[0005] However, in the conventional information process systems described above, a case where a difference may exist in the synchronization between a Real Time Clock (RTC) which is a source of synchronization and a CPU or IOP which is a target of synchronization by a number of effective figures per clocking is not taken into consideration. Thus, for example, if the number of effective figures per clocking of RTC which is the source of synchronization is greater than the number of effective figures per clocking of CPU or IPO which is the target of synchronization, it is impossible to perform an accurate time synchronization because, for example, the time in low digits (milliseconds) is not always in agreement with each other.

[0006] Further, since communication processing for receiving a clock signal used for the time synchronization always occurs in the conventional seismological observation systems described above, this system cannot achieve power savings when performing battery-drive wireless communications.

[0007] Therefore, embodiments of the present invention seek to provide a time synchronization system which can accurately perform a time synchronization even when a difference in the number of effective figures per clocking exists between a source of synchronization and a target of synchronization, and can save power by eliminating wireless communications for receiving clock signals.

[Summary of the Invention]

[0008] In order to solve the problem, a time synchronization system according to an aspect of the present invention includes a plurality of wireless terminal devices, each

having a first real-time clock, and a control device having a second real-time clock of which the number of effective figures per clocking is greater than that of the first real-time clock. The control device includes a preset time determinator for determining a preset time to be set to the first real-time clock of the wireless terminal device based on the second real-time clock a latency time calculator for calculating a latency time, the latency time being a period of time from the wireless terminal device acquiring the preset time until the preset time being set to the first real-time clock, and the latency time being calculated in a clock accuracy having the number of effective figures greater than that of the first real-time clock, by subtracting a time required for the wireless terminal device to acquire the preset time from the preset time. The plurality of wireless terminal devices include: a latency time timer for clocking a lapse of a latency time based on the latency time; and a time setter for setting the preset time to the first real-time clock when the latency time is lapsed, wherein the control device transmits the latency time and the preset time to the wireless terminal devices in decreasing order of the number of hops from the control device.

[0008a] According to a second aspect of the present invention, there is provided a method of setting time using a control device comprising: a

plurality of wireless terminal devices, each having a first real-time clock; and a control device having a second real-time clock of which the number of effective figures per clocking is greater than that of the first real-time clock, wherein the control device includes a preset time determinator for determining a preset time to be set to the first real-time clock of the wireless terminal device based on the second real-time clock, and

a latency time calculator for calculating a latency time, the latency time being a period of time from the wireless terminal device acquiring the preset time until the preset time being set to the first real-time clock, and the latency time being calculated in a clock accuracy having the number of effective figures greater than that of the first real-time clock, by subtracting a time required for the wireless terminal device to acquire the preset time from the preset time wherein the plurality of terminal devices include: a latency time timer for clocking a lapse of a latency time based on the latency time; and a time setter for setting the preset time to the first real-time clock when the latency time is lapsed, wherein the control device transmits the latency time and the preset time to the wireless terminal devices in decreasing order of the number of hops from the control device.

[Effects of the Invention]

[0009] According to the present disclosure, a time synchronization can accurately be performed even when a difference in the number of effective figures per clocking exists between a source of synchronization and a target of synchronization, and power can be saved by eliminating wireless communications for receiving clock signals.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a view illustrating one example of an entire configuration of a time synchronization system 1.

Fig. 2 is a view illustrating one example of a functional block diagram

CLAIMS / What is claimed is:

1. A time synchronization system, comprising:

a plurality of wireless terminal devices, each having a first real-time clock; and

a control device having a second real-time clock of which the number of effective figures per clocking is greater than that of the first real-time clock,

wherein the control device includes:

a preset time determinator for determining a preset time to be set to the first real-time clock of the wireless terminal device based on the second real-time clock; and

a latency time calculator for calculating a latency time, the latency time being a period of time from the wireless terminal device acquiring the preset time until the preset time being set to the first real-time clock, and the latency time being calculated in a clock accuracy having the number of effective figures greater than that of the first real-time clock, by subtracting a time required for the wireless terminal device to acquire the preset time from the preset time,

wherein the plurality of wireless terminal devices include:

a latency time timer for clocking a lapse of a latency time based on the latency time; and

a time setter for setting the preset time to the first real-time clock when the latency time is lapsed,

wherein the control device transmits the latency time and the preset time to the wireless terminal devices in decreasing order of the number of hops from the control device.

2. The time synchronization system of claim 1, wherein the control device calculates the latency time when setting the same preset time to at least

two or more terminal devices, so that a difference in timings of acquiring the preset time between two of the terminal devices is in agreement with a difference in the latency times between the two terminal devices.

3. The time synchronization system of any one of claims 1 or 2, wherein the terminal device is driven by a battery, and acquires the preset time and the latency time by wirelessly communicating with the control device.

4. The time synchronization system of any one of claims 1 to 3, wherein the control device calculates a timing at which the terminal device acquires the preset time, based on the number of hops between the control device and the terminal device.

5. A method of setting time using a control device comprising:

a plurality of wireless terminal devices, each having a first real-time clock; and

a control device having a second real-time clock of which the number of effective figures per clocking is greater than that of the first real-time clock,

wherein the control device includes:

a preset time determinator for determining a preset time to be set to the first real-time clock of the wireless terminal device based on the second real-time clock; and

a latency time calculator for calculating a latency time, the latency time being a period of time from the wireless terminal device acquiring the preset time until the preset time being set to the first real-time clock, and the latency time being calculated in a clock accuracy having the number of effective figures greater than that of the first

real-time clock, by subtracting a time required for the wireless terminal device to acquire the preset time from the preset time,

wherein the plurality of wireless terminal devices include:

a latency time timer for clocking a lapse of a latency time based on the latency time

; and

a time setter for setting the preset time to the first real-time clock when the latency time is lapsed,

wherein the control device transmits the latency time and the preset time to the wireless terminal devices in decreasing order of the number of hops from the control device.