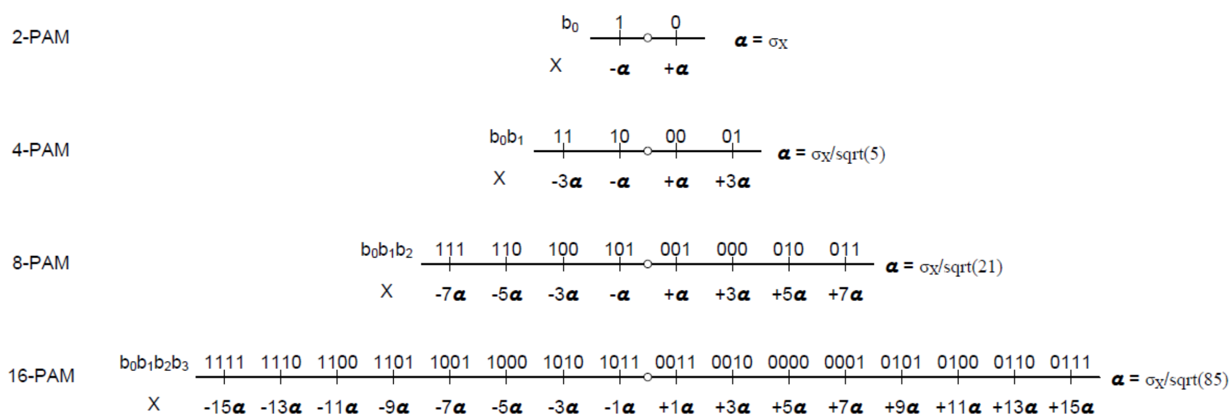
BCP SSL LLR computation:

In order to compute *LLR* values, the Soft Slicer requires the following as input:

1. One-dimensional received symbol Y_n carrying bit b_n (PAM symbol or I or Q component of QAM symbol).
2. Scaling factor $c = \frac{1}{2\sigma_N^2}$, where σ_N^2 is is the variance of the 1-dimensional effective noise in the signal at the input to the soft slicer corresponding to symbol Y_n. This scaling factor may change from symbol to symbol (WiMAX) or it may be the same for a group of symbols (LTE, WCDMA case). If the variance of the effective complex noise in the complex QAM symbol at the input to the soft slicer, σ_C^2, is estimated then $\sigma_C^2 = 2\sigma_N^2$ and $c = \frac{1}{\sigma_C^2}$.
3. The unit value UVA which is the fixed point representation of 1 in the constellation diagram, or the distance between adjacent points. Some examples of how it is used inside the BCP are given below (in this case the 1-dim points are separated by 2*a*).



Some examples of how the BCP SSL block uses the unit value and scaling factor are the following LLR output data calculations for 2-PAM (1 bit per symbol) and 4-PAM (2 bits per symbol), where a=UVA (unit value input parameter), c=scale_ci_i (noise scaling factor), and Yn is the 1-dimensional input (PAM symbol or I or Q component of QAM symbol).

2-PAM

$$LLR_0 = -\frac{2a}{\sigma_N^2} Y_n = -4acY_n$$

4-PAM

$$LLR_0 = 4ac\begin{cases} -Y_n & |Y_n| < 2a \\ 2(a\,\mathrm{sgn}(Y_n) - Y_n) & \text{otherwise} \end{cases}$$

$$LLR_1 = 4ac(|Y_n| - 2a)$$

where $\mathrm{sgn}(Y_n) \overset{def}{=} \begin{cases} 1 & Y_n \geq 0 \\ -1 & Y_n < 0 \end{cases}$