$N_c) + N_d$ as illustrated in Fig. 9 In an additive white Gaussian noise (AWGN) channel, the secondary user signal can be written as:

$$y(k) = s(n) + n(k), k = 0, 1, \cdots, K(N_d + N_c) + N_d - 1 \quad (15)$$

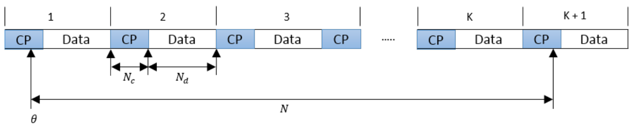

Fig. 9. Model of N-samples of received OFDM signal.

The fundamental problem of spectrum sensing is to reliably detect the presence of absence of the primary signal, then decide about spectrum availability [19] [20]. The formulated binary hypothesis test is as follows [21]:

$$\begin{cases} H_1 : y(k) = s(n) + n(k) \\ H_0 : y(k) = n(k), \;\; k = 0, 1, \cdots, K(N_d + N_c) + N_d - 1 \end{cases} \quad (16)$$

where H_1 and H_0 correspond to the presence and absence of an OFDM signal, respectively. The number of samples during a sensing period is denoted as $L = K(N_d + N_c) + N_d$ and $n(k)$ is the additive white Gaussian [22]. The measure of correlation between two OFDM symbols is described as

$$\hat{R}_i = \frac{1}{K} \sum_{k=0}^{K-1} \hat{r}_{i+k(N_d+N_c)}, \;\; i = 0, \ldots, N_d + N_c - 1 \quad (17)$$