**CLAIMS:**

1. A method for performing on-the-fly compensation on an offset between a sampling frequency and a symbol rate in a symbol sequence, and a phase offset in a receiver in order to restore data in a transmitted symbol sequence, the method comprising the steps of:

generating a plurality of polyphase-resolved received symbol sequences corresponding to the number of polyphases by shifting a relative timing when a received symbol sequence oversampled based on a predetermined number of oversamplings is down-sampled based on the inverse of the predetermined number of oversamplings, the received symbol sequences being two types of symbol sequences:

a symbol sequence having an odd phase, and

a symbol sequence having an even phase when the predetermined number of oversamplings is two;

shifting by at least one step the timing of at least two of the received symbol sequences that have been polyphased to obtain at least two received symbol sequences;

providing tap coefficient sequences with at least two variables for at least two of the received symbol sequences that have been obtained;

applying feedback from an adaptive algorithm to subsequent down-sampled symbol rates in order to input a described relationship according to a size of the tap coefficients and the received symbol sequences as the size of the tap coefficients changes;

monitoring the position of the tap coefficient indicating the maximum size among a plurality of tap coefficients based on a comparison of the sizes of the tap coefficients; and

shifting the positions of all tap coefficients and simultaneously skipping or overlapping any one of the oversampled received symbol sequences when the position of the monitored tap coefficient indicating the maximum size has moved to a different adjacent tap coefficient position.

2. The method according to claim 1 further comprising the steps of:

shifting by at least two steps the timing of at least two of the received symbol sequences that have been polyphased to obtain at least three received symbol sequences; and providing tap coefficient sequences with at least three variables for at least two of the received symbol sequences that have been obtained.

3. The method according to claim 1, wherein the initial value of the tap coefficient is established as $X(z)=1/H(z)Y(z)$ where z indicates the symbol rate in order to represent the response of a channel including multi-path interference and inter-symbol interference as a Z-conversion H(z) and to restore a transmitted symbol sequence X(z) from a received symbol sequence Y(z), and zero-order, first-order, and second-order, coefficients are assigned to the tap coefficient by performing a Taylor expansion at $z=0$ to obtain an FIR-type digital filter configuration.

4. A receiver for performing on-the-fly compensation on an offset between a sampling frequency and a symbol rate in a symbol sequence, and a phase offset in order to restore data in a transmitted symbol sequence, the receiver comprising:

a latch for generating a plurality of polyphase-resolved received symbol sequences corresponding to the number of polyphases by shifting a relative timing when a received symbol sequence oversampled based on a predetermined number of oversamplings is down-sampled based on the inverse of the predetermined number of oversamplings, the received symbol sequences being two types of symbol sequences:

a symbol sequence having an odd phase, and

a symbol sequence having an even phase when the predetermined number of oversamplings is two;

at least one latch for shifting by at least one step the timing of at least two of the received symbol sequences that have been polyphased to obtain at least two received symbol sequences;

tap coefficient sequences with at least two variables for at least two of the received symbol sequences that have been obtained;

an adaptive algorithm for applying feedback to subsequent down-sampled symbol rates in order to input a described relationship according to a size of the tap coefficients and the received symbol sequences as the size of the tap coefficients changes; and

a wavefront aligner for monitoring the position of the tap coefficient indicating the maximum size among a plurality of tap coefficients based on a comparison of the sizes of the tap coefficients, and shifting the positions of all tap coefficients and simultaneously skipping or overlapping any one of the oversampled received symbol sequences when the position of the monitored tap coefficient indicating the maximum size has moved to a different adjacent tap coefficient position.

5. The receiver according to claim 4 further comprising:

a series of two or more latches for shifting by at least two steps the timing of at least two of the received symbol sequences that have been polyphased to obtain at least three received symbol sequences; and tap coefficient sequences with at least three variables for at least two of the received symbol sequences that have been obtained.

6. The receiver according to claim 4, wherein the initial value of the tap coefficient in the tap coefficient register with the adaptive algorithm is established as $X(z)=1/H(z)Y(z)$ where z indicates the symbol rate in order to represent the response of a channel including multi-path interference and inter-symbol interference as a Z-conversion H(z) and to restore a transmitted symbol sequence X(z) from a received symbol sequence Y(z), and zero-order, first-order, second-order, etc. coefficients are assigned to the tap coefficient when a Taylor expansion is performed at $z=0$ to obtain an FIR-type digital filter configuration.

7. The receiver according to claim 4 further comprising:

an analog-to-digital converter (ADC) for oversampling the transmitted symbol sequences;

a synchronization circuit connected to the ADC for detecting the beginning of a frame; and

a Golay correlator connected to the ADC for detecting a Golay sequence; wherein a preamble is detected by detecting a Golay sequence, and frame synchronization and symbol

synchronization are performed to find the beginning position of the header.

8. A computer program product executed in a receiver for performing on-the-fly compensation on an offset between a sampling frequency and a symbol rate in a symbol sequence, and a phase offset in a receiver in order to restore data in a transmitted symbol sequence, the program product comprising: a non-transitory storage medium readable by a processing circuit in said receiver, said medium having encoded thereon:

first program code executable by the receiver to cause the receiver to generate a plurality of polyphase-resolved received symbol sequences corresponding to the number of polyphases by shifting a relative timing when a received symbol sequence oversampled based on a predetermined number of oversamplings is down-sampled based on the inverse of the predetermined number of oversamplings, the received symbol sequences being two types of symbol sequences:

a symbol sequence having an odd phase, and

a symbol sequence having an even phase when the predetermined number of oversamplings is two;

second program code executable by the receiver to cause the receiver to shift by at least one step the timing of at least two of the received symbol sequences that have been polyphased to obtain at least two received symbol sequences;

providing tap coefficient sequences with at least two variables for at least two of the received symbol sequences that have been obtained;

third program code executable by the receiver to cause the receiver to apply feedback from an adaptive algorithm to subsequent down-sampled symbol rates in order to input a described relationship according to a size of the tap coefficients and the received symbol sequences as the size of the tap coefficients changes;

fourth program code executable by the receiver to cause the receiver to monitor the position of the tap coefficient indicating the maximum size among a plurality of tap coefficients based on a comparison of the sizes of the tap coefficients; and

fifth program code executable by the receiver to cause the receiver to shift the positions of all tap coefficients and simultaneously skipping or overlapping any one of the oversampled received symbol sequences when the position of the monitored tap coefficient indicating the maximum size has moved to a different tap coefficient position.

9. The computer program product executed in the receiver according to claim 8 further comprising:

sixth program code executable by the receiver to cause the receiver to shift by at least two steps the timing of at least two of the received symbol sequences that have been polyphased to obtain at least three received symbol sequences; and seventh program code executable by the receiver to cause the receiver to provide tap coefficient sequences with at least three variables for at least two of the received symbol sequences that have been obtained.

10. The computer program product according to claim 8, wherein the initial value of the tap coefficient is established as follows: $X(z)=1/H(z)Y(z)$ where z indicates the symbol rate in order to represent the response of a channel including multi-path interference and inter-symbol interference as a Z-conversion H(z) and to restore a transmitted symbol sequence X(z) from a received symbol sequence Y(z), and zero-order, first-order, second-order, etc. coefficients are assigned to the tap coefficient when a Taylor expansion is performed at $z=0$ to obtain an FIR-type digital filter configuration.