TSG-RAN Working Group 1 meeting #7bis
Kyongju, South Korea
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Agenda item:

Source: Ericsson

Title: Text proposal for PRACH/PCPCH spreading

Document for: Decision

Text proposal for TS 25.213 as in (99)e49

4.2.2 PRACH

The PRACH preamble part consist of a complex-valued code, that after pulse-shaping is transmitted using QPSK. The preamble code in described in section 4.3.3.1.

The spreading and modulation of the message part of the PRACH~~random-access~~ message part is basically the same as for the uplink dedicated physical channels~~, see section 4.2.1~~.~~, where the uplink DPDCH and uplink DPCCH are replaced by the data part and the control part respectively. The scrambling code for the message part is chosen based on the preamble code.~~ Figure XXX illustrates the principle of the spreading and scrambling of the PRACH message part, consisting of data and control parts. The binary control and data parts to be spread are represented by real-valued sequences, i.e. the binary value "0" is mapped to the real value +1, while the binary value "1" is mapped to the real value –1. The control part is spread to the chip rate by the channelization code c_c, while the data part is spread to the chip rate by the channelization code c_d.

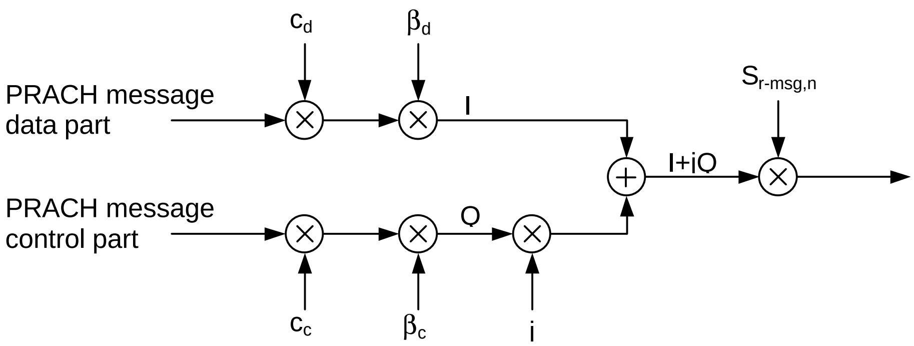

Figure XXX: Spreading and scrambling of PRACH message part.

After channelization, the real-valued spread signals are weighted by gain factors, β_c for the control part and β_d for the data part. At every instant in time, at least one of the values β_c and β_d has the amplitude 1.0. The β-values are quantized into 4 bit words. The quantization steps are given in section 4.2.1.

After the weighting, the stream of real-valued chips on the I- and Q-branches are treated as a complex-valued stream of chips. This complex-valued signal is then scrambled by the complex-valued scrambling code $S_{r\text{-}msg,n}$. After pulse-shaping (described in [1]), QPSK modulation is performed.

4.2.3 PCPCH

The PCPCH preamble part consist of a complex-valued code, that after pulse-shaping is transmitted using QPSK. The preamble code in described in section 4.3.4.3.

The spreading and modulation of the message part of the PCPCH message part is the same as for PRACH message part. Figure YYY illustrates the principle of the spreading and scrambling of the PCPCH message part, consisting of data and control parts. The binary control and data parts to be spread are represented by real-valued sequences, i.e. the binary value "0" is mapped to the real value +1, while the binary value "1" is mapped to the real value –1. The control part is spread to the chip rate by the channelization code c_c, while the data part is spread to the chip rate by the channelization code c_d.

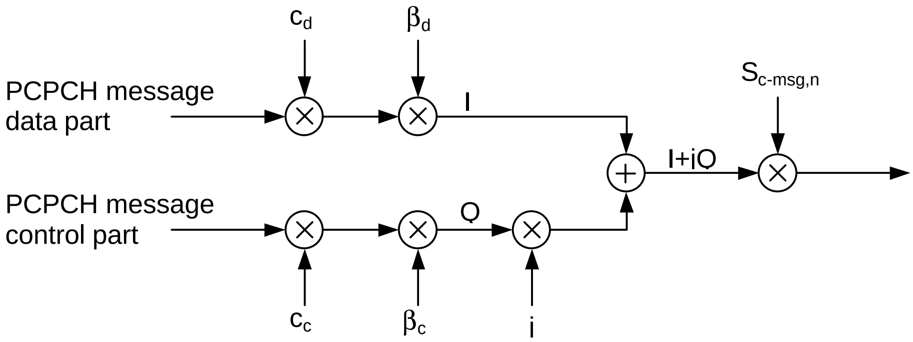

Figure YYY: Spreading and scrambling of PCPCH message part.

After channelization, the real-valued spread signals are weighted by gain factors, β_c for the control part and β_d for the data part. At every instant in time, at least one of the values β_c and β_d has the amplitude 1.0. The β-values are quantized into 4 bit words. The quantization steps are given in section 4.2.1.

After the weighting, the stream of real-valued chips on the I- and Q-branches are treated as a complex-valued stream of chips. This complex-valued signal is then scrambled by the complex-valued scrambling code $S_{c\text{-}msg,n}$. After pulse-shaping (described in [1]), QPSK modulation is performed.

4.3.3.4 Channelization codes for the message part

The preamble signature *s*, 1 ≤ *s* ≤ 16, points to one of the 16 nodes in the code-tree that corresponds to channelization codes of length 16. The sub-tree below the specified node is used for spreading of the message part. The control part is spread with the channelization code $c\cancel{C}_{\cancel{ch},c}$ (as shown in section 4.2.2) of spreading factor 256 in the lowest branch of the sub-tree, i.e. $c\cancel{C}_{\cancel{ch},c} = C\cancel{c}_{ch,256,m}$ where m = 16(s – 1) + 15. ~~The spread control part is mapped to the Q-branch, similar to the DPCCH for dedicated channels.~~

The data part uses any of the channelization codes from spreading factor 32 to 256 in the upper-most branch of the sub-tree. To be exact, the data part is spread by channelization code $C_{ch,d}$ (as shown in section 4.2.2), where $c\cancel{C}_{\cancel{ch},d} = C\cancel{c}_{ch,SF,m}$ and SF is the spreading factor used for the data part and m = SF×(s – 1)/16.