5 ms. One subframe consists of two consecutive slots. T_s = 1/(1500 x 2048) sec.

For FDD, 10 subframes are available for downlink transmission and 10 subframes are available for uplink transmissions in each 10 ms interval. Uplink and downlink transmissions are separated in the frequency domain.

In half-duplex FDD operation, the UE cannot transmit and receive at the same time; this restriction does not apply to full-duplex FDD operation.

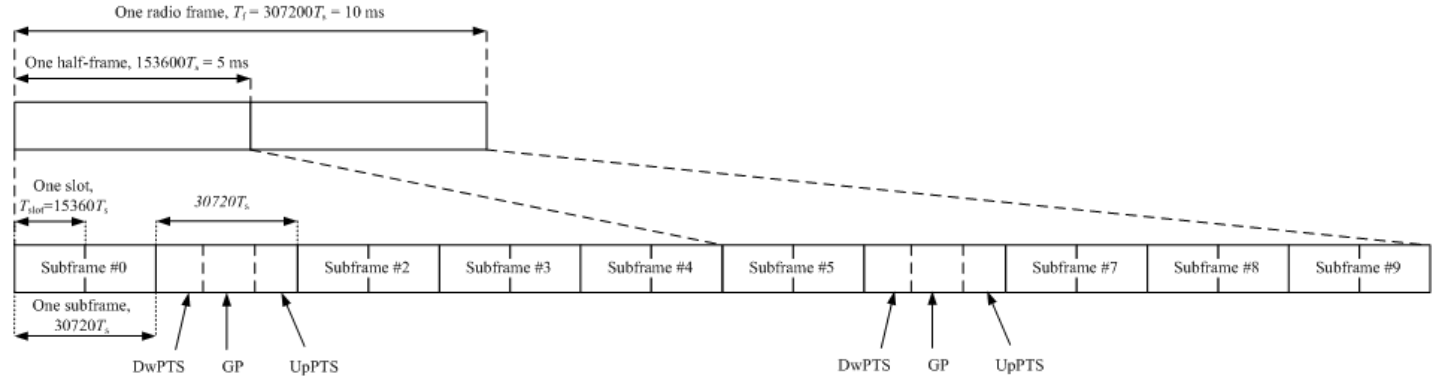


T_s = 1/(1500 x 2048) sec

Figure 1. Frame Structure Type 1 (full-duplex and half-duplex FDD)

Frame Structure Type 2

Figure 2 shows frame structure type 2 for the SC-FDMA uplink. Frame structure type 2 is applicable only to TDD and is provided for compatibility with legacy UTRA TDD systems. Each radio frame consists of two identical 5 ms half-frames. Each half-frame consists of eight 0.5 ms slots and three special fields, Downlink Pilot Timeslot(DwPTS), Guard Period (GP), and Uplink Pilot Timeslot UpPTS. Subframe #0 and #5 and DwPTS are always reserved for downlink transmission.



T_s = 1/(1500 x 2048) sec

Figure 2. Frame Structure Type 2 (TDD only)

Transmission Parameters (FDD Mode)

Transmission BW		1.4 MHz	3.0 MHz	5.0 MHz	10 MHz	15 MHz	20 MHz
Slot duration (frame structure type 1)		0.5 ms	0.5 ms	0.5 ms	0.5 ms	0.5 ms	0.5 ms
Subcarrier spacing		15 kHz	15 kHz	15 kHz	15 kHz	15 kHz	15 kHz
Sampling frequency*		1.92 MHz	3.84 MHz	7.68 MHz	15.36 MHz	23.04 MHz	30.72 MHz
Length of SC-FDMA symbol in time units (excluding cyclic prefix)**		2048	2048	2048	2048	2048	2048
Number of occupied resource blocks		6	15	25	50	75	100
Number of occupied subcarriers		72	180	300	600	900	1200
Number of SC-FDMA symbols per slot	**Normal CP**	7	7	7	7	7	7
	Extended CP	6	6	6	6	6	6
Cyclic Prefix (CP) length (frame structure type 1) where l is the symbol position in a slot	**Normal CP**	160 for l = 0 144 for l = 1 to 6	160 for l = 0 144 for l = 1 to 6	160 for l = 0 144 for l = 1 to 6	160 for l = 0 144 for l = 1 to 6	160 for l = 0 144 for l = 1 to 6	160 for l = 0 144 for l = 1 to 6
	Extended CP	512 for l = 0 to 5	512 for l = 0 to 5	512 for l = 0 to 5	512 for l = 0 to 5	512 for l = 0 to 5	512 for l = 0 to 5

* sampling frequency at one oversampling

** 1 time unit = 1/30.72 MHz