

## Description

The present invention relates to networks in which data is communicated between a central exchange and a number of remote subscriber stations. It is particularly concerned with systems such as optical networks in which packets of data are transmitted at high bit rates.

Optical networks are commonly installed to provide a TPON (Telephony on Passive Optical Network) service. In a typical TPON system the transmission of data is synchronized by a masterclock in the exchange. At the customer end the clock is recovered using a conventional phase lock loop (PLL). When data is transmitted back from the subscriber station to the central exchange it is possible to time the transmission to an accuracy of one tenth of a clock cycle: at a typical TPON bit rate of 20 Mbit/s this requires an accuracy of  $\pm 5$  ns. The required timing accuracy is readily achievable using conventional circuitry of modest cost. Since the system clock is accurately recovered and used by the subscriber stations for the transmission of data back to the exchange, the exchange can simply use its local clock in handling the incoming data and no further clock recovery is needed. A single clock is used throughout the system making it possible to use the TPON in bit interleave mode which reduces the demands made on the subscriber station laser and brings benefits in terms of cost and reliability.

One example of such a system in which subscriber stations recover the masterclock frequency from received data, and transmit data cells back to the exchange at that masterclock frequency is disclosed in the present Applicant's published earlier application no. WO-A-88/05233. A further feature of this system is that control signals may be sent from the exchange to a subscriber station to advance or retard the timing of transmission from the subscriber station.

In practice rather than having a network dedicated to telephony it is desirable to be able to use the system at the same time for other forms of traffic such as high bit-rate data transmission at a wavelength separated from that used for telephony. However at the data-rates typically used for such traffic, which may, for example, be around 150 Mbit/s, it proves difficult to recover the clock with sufficient speed. It is possible for the subscriber stations to retrieve the clock accurately using a conventional PLL and this is sufficient for the reception of data from the exchange. However the recovered clock has an arbitrary phase difference with respect to the masterclock dependent on the transmission distance between the exchange and the subscriber station. The realignment of the phase to an accuracy of the order of one tenth of a clock cycle or  $\pm 0.6$  ns in the time available could only be achieved by using circuitry of a cost and complexity wholly unsuitable for commercial applications. It

can, for example, be shown that to recover the clock with such an accuracy within the few bits of a clock lead-in using a conventional PLL would require a voltage control oscillator capable of covering the range from 74 to 226 MHz, which is beyond the capabilities of most such devices. Moreover the transmission of data with this degree of timing accuracy would also require the use of frequent timing updates to correct for variations in fibre delay characteristics caused by temperature fluctuations.

By contrast with the systems described above, US-A-4012598 discloses a receiver for use in a system with independent clocks in the receiver and in transmitting station. Since the frequency of the receiver clock is in general imperfectly matched to that of the transmitter clock there is a continual phase drift in the received data. In order to correct for this drift a delay line is provided with different output taps. For each pulse of the received data the phases of the different current outputs and preceding outputs are compared with the local clock and the output with optimal pulse durational phase chosen. Since the phase drift is continual a fresh determination has to be made for every pulse.

According to the present invention, there is provided a network comprising an exchange having a masterclock and a number of subscriber stations connected to the exchange and arranged to communicate data cells with the exchange, the subscriber stations being arranged to recover the masterclock frequency from data received from the exchange and to transmit data to the exchange at that masterclock frequency, the exchange including a delay line arranged to receive incoming data cells, means to sample data from different taps of the delay line and means to determine from the sampled data which tap carries data optimally in phase with the masterclock and to select that for outputting a data cell accordingly.

The present invention provides a system with a combination of features which together overcome the disadvantages of the above described systems.

The present invention uses a single clock in the head-end station but instead of attempting to recover an appropriate clock for the incoming data uses a delay line to provide a progressive delay for the data, and then identifies the tap from the delay line which carries data having a phase appropriate to the masterclock. In this manner the exchange is capable of handling data transmitted from subscriber stations with a phase which varies arbitrarily with respect to the system clock. It is therefore sufficient for the subscriber stations to time the retransmission of data to an accuracy of no more than one clock cycle. At the same time, because the entire system is locked to a single masterclock frequency there is not the continual phase drift encountered with systems such as that described in the above cited US patent. It is therefore sufficient for a single phase determination to be made

for an entire cell transmitted by a given termination.

The choice of a tap to output a current cell may be made on the basis of determinations made for one or more preceding cells from the same subscriber station.

Preferably the data cells transmitted by the subscriber stations include a header portion having a predetermined bit pattern and the means to determine includes means to identify the position of the predetermined bit pattern within the sampled data and to select the appropriate tap accordingly.

Preferably the means to determine further includes means to transmit control signals to the subscriber stations to retard the transmission of cells from the subscriber stations when the predetermined bit pattern is found to be advanced with respect to the centre of the delay line and to advance the transmission of the cells when the predetermined bit pattern is determined to be retarded with respect to the centre of the delay line.

Preferably the means to determine are arranged to be strobed at the cell transmission rate of the subscriber stations.

Preferably the network is an optical network.

According to a second aspect of the present invention there is provided a method of communicating data in a network having an exchange including a masterclock and a number of subscriber stations connected to the exchange, comprising transmitting data from the exchange to the subscriber stations, recovering the masterclock frequency at the subscriber stations from the transmitted data, transmitting a data cell from a subscriber station to the exchange at the masterclock frequency, at the exchange applying different progressive delays to a received data cell thereby providing a plurality of different outputs having different respective phases, sampling the different outputs to determine which is optimally in phase with the masterclock and outputting a data cell from a selected one of the outputs accordingly.

A system in accordance with the present invention is now described in detail with respect to the figures of the accompanying drawings in which:

Figure 1 is a diagram showing an optical network;

Figure 2 is a block diagram of the receive circuit of the exchange;

Figure 3 is a diagram showing dataflow in the circuit of Figure 2;

Figure 4 is a diagram showing cell formats; and

Figure 5 is one example of a bit pattern held in the registers of the circuit of Figure 2.

An optical network includes a central exchange 1 connected by optical fibres 2 to a number of subscriber stations 3. In the particular example described the optical network is passive, using splitters 4 at the nodes of the network to provide a tree and branch structure. The present invention however is equally applicable to different networks having different con-

nectivities and can also be used with radio or cable networks.

In use, the central exchange 1 transmits packets of data to the subscriber stations 3 at a rate determined by a masterclock 5 formed in the exchange 1. Each subscriber station 3 recovers the clock from the received data packets using a conventional phase locked loop (PLL).

For the return transmission of data from the subscriber station 3 to the central exchange 1, each subscriber station transmits data at the frequency of the recovered clock and timed to an accuracy of  $\pm 1$  clock cycles. However the phase of the transmission from the subscriber stations 3 differs by an arbitrary amount from the phase of the masterclock at the exchange and from the phase of transmissions from neighbouring subscriber stations 3.

As shown in Figures 2 and 3, the central exchange includes on its receive side a phase alignment system which enables the exchange to handle received data using only its local masterclock 5 despite the arbitrary variations in phase.

The phase alignment system 6 includes a delay line 7 which receives the incoming data. The delay line 7 is a lumped constant line formed from discrete reactive components. The delay line 7 has a series of 30 taps arranged along the line, the taps corresponding to progressively increasing delays. In the particular example described, the delay line as a whole is 3 bits long and successive taps 8 are separated by a delay of 0.1 bits. A series of D type register 12 is arranged in parallel with the delay line, one register being connected to each tap 8. When the registers are strobed by the masterclock they then capture the instantaneous values of the data on the different taps 8. The outputs of the registers are in turn sampled by the eye position detect circuit 9 which is strobed at the cell transmission rate. This circuit which is implemented in standard ECL logic determines from the sampled data which tap on the delay line 7 carries data corresponding in phase to the masterclock and outputs data from that tap accordingly.

Data cells are transmitted between the exchange and subscriber stations using an extended version of the standard ATM (Asynchronous Transfer Mode) cell format. This APON (ATM on passive optical network) format provides a clock lead-in at the head (H) of the cells for the return direction, that is from the subscriber station to the exchange. This lead-in has a distinctive bit pattern which in the present example is simply a binary 1 bounded by at least two binary 0's, one on either side. This pattern provides an "eye" the position of which is determined by the eye position detect circuitry in order to identify the appropriate tap.

Figure 5 shows a typical example of the data from the delay lines held in the D type registers. The eye detect circuitry 9 includes a pair of latched priority encoders 10 which determine the position of the first 1

from the left and from the right of the series of registers respectively. In the present example therefore these would return the values of the 6th and 14th registers. The values are then added and divided by 2, by discarding the least significant bit, to give the value of the register at the centre of the eye pattern, which in the present example is the 10th register. Since the datastream was initially sampled by the D registers in phase with the masterclock and the datastream on the corresponding 10th tap was centred on the eye pattern that data stream is known to be in phase with the masterclock and so thereafter is used to provide the data output. Since the line 7 is 3 bits wide there are in general 3 outputs matched in phase to the masterclock. Choosing only that one output at which the eye is centred ensures that the data is not only synchronised to the masterclock but also to the cell transmission rate, considerably simplifying the handling of the data output by the system.

In practice it is found that the performance of the system is further improved if instead of relying upon a single determination the output is selected upon the basis of, e.g., a rolling average of the results of the calculations for the present sample and, e.g., the two preceding samples made by the eye position detect circuitry for cells from the same subscriber station as the current data cells. The system is then less prone to jitter in response to noise creating a spurious transition in the received data. These cells may of course be separated by cells from other subscriber stations. The logic circuit is able to determine which samples relate to which subscriber stations by reference to information carried in the header of the APON cells identifying the stations concerned.

In order to remove some of the constraints on the timing of the above processes it is found to be advantageous to offset the calculations by one sample: the tap for outputting the  $n$ th cell from a given subscriber station is then chosen on the basis of calculations made for the  $(n-3)$ th,  $(n-2)$ th and  $(n-1)$ th cells from that station.

To prevent the predetermined bit pattern wandering outside the 3-bit wide window defined by the delay line 7 the eye position detect circuitry 9 also includes a control circuit 11 arranged to generate control signals which are transmitted back to the subscriber stations to modify the timing of the transmission of data. These control signals, which can be derived simply by comparing the values from the priority encoders with predetermined ideal values, indicate whether the data cells are arriving at the exchange early or late and cause the subscriber stations to retard or advance the transmission of data accordingly.

## Claims

1. A network comprising an exchange (1) having a

masterclock (5) and a number of subscriber stations (3) connected to the exchange (1) and arranged to communicate data cells with the exchange (1), the subscriber stations (3) being arranged to recover the masterclock frequency from data received from the exchange (1) and to transmit data to the exchange (1) at that masterclock frequency, characterized in that the exchange (1) includes a delay line (7) arranged to receive incoming data cells, means (S) to sample data from different taps of the delay line (7) and means (9) to determine from the sampled data which tap carries data optimally in phase with the masterclock (5) and to select that for outputting a data cell accordingly.

2. A network according to claim 1, characterized in that the data cells transmitted by the subscriber stations (3) include a header portion (H) having a predetermined bit pattern and the means to determine (9) includes means to identify the position of the predetermined bit pattern within the sampled data and to select the appropriate tap accordingly.
3. A network according to claim 2, characterized in that the means to determine (9) further includes means to transmit control signals to the subscriber stations (3) to retard the transmission of cells from the subscriber stations (3) when the predetermined bit pattern is found to be advanced with respect to the centre of the delay line (7) and to advance the transmission of the cells when the predetermined bit pattern is determined to be retarded with respect to the centre of the delay line (7).
4. A network according to claims 2 or 3, characterized in that the means to determine (9) are arranged to be strobed at the cell transmission rate of the subscriber stations.
5. A network according to any one of the preceding claims, characterized in that the means to determine (9) is arranged to choose an output for a current data cell from a particular subscriber station (3) in accordance with the determination made for one or more preceding data cells from the same subscriber station (3).
6. A network according to claim 5, characterized in that the means to determine (9) includes averaging means arranged to calculate a rolling average of the results of at least two determinations and the means to determine (9) are arranged to choose the output for the current data cell in accordance with the rolling average.



from the left and from the right of the series of registers respectively. In the present example therefore these would return the values of the 6th and 14th registers. The values are then added and divided by 2, by discarding the least significant bit, to give the value of the register at the centre of the eye pattern, which in the present example is the 10th register. Since the datastream was initially sampled by the D registers in phase with the masterclock and the datastream on the corresponding 10th tap was centred on the eye pattern that data stream is known to be in phase with the masterclock and so thereafter is used to provide the data output. Since the line 7 is 3 bits wide there are in general 3 outputs matched in phase to the masterclock. Choosing only that one output at which the eye is centred ensures that the data is not only synchronised to the masterclock but also to the cell transmission rate, considerably simplifying the handling of the data output by the system.

In practice it is found that the performance of the system is further improved if instead of relying upon a single determination the output is selected upon the basis of, e.g., a rolling average of the results of the calculations for the present sample and, e.g., the two preceding samples made by the eye position detect circuitry for cells from the same subscriber station as the current data cells. The system is then less prone to jitter in response to noise creating a spurious transition in the received data. These cells may of course be separated by cells from other subscriber stations. The logic circuit is able to determine which samples relate to which subscriber stations by reference to information carried in the header of the APON cells in identifying the stations concerned.

In order to remove some of the constraints on the timing of the above processes it is found to be advantageous to offset the calculations by one sample: the tap for outputting the nth cell from a given subscriber station is then chosen on the basis of calculations made for the (n-3)th, (n-2)th and (n-1)th cells from that station.

To prevent the predetermined bit pattern wandering outside the 3-bit wide window defined by the delay line 7 the eye position detect circuitry 9 also includes a control circuit 11 arranged to generate control signals which are transmitted back to the subscriber stations to modify the timing of the transmission of data. These control signals, which can be derived simply by comparing the values from the priority encoders with predetermined ideal values, indicate whether the data cells are arriving at the exchange early or late and cause the subscriber stations to retard or advance the transmission of data accordingly.

## Claims

1. A network comprising an exchange (1) having a

masterclock (5) and a number of subscriber stations (3) connected to the exchange (1) and arranged to communicate data cells with the exchange (1), the subscriber stations (3) being arranged to recover the masterclock frequency from data received from the exchange (1) and to transmit data to the exchange (1) at that masterclock frequency, characterized in that the exchange (1) includes a delay line (7) arranged to receive incoming data cells, means (S) to sample data from different taps of the delay line (7) and means (9) to determine from the sampled data which tap carries data optimally in phase with the masterclock (5) and to select that for outputting a data cell accordingly.

2. A network according to claim 1, characterized in that the data cells transmitted by the subscriber stations (3) include a header portion (H) having a predetermined bit pattern and the means to determine (9) includes means to identify the position of the predetermined bit pattern within the sampled data and to select the appropriate tap accordingly.
3. A network according to claim 2, characterized in that the means to determine (9) further includes means to transmit control signals to the subscriber stations (3) to retard the transmission of cells from the subscriber stations (3) when the predetermined bit pattern is found to be advanced with respect to the centre of the delay line (7) and to advance the transmission of the cells when the predetermined bit pattern is determined to be retarded with respect to the centre of the delay line (7).
4. A network according to claims 2 or 3, characterized in that the means to determine (9) are arranged to be strobed at the cell transmission rate of the subscriber stations.
5. A network according to any one of the preceding claims, characterized in that the means to determine (9) is arranged to choose an output for a current data cell from a particular subscriber station (3) in accordance with the determination made for one or more preceding data cells from the same subscriber station (3).
6. A network according to claim 5, characterized in that the means to determine (9) includes averaging means arranged to calculate a rolling average of the results of at least two determinations and the means to determine (9) are arranged to choose the output for the current data cell in accordance with the rolling average.



7. A network according to any one of the preceding claims further characterized in that it is an optical network.
8. A method of communicating data in a network having an exchange (1) including a masterclock (5) and a number of subscriber stations (3) connected to the exchange (1), comprising transmitting data from the exchange (1) to the subscriber stations (3), recovering the masterclock frequency at the subscriber stations (3) from the transmitted data, transmitting a data cell from a subscriber station (3) to the exchange (1) at the masterclock frequency, characterized by applying at the exchange different progressive delays to a received data cell thereby providing a plurality of different outputs having different respective phases, sampling the different outputs to determine which is optimally in phase with the masterclock and outputting a data cell from a selected one of the outputs accordingly.
9. A method according to claim 8, characterized in that the data cells transmitted by the subscriber stations include a header portion (H) having a predetermined bit pattern and the step of determining which of the different outputs is optimally in phase with the masterclock includes determining the position of the predetermined bit pattern within the different outputs.
10. A method according to claim 9, further characterized by transmitting control signals from the exchange (1) to the subscriber stations (3) to retard the transmission of cells from the subscriber stations (3) when the predetermined bit pattern is found to be advanced with respect to the centre of the delay line (7) and to advance the transmission of the cells when the predetermined bit pattern is determined to be retarded with respect to the centre of the delay line (7).
11. A method according to any one of claims 8 to 10, characterized in that the determination of which of the outputs is optimally in phase is repeated at the cell transmission rate of the subscriber stations.
12. A method according to claim 11, characterized in that the output for a current data cell from a particular subscriber station is chosen in accordance with the determination made for one or more preceding data cells from the same subscriber station.
13. A method according to claim 12, characterized in that a rolling average of the results of at least two determinations is calculated, and the output for

the current data cell chosen in accordance with the rolling average.

## 5 Patentansprüche

1. Datennetz, das einen Vermittler (1) mit einem Haupttaktgeber (5) und eine Anzahl von mit dem Vermittler (1) verbundenen und zum Austausch von Datenzellen mit dem Vermittler (1) eingerichteten Abonnementstationen (3) umfaßt, wobei die Abonnementstationen (3) eingerichtet sind, um die Haupttaktfrequenz aus von Vermittler (1) empfangenen Daten wiederzugewinnen und Daten an den Vermittler (1) mit der Haupttaktfrequenz zu übertragen, dadurch gekennzeichnet, daß der Vermittler (1) umfaßt: eine Verzögerungsstrecke (7), die eingerichtet ist, um eintreffende Datenzellen zu empfangen, eine Abtasteinrichtung (S) zum Abtasten von Daten von unterschiedlichen Abgriffen der Verzögerungsstrecke (7) und eine Bestimmungseinrichtung (9), die eingerichtet ist, um aus den abgetasteten Daten zu bestimmen, welcher Abgriff optimal in Phase mit dem Haupttaktgeber (5) stehende Daten führt und um dementsprechend diesen zum Ausgeben einer Datenzelle zu wählen.
2. Netz nach Anspruch 1, dadurch gekennzeichnet, daß die von den Abonnementstationen (3) gesendeten Zellen einen Kopfabschnitt (H) mit einem vorgegebenen Bitmuster umfassen und daß die Bestimmungseinrichtung (9) eine Einrichtung zum Identifizieren der Position des vorgegebenen Bitmusters innerhalb der abgetasteten Daten und zum dementsprechenden Auswählen des passenden Abgriffs umfaßt.
3. Datennetz nach Anspruch 2, dadurch gekennzeichnet, daß die Bestimmungseinrichtung (9) ferner eine Einrichtung zum Übertragen von Steuersignalen an die Abonnementstationen (3) umfaßt, um die Übertragung von Zellen von den Abonnementstationen (3) zu verzögern, wenn festgestellt wird, daß das vorgegebene Bitmuster gegen die Mitte der Verzögerungsstrecke (7) nach vorn verschoben ist, und um die Übertragung der Zellen vorzuziehen, wenn festgestellt wird, daß das vorgegebene Bitmuster bezüglich der Mitte der Verzögerungsstrecke (7) nach hinten verschoben ist.
4. Datennetz nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Bestimmungseinrichtung (9) eingerichtet ist, um mit der Zellenübertragungsrate der Abonnen-



tenstationen ausgelöst zu werden.

5. Datennetz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Bestimmungseinrichtung (9) eingerichtet ist, um einen Ausgang für eine gegenwärtige Datenzelle von einer bestimmten Abonnen-tenstation (3) entsprechend der für ein oder mehrere voran-gegangene Datenzellen von derselben Abonnen-tenstation (3) getroffenen Bestimmung zu wäh-len.
6. Datennetz nach Anspruch 5, dadurch gekennzeichnet, daß die Bestimmungseinrichtung (9) eine Mittelwert-einrichtung umfaßt, die eingerichtet ist, um einen laufenden Mittelwert der Ergebnisse von wenig-stens zwei Bestimmungen zu berechnen, und daß die Bestimmungseinrichtung (9) eingerichtet ist, um den Ausgang der gegenwärtigen Daten-zelle gemäß dem laufenden Mittelwert zu wäh-len.
7. Datennetz nach einem der vorhergehenden An-sprüche, dadurch gekennzeichnet, daß es ein optisches Datennetz ist.
8. Verfahren zum Austausch von Daten in einem Datennetz mit einem Vermittler (1), der einen Haupttaktgeber (5) umfaßt, und einer Anzahl von Abonnen-tenstationen (3), die mit dem Vermittler (1) verbunden sind, welches Verfahren umfaßt: Senden von Daten vom Vermittler (1) zu den Abonnen-tenstationen (3), Wiedergewinnen der Haupttaktfrequenz an den Abonnen-tenstationen (3) aus den gesendeten Daten, Senden einer Datenzelle von einer Abonnen-tenstation (3) zum Vermittler (1) mit der Haupttakt-frequenz, dadurch gekennzeichnet, daß am Vermittler unterschiedliche zunehmende Verzögerungen auf eine empfangene Datenzelle angewandt werden, um so eine Mehrzahl von un-terschiedlichen Ausgangssignalen mit jeweils un-terschiedlichen Phasen zu erzeugen, die unterschiedlichen Ausgangssignale abgeta-stet werden, um zu bestimmen, welches optimal in Phase mit dem Haupttakt ist, und eine Datenzelle aus einem dementsprechend ausgewählten Ausgangssignal ausgegeben wird.
9. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß die von den Abonnen-tenstationen übertragenen Datenzellen einen Kopfabchnitt (H) mit einem

vorgegebenen Bitmuster umfassen, und daß der Schritt der Bestimmung, welches der verschiede-nen Ausgangssignale optimal in Phase mit dem Haupttakt ist, die Bestimmung der Position des vorgegebenen Bitmusters in den unterschiedli-chen Ausgangssignalen umfaßt.

10. Verfahren nach Anspruch 9, dadurch gekennzeichnet, daß Steuersignale vom Vermittler (1) zu den Abon-nen-tenstationen (3) übertragen werden, um die Übertragung von Zellen von den Abonnen-tenstationen (3) zu verzögern, wenn festgestellt wird, daß das vorgegebene Bitmuster bezüglich der Mitte der Verzögerungsstrecke (7) nach vorn verschoben ist, und die Übertragung der Zellen vorzuziehen, wenn festgestellt wird, daß das vor-gegebene Bitmuster bezüglich der Mitte der Ver-zögerungsstrecke (7) nach hinten verschoben ist.
11. Verfahren nach einem der Ansprüche 8 bis 10, dadurch gekennzeichnet, daß die Bestimmung, welches der Ausgangssignale optimal in Phase ist, mit der Zellenübertragungs-rate der Abonnen-tenstationen wiederholt wird.
12. Verfahren nach Anspruch 11, dadurch gekennzeichnet, daß das Ausgangssignal für eine gegenwärtige Da-tenzelle von einer bestimmten Atonnen-tenstation entsprechend der für ein oder mehrere vorange-gangene Datenzellen von der gleichen Abonnen-tenstation getroffenen Bestimmung ausgewählt wird.
13. Verfahren nach Anspruch 12, dadurch gekennzeichnet, daß ein laufender Durchschnitt der Ergebnisse von wenigstens zwei Bestimmungen berechnet wird, und daß das Ausgangssignal für die gegenwärti-ge Datenzelle entsprechend dem laufenden Durchschnitt gewählt wird.

## Revendications

1. Réseau comprenant un central (1) possédant une horloge pilote (5) et un certain nombre de postes d'abonnés (3) raccordés au central (1) et agencés de manière à transmettre des blocs de données au central (1), les postes d'abonnés (3) étant disposés de manière à récupérer la fré-quence de l'horloge pilote à partir de données re-çues en provenance du central (1) et envoyer des données au central (1) à la fréquence de l'horlo-ge pilote, caractérisé en ce que le central (1) comprend une ligne à retard (7) agencée de ma-



- nière à recevoir des blocs de données arrivants, des moyens (S) pour échantillonner des données provenant de différentes prises de la ligne à retard (7), et des moyens (9) pour déterminer, à partir des données échantillonnées, quelle prise transfère des données qui sont de façon optimale en phase avec l'horloge pilote (5), et pour sélectionner cette prise pour délivrer, de façon correspondante, un bloc de données.
2. Réseau selon la revendication 1, caractérisé en ce que les blocs de données transmis par les postes d'abonnés (3) comprennent une partie d'en-tête (H) possédant un profil binaire prédéterminé, et les moyens de détermination (9) comprennent des moyens pour identifier la position du profil binaire à l'intérieur des données échantillonnées et sélectionner de façon correspondante la prise appropriée.
  3. Réseau selon la revendication 2, caractérisé en ce que les moyens de détermination (9) comprennent en outre des moyens pour transmettre des signaux de commande aux postes d'abonnés (3) pour retarder la transmission de blocs à partir des postes d'abonnés (3) lorsque le profil binaire prédéterminé s'avère être avancé par rapport au centre de la ligne à retard (7), et pour faire avancer la transmission des blocs lorsqu'il est établi que le profil binaire prédéterminé est retardé par rapport au centre de la ligne à retard (7).
  4. Réseau selon la revendication 2 ou 3, caractérisé en ce que les moyens de détermination (9) sont agencés de manière à être échantillonnés à la cadence de transmission de blocs des postes d'abonnés.
  5. Réseau selon l'une quelconque des revendications précédentes, caractérisé en ce que les moyens de détermination (9) sont agencés de manière à choisir un signal de sortie pour un bloc actuel de données à partir d'un poste d'abonné particulier (3) en fonction de la détermination effectuée pour un ou plusieurs blocs de données précédents provenant du même poste d'abonné (3).
  6. Réseau selon la revendication 5, caractérisé en ce que les moyens de détermination (9) comprennent des moyens de formation de la moyenne, agencés de manière à calculer une moyenne courante des résultats d'au moins deux déterminations, et que les moyens de détermination (9) sont agencés de manière à choisir la sortie du bloc actuel de données en fonction de la moyenne courante.
  7. Réseau selon l'une quelconque des revendications précédentes, caractérisé en outre en ce qu'il s'agit d'un réseau optique.
  8. Procédé de transmission de données dans un réseau possédant un central (1) comprenant une horloge pilote (5) et un certain nombre de postes d'abonnés (3) raccordés au central (1), comprenant l'émission de données par le central (1) en direction des postes d'abonnés (3), la récupération de la fréquence de l'horloge pilote dans les postes d'abonnés (3) à partir des données émises, l'émission d'un bloc de données par un poste central (3) en direction du central (1) à la fréquence de l'horloge pilote, caractérisé par l'application, dans le central, de différents retards progressifs à un bloc de données reçu, de manière à délivrer une pluralité de signaux de sortie différents possédant des phases respectives différentes, l'échantillonnage des différents signaux de sortie pour déterminer lequel est d'une manière optimale en phase avec l'horloge pilote, et la délivrance correspondante d'un bloc de données à partir de l'un sélectionné des signaux de sortie.
  9. Procédé selon la revendication 8, caractérisé en ce que les blocs émis par les postes d'abonnés incluent une partie d'en-tête (H) possédant un profil binaire prédéterminé, et que l'étape de détermination de celui des différents signaux de sortie d'une manière optimale en phase avec l'horloge pilote, inclut la détermination de la position du profil binaire prédéterminé dans les différents signaux de sortie.
  10. Procédé selon la revendication 9, caractérisé en outre par l'émission de signaux de commande par le central (1) en direction des postes d'abonnés (3) pour retarder l'émission de blocs par les postes d'abonnés (3) lorsque le profil binaire prédéterminé s'avère être en avance par rapport au centre de la ligne à retard (3), et faire avancer l'émission des blocs lorsqu'il est établi que le profil binaire prédéterminé est retardé par rapport au centre de la ligne à retard (7).
  11. Procédé selon l'une quelconque des revendications 8 à 10, caractérisé en ce que la détermination de celui des signaux de sortie qui est de façon optimale en phase, est répétée à la fréquence d'émission des blocs des postes d'abonnés.
  12. Procédé selon la revendication 11, caractérisé en ce que le signal de sortie pour un bloc de données actuel délivré par un poste d'abonné particulier est choisi en fonction de la détermination faite pour un ou plusieurs blocs de données précédents provenant du même poste d'abonné.



**13. Procédé selon la revendication 12, caractérisé en ce qu'une moyenne courante des résultats d'au moins deux déterminations est calculée et que le signal de sortie pour le bloc actuel de données est choisi en fonction de la moyenne courante.**

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