

CLAIMS

We claim:

1. A system comprising:
 - a clock module, of a master device, configured to provide a master clock signal having a master clock frequency;
 - a counter module, of the master device, configured to increment or decrement a master device counter value, in response to ~~based on~~ the master clock signal;
 - a packet generation module, of the master device, configured to monitor the master device counter value and to generate a synchronization packet when the master device counter value ~~satisfies a condition~~ reaches a predefined threshold value; and
 - a communication module, of the master device, configured to transmit the synchronization packet to a slave device over a radio link coupling the system to the slave device, the synchronization packet not including the master device counter value or a measurement based on the master device counter value, the synchronization packet being based at least partially on the master clock frequency and not on information provided to the master device from the slave device, thereby allowing the slave device to synchronize a slave clock frequency to an estimated clock frequency, based on a time when the synchronization packet was received and on a slave device counter value, the estimated clock frequency corresponding to the master clock frequency.
2. The system of claim 1, wherein ~~the condition~~ predefined threshold value ~~includes the counter value reaching a predefined threshold~~ modulo value.
3. The system of claim 1, wherein the clock module is further configured to synchronize the master clock signal based on a primary reference clock.
4. The system of claim 3, wherein the primary reference clock includes a Synchronous Ethernet (SyncE) reference clock.
5. The system of claim 1, wherein the system is included in a split-mount microwave system.

6. A system comprising:

a packet monitoring module, of a slave device, configured to detect receipt of a synchronization packet from a master device, the synchronization packet being received by the system over a radio link coupling the system to the master device;

a clock module, of the slave device, configured to provide a slave clock signal having a slave clock frequency;

a counter module, of the slave device, configured to increment or decrement a slave device counter value based on the slave clock signal;

a clock frequency estimation module, of the slave device, configured to, in response to the packet monitoring module detecting the receipt of the synchronization packet from the master device, obtain a current counter value from the counter module of the slave device and to determine an estimated clock frequency of the master device based on the current counter value; and

a frequency offset calculation module, of the slave device, configured to calculate a frequency offset for the slave clock frequency based on the estimated clock frequency of the master device, thereby allowing the system to synchronize the slave clock frequency to the estimated clock frequency of the master device.

7. The system of claim 6, wherein the clock module is further configured to update the slave clock frequency based on the frequency offset.

8. The system of claim 7, wherein the system is included in a split-mount microwave system configured to receive the synchronization packet from the master device.

9. The system of claim 7, wherein the clock frequency estimation module is further configured to determine the estimated clock frequency of the master device based further on a previously estimated clock frequency of the master device.

10. The system of claim 9, wherein the clock frequency estimation module is further configured to determine the estimated clock frequency of the master device using a Kalman filter.

11. A method comprising:

monitoring a counter value of a counter at a master device, the counter being driven by a master clock signal having a master clock frequency;

generating a synchronization packet at the master device in response to the counter value ~~satisfying a condition~~ reaching a predefined threshold value; and

transmitting the synchronization packet from the master device to a slave device over a radio link coupling the slave device to the master device ~~in response to satisfaction of the condition~~ when the counter value reaches the predefined threshold value, the synchronization packet not including the master device counter value or a measurement based on the master device counter value,, the synchronization packet being based at least partially on the master clock frequency and not on information provided to the master device from the slave device, thereby allowing the slave device to synchronize a slave clock frequency to an estimated clock frequency, based on a time when the synchronization packet was received and on a slave device counter value, the estimated clock frequency corresponding to the master clock frequency.

12. The method of claim 11, wherein the ~~condition~~ predefined threshold value includes ~~the counter value reaching a predefined threshold~~ modulo value.

13. The method of claim 11, wherein the master device includes a master clock configured to provide the master clock signal.

14. The method of claim 13, further comprising synchronizing, at the master device, the master clock signal based on a primary reference clock.

15. The method of claim 14, wherein the primary reference clock includes a Synchronous Ethernet (SyncE) reference clock.

16. The method of claim 11, wherein the transmitting the synchronization packet from the master device to the slave device comprises transmitting the synchronization packet through a split-mount microwave transmitter.

17. A method comprising:

detecting receipt of a synchronization packet from a master device at a slave device, the synchronization packet being received over a radio link coupling the slave device to the master device;

in response to the detecting the receipt of the synchronization packet at the slave device, obtaining a current counter value of a counter at the slave device, the counter being driven by a slave clock signal having a slave clock frequency;

generating an estimated clock frequency ~~for~~ of the master device based on the current counter value; and

calculating a frequency offset based on the slave clock frequency and the estimated clock frequency of the master device, thereby allowing synchronization of the slave clock frequency to the estimated clock frequency of the master device.

18. The method of claim 17, further comprising updating the slave clock frequency based on the frequency offset.

19. The method of claim 17, further comprising receiving the synchronization packet through a split-mount microwave receiver coupled to the slave device.

20. The method of claim 17, wherein the slave device includes a slave clock configured to provide the slave clock signal.

21. The method of claim 17, wherein the generating the estimated clock frequency ~~for~~ of the master device is further based on a previously estimated clock frequency ~~for~~ of the master device.

22. The method of claim 21, wherein the generating the estimated clock frequency ~~for~~ of the master device comprises by using a Kalman filter.

23. A system comprising:

means for monitoring a counter value of a counter at a master device, the counter being driven by a master clock signal having a master clock frequency;

means for generating a synchronization packet at the master device in response to the counter value ~~satisfying a condition~~ reaching a predefined threshold value; and

means for transmitting the synchronization packet from the master device to a slave device over a radio link coupling the slave device to the master device when the counter value reaches the predefined threshold value, the synchronization packet not including the master device counter value or a measurement based on the master device counter value, the synchronization packet being based at least partially on the master clock frequency and not on information provided to the master device from the slave device, thereby allowing the slave device to synchronize a slave clock frequency to an estimated clock frequency, based on a time when the synchronization packet was received and on a slave device counter value, the estimated clock frequency corresponding to the master clock frequency.

24. A system comprising:

means for detecting receipt of a synchronization packet from a master device at a slave device, the synchronization packet being received by the system over a radio link coupling the slave device to the master device;

means for obtaining a current counter value of a counter at the slave device in response to the detecting the receipt of the synchronization packet at the slave device, the counter being driven by a slave clock signal having a slave clock frequency;

means for generating an estimated clock frequency of the master device based on the current counter value; and

means for calculating a frequency offset based on the slave clock frequency and the estimated clock frequency of the master device, thereby allowing the system to synchronize the slave clock frequency to the estimated clock frequency of the master device.