Description

This invention relates generally to networks that receive and transmit groups of logic signals from remote locations and, more particularly, to apparatus and method for insuring the accuracy of the information transmitted between the local and the remote locations by unambiguously identifying the initiation of a message on the network.

In the automatic control of processes, process control networks are provided to collect status information by at least one central location and to distribute control signals to the devices coupled to the network. Referring to Fig. 1, a portion of such a process control network is shown. The process control network includes a system bus 5 which has at least one central control unit 6 coupled thereto and at least one bus interface module 9 also coupled thereto. The central control unit 6 receives signals from the system bus 5 that typically communicate the status of user devices coupled to the process control network and applies signals to the network that provide the control signals determining the operation of the user devices. The bus interface unit 9 applies status signals to the system bus and receives signals from the system bus 5 which are relevant to a subset of network user devices 10 that communicate with the central control unit 6 through bus interface unit 9. User devices 10 responding to digital signals, such as motors, lamps and heaters, receive control signals through device interface unit 16 and digital output module 12 from the bus interface unit 9. User devices 10 providing digital status signals in response to contact closures provide status signals to the bus interface unit 9 by means of device interface unit 17 and digital input module 13. User devices 10 responding to analog control signals, such as control valves, receive signals from the bus interface unit 9 by means of output analog module 14 and device interface unit 18. User devices 10 of the type providing analog status information such as flowmeters, level detectors, pressure meters etc. provide the status signals to bus interface unit through interface module 19 and analog input module 15. The device interface units 16, 17, 18 and 19 convert the signals received from and transmitted to the user devices into a format usable by the digital output and input modules and the analog output and input modules, respectively. The digital input and output modules 13 and 12 and the analog input and output modules 15 and 14 couple the signals of the user devices, as transformed by the device interface unit, with the bus interface unit 9 by means of local bus 11.

In the communication between the bus interface unit 9 and the input and output modules, it is necessary to identify the initiation of a message. Otherwise, the initial portion of the message may be lost and the information compromised. In the related art, several techniques have been used to identify the initiation of a message. The intermessage spacing can have a predetermined value. The receiving unit can clock quiescent period when no message is being transmitted and accept the group of signals immediately following the quiescent period. This technique has not proven satisfactory because malfunction in the receiving apparatus can comprise the receipt of valid information after a period of non-use. Another technique to determine the initiation of a message is the use of a preamble character or group of characters that alerts the receiving apparatus of the presence of message being transmitted thereafter. The preamble technique requires relatively sophisticated apparatus for the generation and detection and places a relatively great burden of non-information bearing communication on the network.

In an article "The Domestic Digital Bus" published in New Electronics, Vol. 12, No. 5, March 1982, B. Dimond describes a digital bus for domestic entertainment and information systems, which bus is time-multiplexed into intervals during which one unit, the current master, can send a message to or demand a message from another unit, the current slave. The unit may use the bus for less than the time interval, but not for a time longer than the interval. The length of the interval is determined by the time that the slowest possible mode needs to take control on the bus. Each message is made up of a test time during which it is determined whether or not the bus is in use, mode bits containing the information which is to be transferred, master bits indicating which master has taken control of the bus, slave bits including the address for the message, control bits defining the kind of exchange taking place and data bits defining the data transfer.

US-A 4 310 922 describes a bit-sampling multiplexer with two terminals, each having a transmitter portion and a receiver portion. The transmitter in one terminal multiplexes data on a plurality of incoming data channels into a serial data frame and couples this frame across a high speed digital data bus to the opposite terminal. Two separate buses are provided to enable communication in both directions between said terminals. The transmitter portion of each terminal periodically samples each of the plurality of data channels at a rate significantly faster than the bit rate of each channel. Each transmitter includes an edge detector for generating a signal when a state change is detected in one or more high priority data channels.

A need has therefore been felt for apparatus and method that can identify the initiation of a message on a network that relies on a plurality of

criteria and which does not require elaborate apparatus to implement and which does not appreciably increase the traffic on the network.

It is an object of the present invention to provide an improved network for transmission of messages, in particular process control information, whereat the initiation of a message can be identified by a receiving network member. These objects are achieved by the methods as characterized in claims 1 and 5 and by the apparatus described in claim 7. The analyzing means of claim 7 determine whether

- a second-type bit is present in the first bit position of a character;
- a preselected alert bit is present at the predetermined location in a character, and
- a first-type bit is present in the last bit position of said character.

When any one of these tests is negative, then the character identified is a non-first character of the message. When all three conditions are met, then the initial character is identified, and the next character of a message can be identified.

Preferred details and embodiments of the invention are described in the dependent claims.

SUMMARY OF THE INVENTION

In a process control network the start message can be identified by a plurality of characteristics. The intermessage spacing has a minimum value in which the first character of a message can be distinguished from the remaining characters of the message. In a message comprised of a plurality of characters each character has a data field and at least one control field, wherein at least one bit position of the control field distinguishes the first character of a message from the remaining characters of this message.

The interval between messages is accompanied by a series of identical selected logic signals applied to the network bus. The number of these identical logic signals must exceed a certain value before the signal sequence is identified as a intermessage interval. The messages are comprised of a plurality of characters having a preselected format. The format includes a data field, a start field, a stop field and a third field. The start field and stop field have logic signals stored therein. With respect to the third field, in the preferred embodiment the third field has a first logic signal when the character is the first character of a message and has the inverse logic signal for the remaining characters of the message.

These and other features of the present invention will be understood upon reading of the following description along with the drawings.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a block diagram of process control network capable of using the present invention.

Figure 2A illustrates the features of two messages applied to the network bus, while Figure 2B is a diagram of a message character when the message character is in the first and in a non-first position of a message according to the preferred embodiment.

Figure 3 is a logic flow diagram illustrating the steps in determining when a character is a first character of a message.

DESCRIPTION OF THE PREFERRED EMBODIMENT

1. Detailed Description of the Figures

Fig. 1 has been described with reference to the related art.

Referring now to Fig. 2A, a first message 20 is followed after an intermessage distance 22 by message 21. Message 20 includes a first message character 20^{I} and a plurality of non-first message characters 20^{II}. Similarly, the next consecutive message 21 has a first message character 21^{I} and a plurality of non-first message characters 21^{II}. The intermessage interval 22 has plurality of logic '1' signals in the interval. Figure 2B illustrates the format of a message character 23 when the message character is in the first position of a message and a message character 24 when the message character is not in the first message position. The message character 23 includes a start field 23^{I} or first bit position that is chosen as a logic '0' signal (after the logic '1' signals of the intermessage interval). The first message character 23 includes a stop field 23^{IV} or bit position that is selected to be a logic '1' signal. The data (or information conveying) field 23^{II} follows the start field 23^{I} and has generally unpredictable logic signals, the logic signal depending on the information to be conveyed by that character. The alert field 23^{III} or bit position is interposed between the data field 23^{III} and the stop field 23^{IV}. The alert field is a logic '1' signal when the message character 23 is the first character of the message. For any message character 24 following the first message, character, the start field 24^{I} is a logic '0' signal, the stop field 24^{IV} is a logic '1' signal and the data field 24^{II} is determined by the information to be conveyed by the character. The alert field 24^{III} is a logic '0' signal when the character is not the first character of the message.

Referring next to Fig. 3, procedure for identifying the first character position of a message is shown. After the begin step 300, the receiving unit counts the number of logic '1' signals in step 301.

In step 302, when a non-logic '1' signal is received prior to a count of N, indicating that the interval between the messages is less than the lowest allowable value. In this situation, a determination is made that an invalid intermessage gap has occurred in step 303 and the count of logic '1' signals is begun again. When the count of logic '1' signals exceeds the value N, then, a valid intermessage interval is identified in step 304. After the determination of a valid intermessage interval, then the receiving unit determines whether the start field is a logic '0' signal, the stop field is a logic '1' signal and the alert field is a logic '1' signal in step 306. When any of these tests are negative, than the character is identified a non-first character of a message in a position that should include the first message character and a return is made to step 301 to resume the counting of logic '1' signals on the bus. When all three conditions of step 306 are valid, then the next character is detected in step 307. In step 308, tests are made to determine when the start field is a logic '0' signal, the stop field is a logic '1' signal and the alert bit is a logic '0' signal. When all of these tests are positive, the character is a legitimate character of a message, other than the first character and a return is made to step 307 to detect the next character and determine if the character is a legitimate message character in step 308. When any of the conditions of step 308 are not met, the procedure returns to step 301 to determine the presence of a valid intermessage interval and to identify a first message character.

2. Operation of the Preferred Embodiment

The identification of an initial message character depends on several factors. First, an intermessage interval that meets the criterion of exceeding a certain interval must be detected. Next, the format of each character is specified in the preferred embodiment, a character is 11 bit positions in length. A first and a last field (i.e., bit position) of the character are specified with respect to what logic signal should be stored therein. The data field consists of 8 bit positions following the start field. And finally, the next to the last (alert) field can take on two possible logic signals. When the alert field is a logic '1' signal, the associated character is (or should be) the first message character entity. When the next to last (alert) position field is a logic '0' signal, then the associated character is (or should be) a message character that is not the first character of a message. Therefore, the detection of first message character requires that the intermessage interval exceed a certain value and that a specified logic signal be present in a certain character bit location only when the character is in the first message position. This redundancy provides greater integrity in the transfer of information because the starting boundary of a message can be unambiguously identified.

An added feature of the invention is the use of the logic '1' signals during the intermessage interval. These signals help insure that the detection apparatus used by the receiving unit is operative, the detection apparatus being in constant use to identify an intermessage interval. The use of the logic '1' signals also simplifies the interval determination, the determination being obtained by counting the number of consecutive logic '1' signals.

The procedure identified in Fig. 3 can be implemented by appropriate dedicated logic apparatus. In the preferred embodiment, a microprocessor is programmed to execute the procedure. The microprocessor can be used to provide other network functionality in addition to the analysis of the character fields.

Claims

1. A method for transmitting information over a network, said information consisting of a train of messages (20, 21) with subsequent messages being spaced apart by gaps (22) filled with at least a predetermined number of first-type bits (1) and each message consisting of a series of characters comprised of bits
characterized in that
a) in each character (23, 24) the first bit (23^{I}, 24^{I}), the last bit 23^{IV}, 24^{IV}), and a preselected alert bit (23^{III}, 24^{III}) occupying a predetermined position within each character together identify the position of the character within said message; and other bits in said character represent data;
b) the first bit (23^{I}, 24^{I}) is a second-type bit and the last bit (23^{IV}, 24^{IV}) is a first-type bit;
c) the preselected alert bit (23^{III}) is a third-type bit if the character (23) is the first character of a message; and
d) the preselected alert bit (24^{III}) is a third-type bit complement if the character (24) is not the first character of a message.

2. The method of claim 1, **characterized in that** said third-type bit corresponds to the first-type bit.

3. The method of claim 1 or 2, **characterized in that** the first-type bit is "1" and the second-type bit is "0".

4. The method of claim 1, 2 or 3, **characterized in that** the preselected alert bit (23^{III}, 24^{III}) is



In step 302, when a non-logic '1' signal is received prior to a count of N, indicating that the interval between the messages is less than the lowest allowable value. In this situation, a determination is made that an invalid intermessage gap has occurred in step 303 and the count of logic '1' signals is begun again. When the count of logic '1' signals exceeds the value N, then, a valid intermessage interval is identified in step 304. After the determination of a valid intermessage interval, then the receiving unit determines whether the start field is a logic '0' signal, the stop field is a logic '1' signal and the alert field is a logic '1' signal in step 306. When any of these tests are negative, than the character is identified a non-first character of a message in a position that should include the first message character and a return is made to step 301 to resume the counting of logic '1' signals on the bus. When all three conditions of step 306 are valid, then the next character is detected in step 307. In step 308, tests are made to determine when the start field is a logic '0' signal, the stop field is a logic '1' signal and the alert bit is a logic '0' signal. When all of these tests are positive, the character is a legitimate character of a message, other than the first character and a return is made to step 307 to detect the next character and determine if the character is a legitimate message character in step 308. When any of the conditions of step 308 are not met, the procedure returns to step 301 to determine the presence of a valid intermessage interval and to identify a first message character.

2. Operation of the Preferred Embodiment

The identification of an initial message character depends on several factors. First, an intermessage interval that meets the criterion of exceeding a certain interval must be detected. Next, the format of each character is specified in the preferred embodiment, a character is 11 bit positions in length. A first and a last field (i.e., bit position) of the character are specified with respect to what logic signal should be stored therein. The data field consists of 8 bit positions following the start field. And finally, the next to the last (alert) field can take on two possible logic signals. When the alert field is a logic '1' signal, the associated character is (or should be) the first message character entity. When the next to last (alert) position field is a logic '0' signal, then the associated character is (or should be) a message character that is not the first character of a message. Therefore, the detection of first message character requires that the intermessage interval exceed a certain value and that a specified logic signal be present in a certain character bit location only when the character is in the first message position. This redundancy provides greater integrity in the transfer of information because the starting boundary of a message can be unambiguously identified.

An added feature of the invention is the use of the logic '1' signals during the intermessage interval. These signals help insure that the detection apparatus used by the receiving unit is operative, the detection apparatus being in constant use to identify an intermessage interval. The use of the logic '1' signals also simplifies the interval determination, the determination being obtained by counting the number of consecutive logic '1' signals.

The procedure identified in Fig. 3 can be implemented by appropriate dedicated logic apparatus. In the preferred embodiment, a microprocessor is programmed to execute the procedure. The microprocessor can be used to provide other network functionality in addition to the analysis of the character fields.

Claims

1. A method for transmitting information over a network, said information consisting of a train of messages (20, 21) with subsequent messages being spaced apart by gaps (22) filled with at least a predetermined number of first-type bits (1) and each message consisting of a series of characters comprised of bits **characterized in that**
   a) in each character (23, 24) the first bit (23^{I}, 24^{I}), the last bit 23^{IV}, 24^{IV}), and a preselected alert bit (23^{III}, 24^{III}) occupying a predetermined position within each character together identify the position of the character within said message; and other bits in said character represent data;
   b) the first bit (23^{I}, 24^{I}) is a second-type bit and the last bit (23^{IV}, 24^{IV}) is a first-type bit;
   c) the preselected alert bit (23^{III}) is a third-type bit if the character (23) is the first character of a message; and
   d) the preselected alert bit (24^{III}) is a third-type bit complement if the character (24) is not the first character of a message.

2. The method of claim 1, **characterized in that** said third-type bit corresponds to the first-type bit.

3. The method of claim 1 or 2, **characterized in that** the first-type bit is "1" and the second-type bit is "0".

4. The method of claim 1, 2 or 3, **characterized in that** the preselected alert bit (23^{III}, 24^{III}) is

immediately preceding the last bit (23^{IV}, 24^{IV}) of the character (23, 24).

5. A method for detecting the start of each information message in a train of messages transmitted over a network in the form of binary signals (bits), wherein subsequent messages (20, 21) are spaced apart by gaps (22) filled with at least a predetermined number of first-type bits (1) and wherein each message consists of a series of characters comprised of bits;
characterized by the steps of:
a) sensing the bits of said train to identify the occurence of a succession (22) of said predetermined number of first-type bits constituting a gap between subsequent messages;
b) following an identification of the occurence of said succession, sensing the bits of the train following said gap (22) to identify a first-occurring second-type bit (23^{I}, 24^{I}); and
c) following the identification of said first-occurring second-type bit, sensing bits of said train to identify whether an alert bit (23^{III}) occurring in the predetermined position is a first-type bit, and therefore, that a first character (20^{I}, 21^{I}) of a message (20, 21) has been detected.

6. The method of claim 5, **characterized in that** following the detection of said first character (23) of a message, sensing the bits of said train to identify whether for each following character (24) the first bit (24^{I}) is a second-type bit and the selected alert bit (24^{III}) is of opposite type than the preselected alert bit (23^{III}) of said first message character (23).

7. Apparatus for detecting an initial character of a character message transmitted over a network in the form of binary signals (bits), wherein subsequent messages (20, 21) are spaced apart by gaps (22) filled with at least a predetermined number of first-type bits (1) and wherein each message consists of a series of characters (23, 24) comprised of bits; **characterized by:**

a) timing means for determining the length of an interval (22) between subsequent messages (20, 21);
b) detection means for detecting a series of logic signals, said detection means activated when said interval (22) exceeds a preselected value, said detection means providing a character group of logic signals;
c) analyzing means for determining whether
- a second-type bit is present in the first bit position (23^{I}, 24^{I}) of a character (23, 24);
- a preselected alert bit (23^{III}) is present at the predetermined location in a character, and
- a first-type bit is present in the last bit position (23^{IV}, 24^{IV}), of said character.

8. The apparatus of claim 7, **characterized** in **that** said timing means includes a counter.

Patentansprüche

1. Verfahren zur Informationsübertragung über ein Netzwerk, wobei die Information aus einer Folge von Nachrichten (20, 21) besteht und aufeinanderfolgende Nachrichten durch Lücken (22) voneinander getrennt sind, die mit wenigstens einer vorbestimmten Anzahl von Bits (1) eines ersten Typs gefüllt sind und wobei jede Nachricht aus einer Reihe von Bits umfassenden Zeichen besteht,
dadurch gekennzeichnet, daß
a) in jedem Zeichen (23, 24) das erste Bit (23^{I}, 24^{I}), das letzte Bit (23^{IV}, 24^{IV}) und ein ausgewähltes eine vorbestimmte Position innerhalb eines Zeichens besetzendes Warnbit (23^{III}, 24^{III}) zusammen die Position des Zeichens innerhalb der Nachricht kennzeichnen; und andere Bits in dem Zeichen Daten darstellen;
b) das erste Bit (23^{I}, 24^{I}) ein Bit von einem zweiten Typ ist und das letzte Bit (23^{IV}, 24^{IV}) ein Bit vom ersten Typ ist;
c) das vorgewählte Warnbit (23^{III}) ein Bit von einem dritten Typ ist, wenn das Zeichen (23) das erste Zeichen einer Nachricht ist; und
d) das vorgewählte Warnbit (24^{III}) ein Komplementbit vom dritten Typ ist, wenn das Zeichen (24) nicht das erste Zeichen einer Nachricht ist.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet**, daß das Bit vom dritten Typ dem Bit vom ersten Typ entspricht.

3. Verfahren nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß das Bit vom ersten Typ mit "1" und das Bit vom zweiten Typ mit "0" vorgegeben ist.

4. Verfahren nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet**, daß das vorgewählte Warnbit (23^{III}, 24^{III}) unmittelbar dem letzten Bit (23^{IV}, 24^{IV}) des Zeichens (23, 24) vorausgeht.

5. Verfahren zur Feststellung des Beginns einer jeden Informationsnachricht in einer Folge von Nachrichten, die über ein Netzwerk in der Form von Binärsignalen (Bits) übertragen werden, wobei aufeinanderfolgende Nachrichten (20, 21) voneinander durch Lücken (22) getrennt sind, die mit wenigstens einer vorbestimmten Anzahl von Bits (1) eines ersten Typs gefüllt sind und wobei jede Nachricht aus einer Reihe von Bits umfassenden Zeichen besteht;
gekennzeichnet durch die Schritte:
a) Erfassung der Bits der besagten Folge, um den Auftritt einer Folge (22) der vorbestimmten Anzahl von Bits des ersten Typs zu identifizieren, die eine Lücke zwischen aufeinanderfolgenden Nachrichten bilden;
b) nachfolgend einer Identifikation des Auftritts der genannten Folge eine Erfassung der Bits der Folge, die auf die Lücke (22) folgt, um ein zuerst auftretendes Bit (23^{I}, 24^{I}) des zweiten Typs zu identifizieren; und
c) nachfolgend auf die Identifikation des zuerst auftretenden Bits vom zweiten Typ eine Erfassung der Bits der Folge, um zu identifizieren, ob ein in der vorbestimmten Position auftretendes Warnbit (23^{III}) ein Bit vom ersten Typ ist und daher, ob ein erstes Zeichen (20^{I}, 21^{I}) einer Nachricht (20, 21) festgestellt worden ist.

6. Verfahren nach Anspruch 5, **dadurch gekennzeichnet,** daß nachfolgend auf die Feststellung des ersten Zeichens (23) einer Nachricht eine Erfassung der Bits der genannten Folge erfolgt, um zu identifizieren, ob für jedes folgende Zeichen (24) das erste Bit (24^{I}) ein Bit vom zweiten Typ und das ausgewählte Warnbit (24^{III}) vom entgegengesetzten Typ wie das vorgewählte Warnbit (23^{III}) des ersten Nachrichtenzeichens (23) ist.

7. Vorrichtung zur Feststellung eines Anfangszeichens einer Zeichennachricht, die über ein Netzwerk in der Form von Binärsignalen (Bits) übertragen wird, wobei aufeinanderfolgend Nachrichten (20, 21) voneinander durch Lükken (22) getrennt sind, die mit wenigstens einer vorbestimmten Anzahl von Bits (1) eines ersten Typs gefüllt sind und wobei jede Nachricht aus einer Reihe von Bits umfassenden Zeichen (23, 24) besteht;
gekennzeichnet durch
a) eine Zeitgebereinrichtung zur Bestimmung der Länge eines Intervalles (22) zwischen aufeinanderfolgenden Nachrichten (20, 21);
b) eine Feststelleinrichtung zur Feststellung einer Reihe von Logiksignalen, wobei diese Feststelleinrichtung aktiviert wird, wenn das Intervall (22) einen vorbestimmten Wert überschreitet und die Feststelleinrichtung eine Zeichengruppe von Logiksignalen vorgibt;
c) eine Analysiereinrichtung zur Feststellung, ob
- ein Bit vom zweiten Typ in der ersten Bitposition (23^{I}, 24^{I}) eines Zeichens (23, 24) vorliegt;
- ein vorgewähltes Warnbit (23^{III}) an der vorbestimmten Position in einem Zeichen vorliegt, und
- ein Bit vom ersten Typ in der letzten Bitposition (23^{IV}, 24^{IV}) des genannten Zeichens vorliegt.

8. Vorrichtung nach Anspruch 7, **dadurch gekennzeichnet**, daß die Zeitgebervorrichtung einen Zähler umfaßt.

Revendications

1. Procédé pour transmettre une information dans un réseau, ladite information étant constituée d'un train de messages (20, 21) dont les messages subséquents sont séparés par des intervalles (22) remplis par au moins un nombre prédéterminé de chiffres binaires (bits) du premier type (1) et chaque message étant constitué d'une série de caractères composés de bits,
caractérisé en ce que
a) dans chaque caractère (23, 24) le premier bit (23^{I}, 24^{I}), le dernier bit (23^{IV}, 24^{IV}), et un bit d'incident présélectionné (23^{III}, 24^{III}) occupant une position prédéterminée à l'intérieur de chaque caractère, identifient ensemble la position du caractère à l'intérieur dudit message; et d'autres bits dans ledit caractère représentent des données;
b) le premier bit (23^{I}, 24^{I}) est un bit du deuxième type et le dernier bit (23^{IV}, 24^{IV}) est un bit du premier type;
c) le bit d'incident présélectionné (23^{III}) est un bit du troisième type si le caractère (23) est le premier caractère d'un message; et
d) le bit d'incident présélectionné (24^{III}) est un bit du troisième type complémentaire si le caractère (24) n'est pas le premier caractère d'un message.

2. Procédé de la revendication 1, caractérisé en ce que ledit bit du troisième type correspond au bit du premier type.

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3. Procédé de la revendication 1 ou 2, caractérisé en ce que le bit du premier type est "1" et le bit du deuxième type est "0".

4. Procédé de la revendication 1, 2 ou 3 caractérisé en ce que le bit d'incident présélectionné (23^{III}, 24^{III}) précède immédiatement le dernier bit (23^{IV}, 24^{IV}) du caractère (23, 24).

5. Procédé pour détecter le début de chaque message d'information dans un train de messages transmis dans un réseau sous la forme de signaux binaires (bits), dans lequel des messages subséquents (20, 21) sont séparés par des intervalles (22) remplis par au moins un nombre prédéterminé de bits du premier type (1) et dans lequel chaque message est constitué d'une série de caractères composés de bits;
caractérisé par les étapes suivantes:
a) détecter les bits dudit train pour identifier l'occurrence d'une succession (22) dudit nombre prédéterminé de bits du premier type constituant un intervalle entre des messages subséquents;
b) suivre une identification de l'occurrence de ladite succession, détecter les bits du train suivant ledit intervalle (22) pour identifier un bit du deuxième type (23^{I},24^{I}) arrivant en premier; et
c) suivre l'identification dudit bit du deuxième type arrivant en premier, détecter des bits dudit train pour identifier si un bit d'incident (23^{III}) arrivant dans la position prédéterminée, est un bit du premier type et, par conséquent, qu'un premier caractère (20^{I}, 21^{I}) d'un message (20, 21) a été détecté.

6. Procédé de la revendication 5, caractérisé en ce qu'on suit la détection dudit premier caractère (23) d'un message, qu'on détecte les bits dudit train pour identifier si pour chaque caractère suivant (24), le premier bit (24^{I}) est un bit du deuxième type et le bit d'incident sélectionné (24^{III}) est de type opposé au bit d'incident présélectionné (23^{III}) dudit premier caractère de message (23).

7. Appareil pour détecter un caractère de début d'un message de caractères transmis dans un réseau sous la forme de signaux binaires (bits), dans lequel des messages subséquents (20, 21) sont séparés par des intervalles (22) remplis par au moins un nombre prédéterminé de bits du premier type (1) et dans lequel chaque message est constitué d'une série de caractères (23, 24) composés de bits;
caractérisé par:
a) un moyen de chronométrage pour déterminer la longueur d'un intervalle (22) entre des messages subséquents (20, 21);
b) un moyen de détection pour détecter une série de signaux logiques, ledit moyen de détection étant activé quand ledit intervalle (22) dépasse une valeur présélectionnée, ledit moyen de détection produisant un groupe de caractères de signaux logiques;
c) un moyen d'analyse pour déterminer si:
- un bit du deuxième type est présent dans la position du premier bit (23^{I}, 24^{I}) d'un caractère (23, 24);
- un bit d'incident présélectionné (23^{III}) est présent à l'emplacement prédéterminé du caractère, et
- un bit du premier type est présent dans la position du dernier bit (23^{IV}, 24^{IV}) dudit caractère.

8. Appareil de la revendication 7, caractérisé en ce que ledit moyen de chronométrage comprend un compteur.