CSK Fixed Length 300-Chip Codes with Multiple Tier0 Pulse-Width Options

The shift register-based binary codes of today (without data bits overlayed) have ONE and only ONE configuration option (without XOR feedback variants). They are all precisely $(2 \wedge N) - 1$ binary bits in length that defines the "maximal length shift register code". The N is the integer count of bits in the shift-register length. The maximum number of orthogonal PN codes is very small compared with a near infinite count of orthogonal RANDOM CSK codes described in the Code Generator of **Patent No. US 10056937 B1 dated Aug. 21, 2018**.

Every CSK Code Generator has a family of selected code lengths configurations with options for variable Pulse Width distributions and Tier0 Pulse Width counts. This option can be used to create multiple CSK 1-second epochs with equal code lengths that result from using Tier0 variable Pulse Width counts. For example, two such variations are shown in the figure with different Pulse Width counts for a fixed length Tier0 binary code length of 300 binary bits. The top configuration is for the common 300-bit code with a

tier0	tier0/2	Half sun	Base Ct	Product	1	2	3	4	5	6	7	8	9	10	11	12	Calc Su	New Hal	err	PWs
300	150	66	2	132	0	0	0	0	0	0	1	0	0	0	1		2	22		24
					0	0	0	0	0	0	7	0	0	0	11	12	18	150	0	
300	150	78	1	78	1	1	1	1	1	0	1	1	1	1	1	1	11	12		23
					1	2	3	4	5	0	7	8	9	10	11	12	72	150	0	

half-code Pulse Width count of 24 (codes count of 24 factorial). The alternate configuration with the same length code is found in the lower spread sheet configuration with Pulse Width count of 23. The target half code from Tier0 Pulse Width distribution is for a common Tier0 source code of 300 bits and pulse width count target for 25 PW source code in papers 9 and 10. These options create Tier2 CSK Codes that are all 300 bits in length where all are saved to memory in exactly the same formats allowing the signal processing system to read from one of multiple CSK 1-second epoch files and process the 16ary symbols without changing the receive or transmit processing software. The original CSK files retrieved from memory look exactly like the CSK random files from the above two CSK memory-based files and codes and cannot be distinguished from any of the three options described here. Since all are synchronized to the same 20 microsecond half-symbol lengths within the 1-second epoch, rollover from one unique user (and epoch file) can allow all unique users to roll in and roll out of a continuous 128 frequency carrier cluster without losing any of their unique private data. This versatility allows a dynamic rotation of network membership within a very large network membership list while keeping each member exchange data unique to each member during his online time without loss of data. With multiple in multiple out (MIMO) modes throughput to member clients receive throughputs can be from 51.2 Mbps to 2.048 Gbps on the same receive channel of 128 carriers. The transmit, or receive, carrier cluster allocation of 100 MHz is common to all members of this configuration example.

Note that a common receive channel is described for common connectivity to 1 transmitter or to 20 transmitters on the same set of 128 carriers, but with 20x CDMA levels on each cluster carrier. All memory 1-second epochs are assumed downloaded to each client or server before the rollover event. The 1-second epoch of CSK codes is about a Gigabyte of memory. A 256-code set of 128 carrier cluster is about 256 Gigabyte. The receive MIMO memory will vary between 256 Gigabytes and 2.56 Terabytes for 10x MIMO receive mode assumed common for roll-in/roll-out client users.

Primary CSK Codes Advantages

- The top configuration is for the common 300-bit code with a half-code Pulse Width count of 24
- The alternate configuration with the same length code is for Pulse Width count of 23
- The original CSK files retrieved from memory have the same format any replaced user CSK files
- A 256-code set of 128 carrier cluster is about 256 Gigabytes
- 10x MIMO receive mode channels requires 2.56 Terabytes common for roll-in/roll-out client users