METHOD OF GENERATING PROTOCOL DATA UNITS IN SPLIT MODE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a next generation mobile communication system, and more particularly, to a method of generating protocol data units in a split mode of a radio link control layer and transmitting them separately to a lower layer through a pair of different channels.

[0003] 2. Background of the Related Art

[0004] **FIG. 1** illustrates a method of data processing between open system interconnection (OSI) layers according to the related art. Generally, a radio link control (RLC) layer is a protocol layer corresponding to the second layer in an OSI. First, The RLC layer initially segments and/or concatenates one or more service data units (SDU) received from its next higher layer and generates a payload unit (PU). Then it produces a radio link control protocol data unit (RLC PDU) by attaching a RLC header to the PU generated and transmits the RLC PDU produced to its next lower layer called media access control (MAC) layer through a logical channel.

[0005] Thereafter, the MAC layer produces a transport block (TB), which is a MAC PDU, by optionally attaching a MAC header to a MAC SDU, which is the RLC PDU received from the RLC layer. Then the TB is transmitted to a physical (PHY) layer through a transport channel, and the PHY layer attaches a cyclic redundancy check (CRC) to the TB received and lastly transmits it to a receiving system though a physical channel.

[0006] There are two different types of the RLC PDUs generated in the RLC layer: a first type of PDUs including an unacknowledged mode data (UMD PDU) and the other type of PDUs including an acknowledged mode data (AMD PDU). The UMD PDUs are used when it is not required to transmit an acknowledgement signal to an originating system after PDUs are transmitted to a receiving system. On the other hand, the AMD PDUs are used when the acknowledgement signal is required to be transmitted to the originating system after PDUs are transmitted to the receiving system.

[0007] **FIG. 2** and **FIG. 3** illustrate structures of the UMD PDU and AMD PDU, respectively, according to the prior art. Each PDU consists of a header portion and a PU portion which includes the data. Each header in both figures commonly includes a sequence number (SN), one or more length indicators (LI), and extension (E) fields. The header attached in **FIG. 3** further includes a data/control (D/C), a polling (P), and a header extension (HE) field.

[0008] The SN field represents an order number of each PDU and has a size of 7 bits for the UMD PDU and 12 bits for the AMD PDU. The LI forms boundaries between the RLC SDUs if the PDU has more than one SDU and has a size of 7 bits or 15 bits. The E field indicates what the next following field is and has a size of one bit. The D/C field indicates whether the corresponding PDU contains data or control information. The P field requests the receiving system to send a status report and has a size of one bit. The PU includes a data field and a padding (PAD) field or a piggyback status PDU field. The data field includes the SDUs transmitted from the upper layer, and the padding is performed to make the size of each PDU in octet units. The AMD PDU sometimes is attached with the piggyback status PDU field instead of the PAD field and gets transmitted to a lower layer.

[0009] Since the header and data portions of the RLC PDU get transmitted together according to the prior art, an error rate of the header portion is always same as that of the data portion for each PDU. When it is desired to separately transmit the header portion of a PDU at a lower rate than the rate of the data portion for each PDU, the prior art technique cannot be adequately used because both portions are transmitted together at a same rate. Similarly, same problem occurs when it is necessary to separately transmit a sequence number of a RLC PDU through a different channel.

SUMMARY OF THE INVENTION

[0010] Accordingly, an object of the present invention is to solve at least the problems and disadvantages of the related art.

[0011] An object of the present invention is to provide a method of dividing a protocol data unit (PDU) into a part including its sequence number (SN) and the other part including data in a split mode and generating new PDUs corresponding to each part so that the PDU including its SN could have a lower error rate.

[0012] Another object of the present invention is to provide a method of transmitting the newly generated PDUs corresponding to each divided part through different channels so that the receiving system can receive the SNs ahead of the corresponding data.

[0013] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0014] To achieve the objects and in accordance with the purposes of the invention, as embodied and broadly described herein, a method of generating PDUs in a radio link control layer includes producing a payload unit by segmenting and/or concatenating one or more service data units received from a higher layer, generating a first PDU which includes a sequence number corresponding to the payload unit and a second PDU which includes the payload unit, and transmitting the first and second PDUs to a lower layer.

[0015] In another aspect of the present invention, a method of generating protocol data units in a system having a radio link control layer, a media access control layer, and a physical layer includes producing a first PDU which includes a sequence number corresponding to the payload unit and a second PDU which includes the payload unit, transmitting the first and second PDUs to the MAC layer, generating a first transport block by attaching a MAC header to the first PDU and a second transport block by attaching the MAC header to the second PDU, transmitting the first