

Agenda Item:**Source: Nokia****Title: Text proposal for uplink long scrambling codes****Document for: Discussion (AdHoc 10)**

6.3.2.2. Long scrambling code

The long scrambling codes are formed as described in section 6.3.2, where c_1 and c_2 are constructed as the position wise modulo 2 sum of 40960 chip segments of two binary m -sequences generated by means of two generator polynomials of degree 31. The resulting sequences thus constitute segments of a set of Gold sequences. The code c_1 is used in generating the in phase component of the complex spreading code and the code c_2 is used in generating the quadrature component. The uplink scrambling code word has a period of one radio frame of 10 ms.

Let A be an m -sequence generated by the polynomial $X^{31} + X^3 + 1$ and let B be that one by $X^{31} + X^3 + X^2 + X + 1$ over GF(2) with the same initial conditions: $A(0) = B(0) = 1$ and $A(i) = B(i) = 0$ for $i = 1, 2, \dots, 30$. Then the sequences A and B satisfy the following recurrence relations:

$$A(i + 31) = A(i + 3) + A(i) \text{ modulo } 2, i = 0, 1, 2, \dots, 2^{31} - 33 \text{ and}$$

$$B(i + 31) = B(i + 3) + B(i + 2) + B(i + 1) + B(i) \text{ modulo } 2, i = 0, 1, 2, \dots, 2^{31} - 33.$$

The long scrambling code parametrization is one dimensional, denoted by m , the parameter m runs thru pairs of Gold codes and takes integral values from 0 to $2^{25} - 1 = 33\,554\,431$. The in phase component, $c_{1,m}$, and the quadrature component, $c_{2,m}$, for the m :th long scrambling code are given by

$$c_{1,m}(k) = A(k + 2*m) \oplus B(k + 715827873) \text{ and}$$

$$c_{2,m}(k) = A(k + 1 + 2*m) \oplus B(k + 715827873),$$

where k is a chip index, $k = 0, 1, 2, \dots, 40960 - 1$, and the symbol \oplus stands for modulo 2 addition. The lowest chip index corresponds to the chip scrambled first in each radio frame. These binary code words are converted to real valued sequences by the transformation '0' -> '+1', '1' -> '-1'.

<Editor's note: this parametrization works for all chip rates, however, the value 40960 is based on assumption of a 4.096Mcps chip rate.>

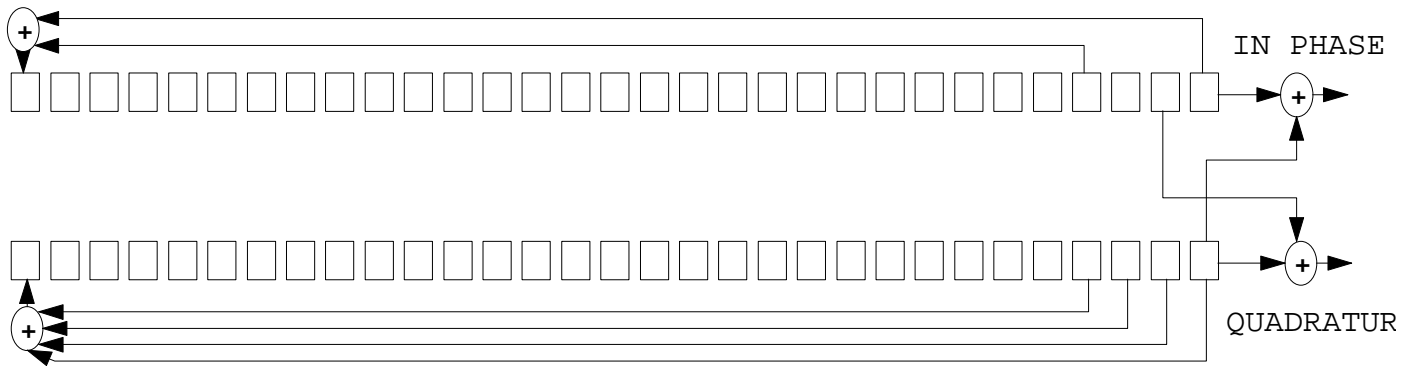


Figure 1. Configuration of uplink scrambling code generator (This is only an example, there are other possibilities as well.)