998-94-51 **Guang Gong*** (ggong@calliope.uwaterloo.ca), Department of Elec. and Comp. Eng., University of Waterloo, Waterloo, Ontario N2L 3G1, Canada. *Correlation Among Signal Sets.* Preliminary report.

Let $\mathbf{a} = \{a_i\}$ and $\mathbf{b} = \{b_i\}$ be two binary sequences with period $v$. The crosscorrelation between $\mathbf{a}$ and $\mathbf{b}$ is defined by $C_{\mathbf{a},\mathbf{b}}(\tau) = \sum_{i=0}^{v-1}(-1)^{a_{i+\tau}+b_i}, \tau = 0, 1, \cdots$. Let $\mathbf{s}_j = (s_{j,0}, s_{j,1}, \cdots, s_{j,v-1}), 0 \leq j < r$, be $r$ shift-distinct binary sequences of period $v$. Let $S = \{\mathbf{s}_0, \mathbf{s}_1, \cdots, \mathbf{s}_{r-1}\}$ and $\delta = max|C_{\mathbf{s}_i,\mathbf{s}_j}(\tau)|$ for any $0 \leq \tau < v, 0 \leq i, j < r$ where $\tau \neq 0$ if $i = j$. The set $S$ is said to be a $(v, r, \delta)$ *signal set*, and $\delta$ is referred to as the *maximum correlation of* $S$. A Kasami signal set has the parameters $v = 2^{2n} - 1$, $r = 2^n$ and $\delta = 2^n + 1$. In this work, we show the minimum maximum correlation among shift-distinct Kasami signal sets (two signal sets $S$ and $T$ are said to be *shift-distinct* if each sequence in $S$ can not be obtained from any sequence in $T$ by performing shift operation.) We also discovery a family of Kasami signal sets in which any pair of them (in a certain order) achieves the minimum maximum correlation. This result has an important application in CDMA communications and design of stream or block cipher with high nonlinearity. (Received January 06, 2004)