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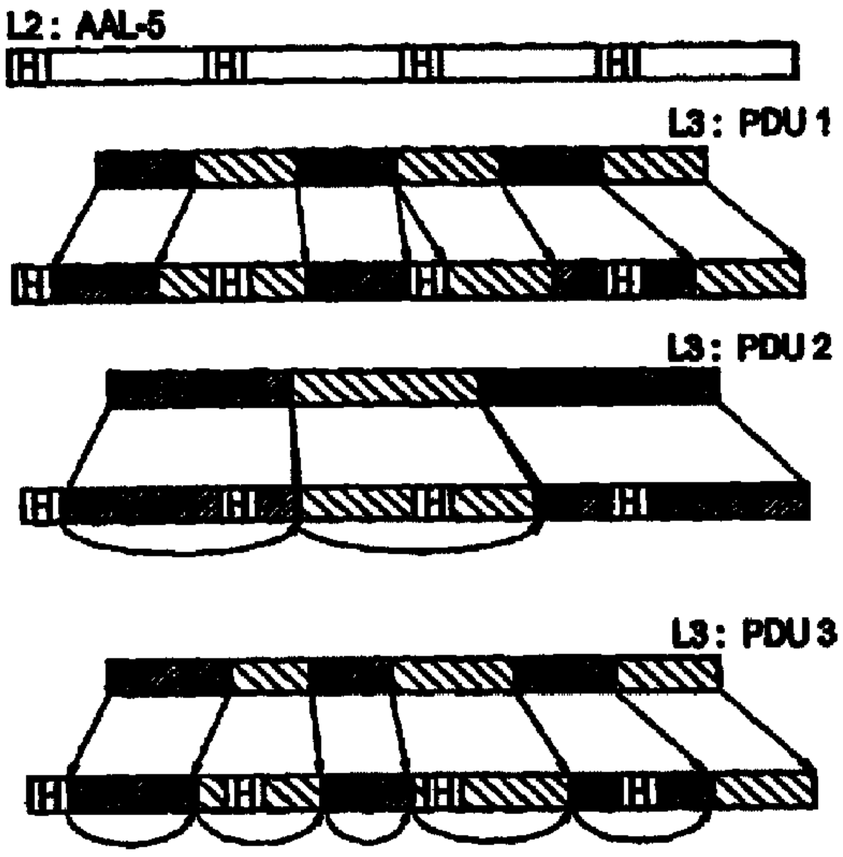
(54) **PROCEDE POUR TRANSMETTRE DES DONNEES UTILES POUVANT ETRE AFFECTEES A DIFFERENTES APPLICATIONS**

(54) **METHOD FOR TRANSMITTING USER DATA THAT CAN BE ALLOCATED TO DIFFERENT APPLICATIONS**



(57) L'invention concerne un procédé pour transmettre des données utiles pouvant être affectées à différentes applications, entre un côté A et un côté B d'une ligne de transmission au moyen d'une liaison MTA conçue par signalisation. Les données affectées aux applications individuelles sont transmises chacune à l'intérieur d'une trame à couche d'adaptation MTA contenant plusieurs cellules MTA dans des sous-structures pouvant être affectées aux applications. A cet effet, l'affectation côté A et côté B des sous-structures d'une trame à couche d'adaptation MTA est fixée, par signalisation, dans la phase de signalisation. Il est possible de fixer, par signalisation, d'autres informations, par ex. le nombre de cellules MTA qui contiennent une trame à couche d'adaptation MTA, ou bien les informations permettant de savoir si les sous-structures individuelles sont de même taille.

(57) The invention relates to a method for transmitting user data, that can be allocated to different applications, between the A-side and the B-side of an ATM transmission path using an ATM connection established by signalization. The data allocated to the individual applications is transmitted in the substructures that can be allocated to the applications within an ATM adaptation layer frame containing several ATM cells. To this end, the A-side and the B-side allocation of the substructures of an ATM adaptation layer frame is determined by signalization in the signalization phase. Additional information such as the number of ATM cells contained in an ATM adaptation layer frame or data indicating whether the individual substructures have the same size can also be determined by signalization.

PCT

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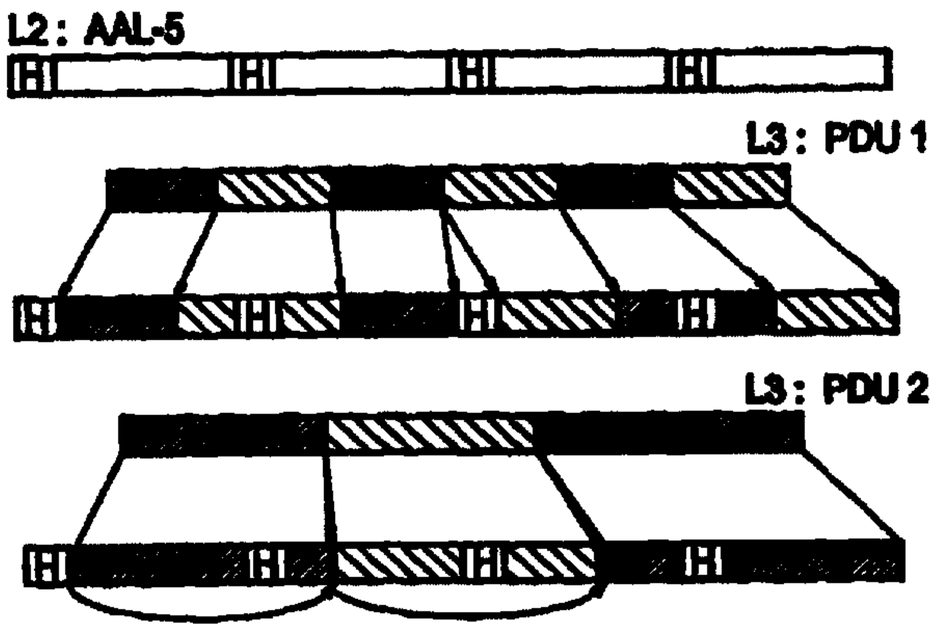
(54) Title: METHOD FOR TRANSMITTING USER DATA THAT CAN BE ALLOCATED TO DIFFERENT APPLICATIONS

(54) Bezeichnung: VERFAHREN ZUM ÜBERTRAGEN VON NUTZDATEN, DIE UNTERSCHIEDLICHEN ANWENDUNGEN ZUORDENBAR SIND

(57) Abstract

The invention relates to a method for transmitting user data, that can be allocated to different applications, between the A–side and the B–side of an ATM transmission path using an ATM connection established by signalization. The data allocated to the individual applications is transmitted in the substructures that can be allocated to the applications within an ATM adaptation layer frame containing several ATM cells. To this end, the A–side and the B–side allocation of the substructures of an ATM adaptation layer frame is determined by signalization in the signalization phase. Additional information such as the number of ATM cells contained in an ATM adaptation layer frame or data indicating whether the individual substructures have the same size can also be determined by signalization.



(57) Zusammenfassung

Verfahren zum Übertragen von Nutzdaten, die unterschiedlichen Anwendungen zuordenbar sind, zwischen einer A–Seite und einer B–Seite einer Übertragungsstrecke mit Hilfe einer per Signalisierung aufgebauten ATM–Verbindung, wobei den einzelnen Anwendungen zugeordnete Daten jeweils innerhalb eines mehrere ATM–Zellen enthaltenden ATM–Anpassungsschichtrahmens in den Anwendungen zuordenbaren Substrukturen übertragen werden. Hierzu werden die A–seitige und die B–seitige Zuordnung der Substrukturen eines ATM–Anpassungsschichtrahmens in der Signalisierungsphase per Signalisierung festgelegt. Es können auch weitere Informationen wie z.B. die Anzahl der ATM–Zellen, die ein ATM–Anpassungsschichtrahmen enthält oder die Information, ob die einzelnen Substrukturen gleich groß sind, per Signalisierung festgelegt werden.

Description

Method for transmitting user data which can be allocated to different applications

The invention relates to a method for transmitting user data which can be allocated to different applications, between an A end and a B end of a transmission path, an ATM connection being established by signaling in a signaling phase before the transmission of data between the A and the B end, data which are allocated to the individual applications being transmitted in each case within an ATM adaptation layer frame containing a plurality of ATM cells, in the substructures containing ATM cells, and it being possible to pass on the user data of the substructures in different ways depending in each case on receiver-end application allocations.

In this context, the interface which permits access to the ATM network, the ATM adaptation layer, which is also referred to as ATM adaptation layer or AAL, is of prime importance.

The AAL is the interface between ATM and the higher protocol layers. It conceals the ATM-specific properties of the transmission from the higher layers and adapts the ATM layer (bidirectionally) to them. For this purpose, the data of the higher layers are packed, together with the protocol information of the AAL layer, into the information fields of the ATM cells and are transmitted as user information, also referred to as payload. Because the AAL is responsible for the adaptation of the services of higher

layers to ATM, it does not itself play any role in the network during transmission. The AAL is for the user's benefit. It established the connection between the subscriber and network.

In increasing numbers of applications, driver programs are being used at the subscriber end instead of specific processors, said drive programs using powerful processors, which are present in any case, in computers. The intention of this was also to implement the adaptation of the data to be transmitted to the conditions of the network. This has given rise, inter alia, to the fact that the AAL-5 which was specified according to the international standard ITU-T I.362 and was provided initially only for data transmission and for the transmission of signaling data is also used in the voice domain.

In order to be able to fulfill the requirements which different services make of the AAL layer, said layer is divided into sublayers, so-called AAL sublayers, with respectively different functions.

According to the international standard ITU-T I.362, a further subdivision is expressly possible. Currently, the functions are defined as follows:

Segmentation and reassembly (SAR)

- The data which are to be transmitted are adapted to the ATM structure by appropriate segmentation into a variable which is matched to the available information field of the ATM cell
- The information content of the information fields is recovered from ATM cells for the higher layers, the

Convergence Sublayers (CS)

- The data are adapted to the requirements of the respective services by making available the service-specific properties of the AAL

Because AAL-specific protocol elements have to be inserted into the datastream by the higher layers in order to implement the properties required by the services, the function CS influences the method of operation of the SAR.

The requirements which individual services make of the transmission can be grouped together in classes, so-called Classes of Services. The requirements are given in ITU-T I.362.

For the categorization into services classes, the following criteria are to be taken into account in particular:

Is a "timing relation" necessary or not between the source and destination;

Is the bit rate constant or variable; and

Is a connection-oriented service or a connectionless service provided.

AAL-5 has, in comparison with other AALs, the advantage of a lower protocol overhead. In addition, AAL-5 provides better possibilities for detecting cell losses over the entire information content when using CRC mechanisms. In the case of voice transmission, AAL-5 fulfills most service requirements, namely synchronization of source and destination (timing relation between source and destination), constant bit rate CBR, variable bit rate VBR, connection-oriented

service, connection pipes service, low proportion of protocol in comparison with the user data (payload) of the ATM cells (protocol overhead), favorable behavior in terms of "binary alignment". Only the delay which is caused by the cell filling time when compressed voice data are transmitted is unfavorable. As long as uncompressed ISDN data are being transmitted, the cell filling times do not play any particular role. However, in the field of mobile radio, data compression is necessary in order to be able to use the restricted radio frequency bandwidth in an optimum way. Compression factors of 10 lead to a situation in which the filling times for an ATM cell rise to up to 60 msec. For this reason it is appropriate in the case of mobile radio and, if appropriate, also for other low-bit-rate applications such as ATM, to transmit more than one channel multiplexed over one VCI. For this purpose, a suitable substructure must be defined which can be embedded in ATM adaptation layers, such as AAL-5.

For this purpose, at the AAL level, an integral multiple of ATM cells should be selected as the frame, for example on the basis of AAL-5. In this context, AAL-5 would permit the protection systems contained in it to be used.

From the definition of AAL-5 it is possible to infer that a substructure can easily also be selected to be larger than the actual cell format and that it must be able to overlap the boundaries between two (or more) cells.

The fact that data are compressed in the case of mobile radio, and there is therefore no longer a constant datastream, gives rises to the need for the possibility

to be able to define in the substructure both structure elements of different magnitudes and structure elements whose magnitude changes over time.

In addition, it should be possible to be able to select the structure elements so that they all have the same magnitude in order to be able to support CBR. It should also be possible to transmit elements to support the synchronization at the same time.

It would also be desirable to be able to transmit datastreams with different addressees within one AAL frame.

For this reason, additional properties of the structure elements would have to be known at the transmitter end and receiver end, said properties being namely the magnitude of the AAL frame, the length of a structure element, the number of the structure elements in a virtual channel, the allocation of individual structure elements to addresses, an information item relating to synchronicity or asynchronicity and an information item relating to the constancy of the bit rate, that is to say CBR/VBR. If this information is transmitted in a known way within AAL frames, the protocol overhead is greatly increased.

The object of the present invention is to specify a method for transmitting user data which can be allocated to different applications, between an A end and a B end of a transmission path, an ATM connection being established by signaling in a signaling phase before the transmission of data between the A and the B end, data which are allocated to the individual applications being transmitted in each case within an ATM adaptation layer frame containing a plurality of ATM cells, in the substructures

containing ATM cells, without the protocol overhead being greatly increased.

This is achieved according to the invention in that the A-end and the B-end allocations of the substructures of an ATM adaptation layer frame are defined by signaling in the signaling phase.

This means that the address information of the individual substructures is exchanged within the scope of the signaling operations. The protocol overhead is on average increased only very slightly as a consequence of the fact that the address information only needs to be transmitted within the scope of the connection setup, and further information only has to be transmitted to a limited degree.

In addition, additional information relating to the format of the substructures can be defined by signaling in the signaling phase.

If, for example in one development of the invention, the number of ATM cells which an ATM adaptation layer frame contains is defined by signaling in the signaling phase, this information does not need to be transmitted either when there is an existing connection.

For example, in one refinement of a method according to the invention it is possible to define, by signaling in the signaling phase, whether or not the individual substructures are of equal magnitude.

In the method according to the invention, the start of the first substructure is preferably defined within a frame by the start of the frame.

When there are substructure elements of different magnitudes, in particularly favorable refinements of a method according to the invention the first element of each substructure element indicates the length of the substructure element to which it belongs, and thus indicates when the next substructure begins.

When there are substructures of different magnitudes, the length of one substructure element is preferably defined by the value range ***l*** of a length indicator field.

When ***l*** = 0 there is no longer a substructure element present. The maximum length which a substructure element can assume is thus defined by l_{max} - 1. If the length indicator field is eight bits, that is to say one octet, long, up to 256 octets can be numbered sequentially. In this way, an AAL-5 frame can consist of up to a maximum of 5 ATM cells when there are flexible structure elements.

The ATM adaptation layer frame can preferably correspond to the AAL-5 frame according to the ATM form.

A connection between the A end and the B end can be bidirectional in terms of the substructures of an ATM adaptation layer frame.

One particularly favorable refinement of a method according to the invention provides that the length of the substructure is shortened by the part which is provided for user data if no network data are to be transmitted when substructures of different magnitudes are used within one substructure.

A substructure can, if necessary, also extend over the user data area of two adjacent ATM cells, and thus include the header information area of an ATM cell.

The invention is summarized below with reference to an example.

An integral number of ATM cells is used as the structure of an AAL-5 frame. The number of cells per structure is to be negotiated during the signaling within the scope of the connection setup. When the structure elements are of flexible length, the length of one frame should not exceed 5, as is explained further below.

Whether a fixed or flexible format is to be selected is agreed through signaling. The same applies to the number of structure elements, i.e. substructures, which are to be transmitted in one frame.

Substructures can overlap from one ATM cell into the next ATM cell within one AAL-5 frame.

The allocation of individual substructures to addresses is agreed by signaling. An additional loading on the

substructures by the transportation of addressing data is thus avoided.

So that structure elements of variable length can be linked to one another, each element contains as a first octet a pointer which points to the start of the following element. This pointer has the length of one octet, with the result that up to 256 octets can be numbered sequentially. In this way, one AAL-5 frame can comprise up to a maximum of 5 cells when the structure elements are flexible. This restriction is also useful because pointing which has been possibly lost can be recovered immediately at the start of the next AAL-5 frame.

The pointing can be dispensed with in the case of structure elements of fixed length. The selected length must be negotiated here either within the scope of the signaling or be defined by administration. The length of the structure elements must always be defined as integral multiples of octets. Specific processor or bus properties can be taken into account here.

The method described is characterized by the fact that the individual structure elements do not need to be accompanied by any address information. Synchronization measures which are necessary due to frame loss can be supported on AAL-5 mechanisms. This does not require any additional agreements relating to the formats used. The identification of the last cell of a frame is sufficient with AAL-5.

Both substructures of flexible length and permanently set substructures can be used.

Within one frame, information which is chronologically correlated along one path, such as coherent audio and video signals which are transmitted in different channels, can always be sure to be transmitted in synchronism.

New formats can be defined and can then be negotiated by signaling, without having to intervene in existing processes.

In order to clarify the conversion of information from a higher layer into substructures of an AAL-5 frame, the figure shows an AAL-5 frame of the second layer L2:AAL-5, composed of four ATM cells, each with a header H and a payload element which is not identified individually. Data of a higher layer L3:PDU1, L3:PDU2 and L3:PDU3 are converted into this AAL-5 frame.

The conversion of the information L3:PDU1 gives rise here to an equidistant substructure, the conversion of the information L3:PDU2 gives rise to a variable substructuring, the individual substructures being greater than cell formats and the conversion of the information L3:PDU3 gives rise to a variable substructuring, the individual substructures being smaller than cell formats.

Patent Claims

1. A method for transmitting user data which can be allocated to different applications, between an A end and a B end of a transmission path, an ATM connection being established by signaling in a signaling phase before the transmission of data between the A and the B end, data which are allocated to the individual applications being transmitted in each case within an ATM adaptation layer frame containing a plurality of ATM cells, in the substructures containing ATM cells, and it being possible to pass on the user data of the substructures in different ways depending in each case on receiver-end application allocations, characterized in that the A-end and the B-end allocations of the substructures of an ATM adaptation layer frame are defined by signaling in the signaling phase.

2. The method as claimed in claim 1, characterized in that the number of ATM cells which an ATM adaptation layer frame contains is defined by signaling in the signaling phase.

3. The method as claimed in one of the preceding claims, characterized in that whether or not the individual substructures are of equal magnitude is defined by signaling in the signaling phase.

4. The method as claimed in one of claims 1 to 3,

characterized in that the start of the first substructure is defined within a frame by the start of the frame.

5. The method as claimed in claim 3, characterized in that in the case of substructures which are of different magnitudes, the first element of each substructure indicates the length of the substructure element to which it belongs, and thus indicates when the next substructure begins.

6. The method as claimed in one of the preceding claims, characterized in that, in the case of substructures which are of different magnitudes, the length of a substructure element is defined by the value range *1* of a length indicator field.

7. The method as claimed in one of the preceding claims, characterized in that the ATM adaptation layer frame corresponds to the AAL-5 frame in accordance with the ATM form.

8. The method as claimed in one of the preceding claims, characterized in that the connection between the A end and the B end is bidirectional in terms of the substructures of an ATM adaptation layer frame.

9. The method as claimed in one of claims 4 to 8,

characterized in that, in the case of substructures which are of different magnitudes, if no network data are to be transmitted within a substructure, the length of the substructure is shortened by the part which is provided for user data.

10. The method as claimed in one of the preceding claims, characterized in that a substructure can extend over the user data area of two adjoining ATM cells, and thus includes the header information area of one ATM cell.

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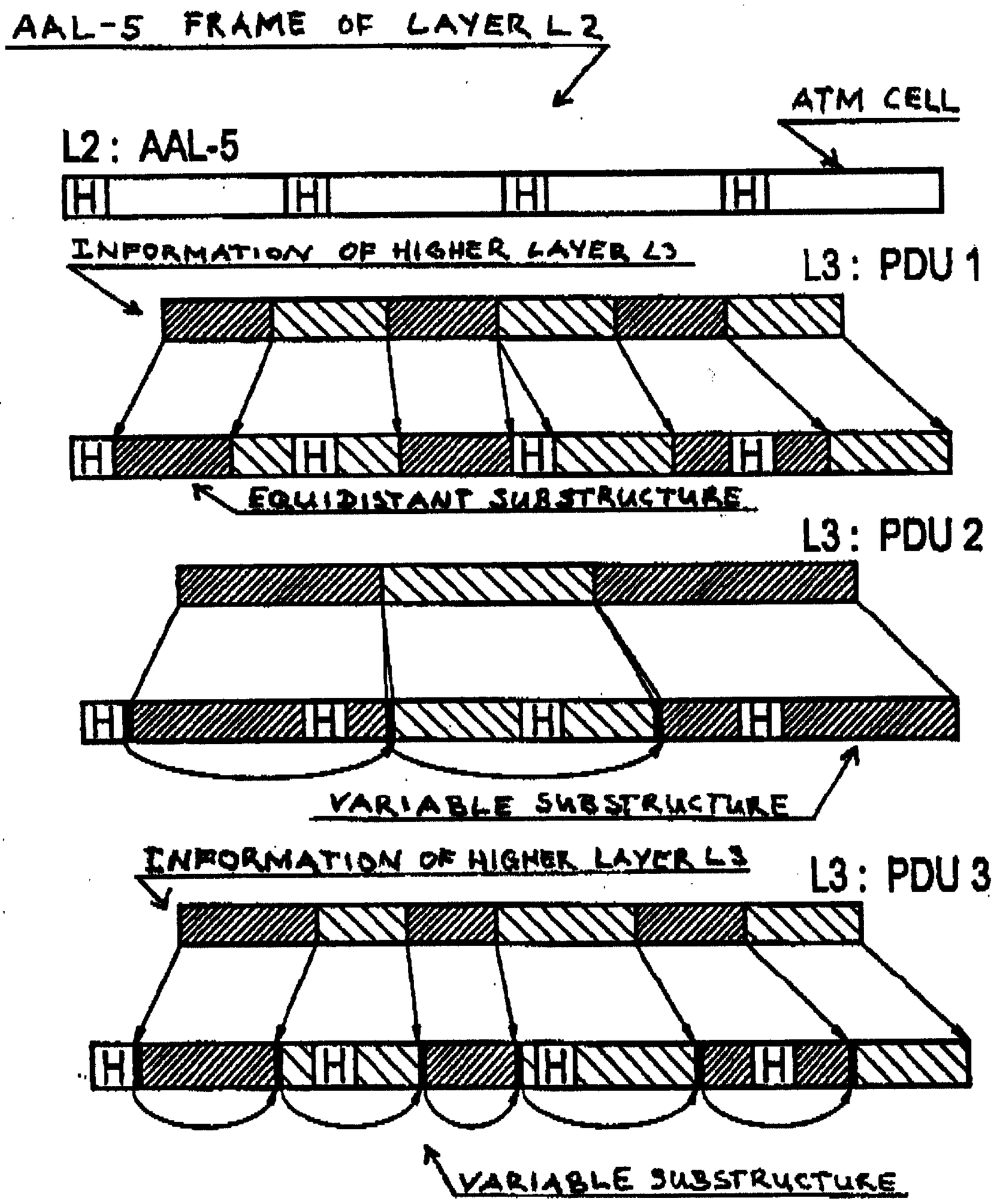
AAL-5 FRAME OF LAYER L2
ATM CELL
L2 : AAL-5
H
INFORMATION OF HIGHER LAYER L3
L3 : PDU 1
EQUIDISTANT SUBSTRUCTURE
L3 : PDU 2
VARIABLE SUBSTRUCTURE
INFORMATION OF HIGHER LAYER L3
L3 : PDU 3
VARIABLE SUBSTRUCTURE