Mueller Exhibit 61

EXHIBIT G

SAMSUNG'S PATENT L.R. 3-1(A)-(D) DISCLOSURES FOR U.S. PATENT NO. 7,386,001

Asserted Claim (Patent L.R. 3-1(a))	**Accused Instrumentality And How Each Element Is Met By Accused Instrumentality (Patent L.R. 3-1(b)-(d))**
1. A channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have different transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame, the apparatus comprising:	Apple's 3G Products[1] comprise a channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have different transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame. *See, e.g.,* Apple iPhone user guide re iOS 3.1: (iPhone 3G or later, p. 21): 3G 3G Shows that your carrier's 3G network is available, and iPhone can connect to the Internet over 3G. Available on iPhone 3G or later. See "How iPhone Connects to the Internet" on page 40. http://www.apple.com/iphone/specs.html (iPhone 4):

[1] "Apple's 3G Products" include iPhone 3G, iPhone 3GS, iPhone4, iPad 3G, iPad2 3G and any other products compliant with 3GPP UMTS standard.

	Cellular and wireless ▪ GSM model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz) ▪ CDMA model: CDMA EV-DO Rev. A (800, 1900 MHz) ▪ 802.11b/g/n Wi-Fi (802.11n 2.4GHz only) ▪ Bluetooth 2.1 + EDR wireless technology **Location** ▪ Assisted GPS ▪ Digital compass ▪ Wi-Fi ▪ Cellular iPad iOS 3.2 user guide (iPad):

Cellular Data

Use Cellular Data settings (on iPad Wi-Fi + 3G only) to turn Data Roaming on or off, change your account information, or add a Personal Identification Number (PIN) to lock the micro-SIM card.

Turn the cellular data network on or off: Choose Cellular Data, then turn Cellular Data on or off.

Turn data roaming on or off: Choose Data Roaming, then turn data roaming on or off.

View your account information: To see or change your account information, tap View Account.

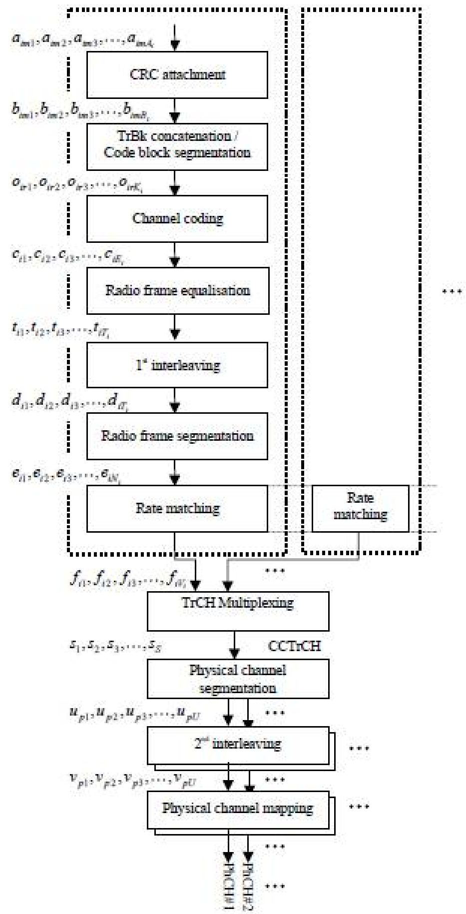
Chapter 17 Settings

http://www.apple.com/ipad/specs/ (iPad 2):

Wireless and Cellular	▪ Wi-Fi (802.11 a/b/g/n) ▪ Bluetooth 2.1 + EDR technology	▪ Wi-Fi + 3G model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz) ▪ Wi-Fi + 3G for Verizon model: CDMA EV-DO Rev. A (800, 1900 MHz) ▪ Data only[8] ▪ Wi-Fi (802.11 a/b/g/n) ▪ Bluetooth 2.1 + EDR technology Learn more about Wi-Fi + 3G
Carriers		at&t verizon

Apple's 3G products contain a baseband processor for processing UMTS ("3G") signals compliant with the multiplexing and channel coding standards specified in at least 3GPP Release 6 (3GPP Technical

	Specification 25.212 v6.0.0 ("TS 25.212 v6.0.0")). *See, e.g.,* TS 25.212 v6.0.0: "Data stream from/to MAC and higher layers (Transport block / Transport block set) is encoded/decoded to offer transport services over the radio transmission link. Channel coding scheme is a combination of error detection, error correcting, rate matching, interleaving and transport channels mapping onto/splitting from physical channels." (V6.0.0, paragraph 4.1, page 9.)

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11.) As specified in V.6.0.0, Apple's 3G products receive data frames that have different transmission time intervals (TTIs). "All transport blocks in a TTI are serially concatenated. If the number of bits in a TTI is larger than *Z*, the maximum size of a code block in question, then code block segmentation is performed after the

concatenation of the transport blocks. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)

As it can be seen from the following figure, data frames that have different transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame.

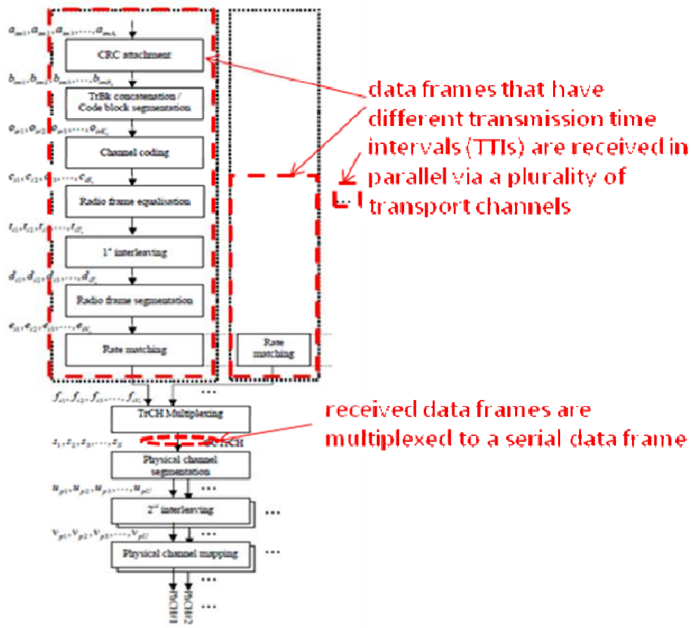
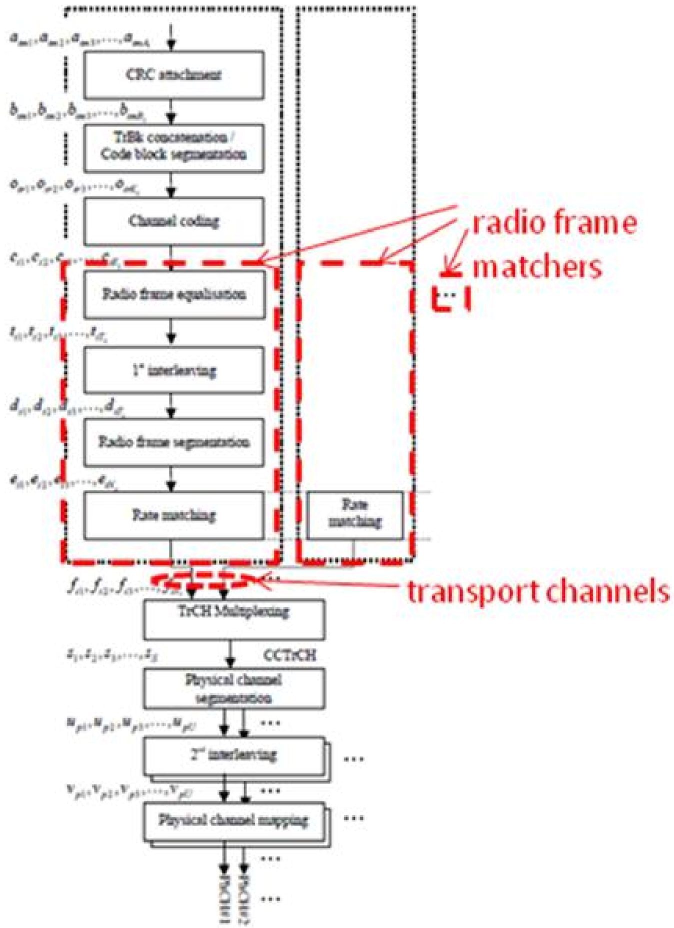


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotations added.)

"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i.
The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows:

	$y_{i,n_i k} = x_{i,((n_i - 1) \cdot Y_i) + k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.)
[a] a number of radio frame matchers, the number of radio frame matchers being at least equal to the number of the transport channels, each radio frame matcher having a radio frame segmenter for receiving the data frames and segmenting the data frames into radio frames; and	Apple's 3G products have a number of radio frame matchers, the number of radio frame matchers being at least equal to the number of the transport channels, each radio frame segmenter for receiving the data frames and segmenting the data frames into radio frames. The transport channels are denoted in the figure below as TrCH. Each of the radio frame matchers generates a transport channel and thus the number of radio frame matchers is at least equal to the number of the transport channels. *See, e.g.,* TS 25.212 v6.0.0:

	 Figure 1: Transport channel multiplexing structure for uplink (V6.0.0, paragraph 4.2, page 11. Annotations added.) Each radio frame matcher in Apple's 3G products has a radio frame segmenter.

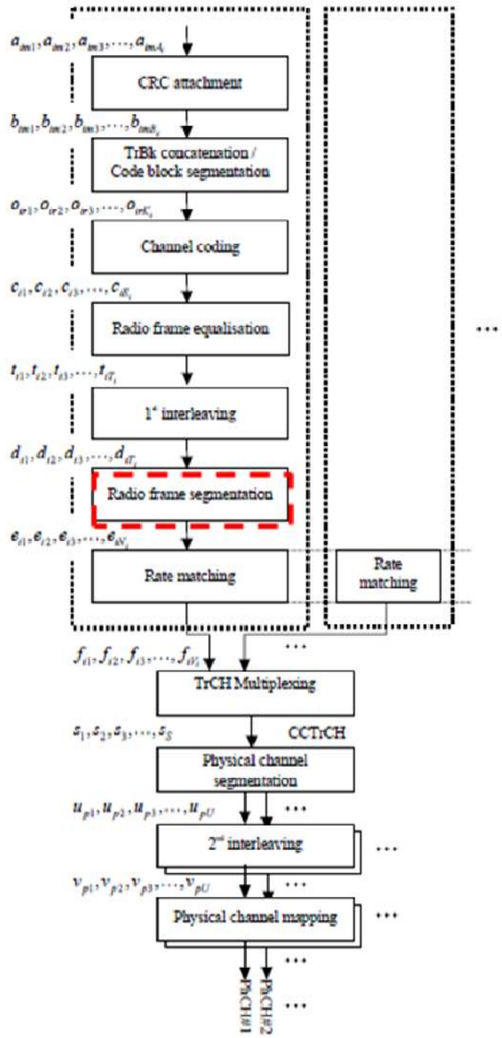
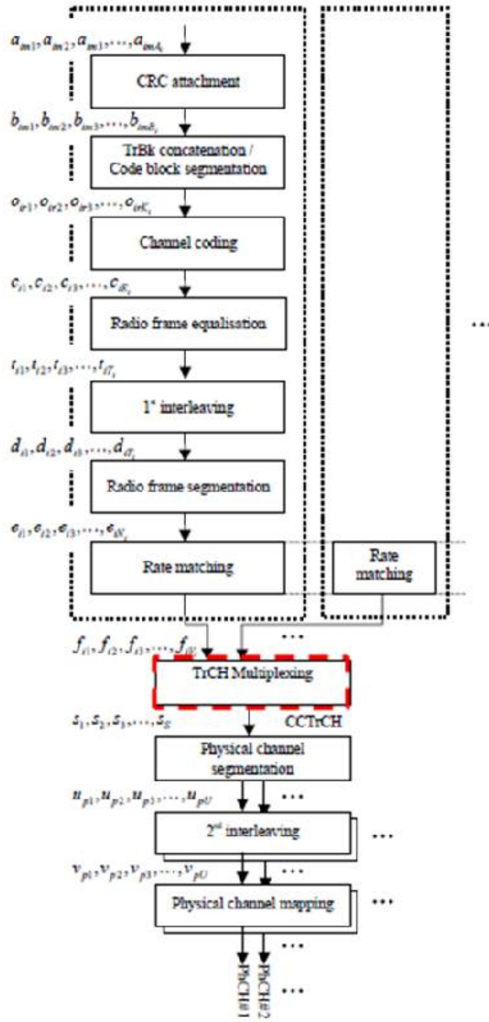


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotation added.)

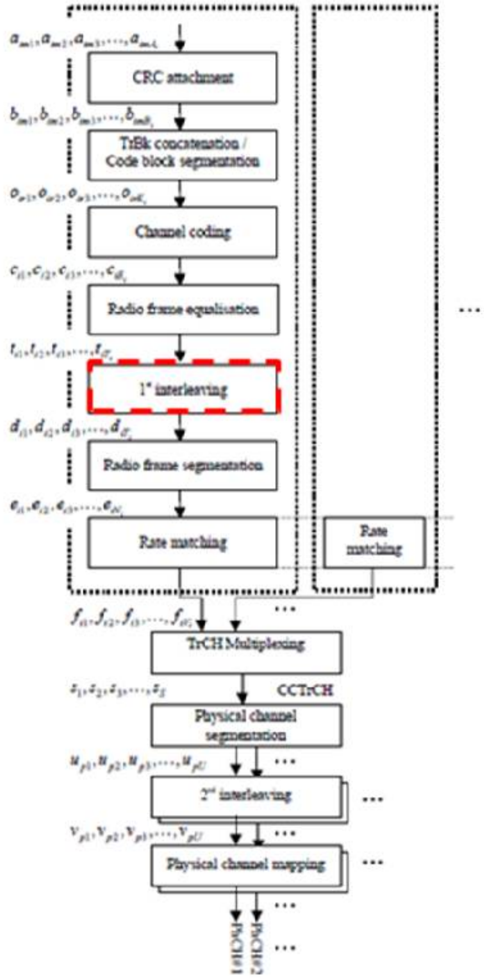
The radio frame segmenter receives the data frames and segments the data frames into radio frames.

	"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) "The input bit sequence to the radio frame segmentation is denoted by $d_{i1}, d_{i2}, d_{i3}, \ldots, d_{iT_i}$, where i is the TrCH number and T_i the number of bits. Hence, $x_{ik} = d_{ik}$ and $X_i = T_i$. The output bit sequence corresponding to radio frame n_i is denoted by $e_{i1}, e_{i2}, e_{i3}, \ldots, e_{iN_i}$, where i is the TrCH number and N_i is the number of bits. Hence, $e_{i,k} = y_{i,n_ik}$ and $N_i = Y_i$." (V6.0.0, paragraph 4.2.6.1, page 24.)
[b] a multiplexer for multiplexing the radio frames to the serial data frame,	Apple's 3G products have a multiplexer for multiplexing the radio frames to the serial data frame. *See, e.g.,* TS 25.212 v6.0.0:

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11. Annotation added.) The multiplexer in the Accused Product receives radio frames from the rate matcher and multiplexes the radio frames to the serial data frame.

	"Every 10 ms, one radio frame from each TrCH is delivered to the TrCH multiplexing. These radio frames are serially multiplexed into a coded composite transport channel (CCTrCH). The bits input to the TrCH multiplexing are denoted by $f_{i1}, f_{i2}, f_{i3}, \ldots, f_{iV_i}$, where i is the TrCH number and V_i is the number of bits in the radio frame of TrCH i. The number of TrCHs is denoted by I. The bits output from TrCH multiplexing are denoted by $s_1, s_2, s_3, \ldots, s_S$, where S is the number of bits, i.e. $S = \sum_i V_i$. The TrCH multiplexing is defined by the following relations: $s_k = f_{1k}$ $k = 1, 2, \ldots, V_1$ $s_k = f_{2,(k-V_1)}$ $k = V_1+1, V_1+2, \ldots, V_1+V_2$ $s_k = f_{3,(k-(V_1+V_2))}$ $k = (V_1+V_2)+1, (V_1+V_2)+2, \ldots, (V_1+V_2)+V_3$ … $s_k = f_{I,(k-(V_1+V_2+\ldots+V_{I-1}))}$ $k = (V_1+V_2+\ldots+V_{I-1})+1, (V_1+V_2+\ldots+V_{I-1})+2, \ldots, (V_1+V_2+\ldots+V_{I-1})+V_I$" (V6.0.0, paragraph 4.2.8, pages 41-42.)
[c] wherein each radio frame segmenter determines the bit number of a radio frame according to the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame and divides the data frames by the bit number of the radio frame.	Each radio frame segmenter determines the bit number of a radio frame according to the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame and divides the data frames by the bit number of the radio frame. *See, e.g.,* TS 25.212 v6.0.0: As the following passage explains, the i^{th} transport channel receives $x_{i1}, x_{i2}, x_{i3} \ldots x_{iXi}$ where X_i is the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio

	frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_i k} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1\ldots F_i$, $k = 1\ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) As the above passage also shows, the bit number of a radio frame is Y_i. The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel i maps the first Y_i bits of the received data frame (*i.e.*, $y_{i,1,k} - x_{i,k}$, $k=1,2,\ldots,Y_i$). The second radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,2,k} - x_{i,Yi+k}$, $k=1,2,\ldots,Y_i$), the third radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,3,k} - x_{i,2Yi+k}$, $k=1,2,\ldots,Y_i$), and so on.
2. The channel coding and multiplexing apparatus of claim 1, wherein each radio frame matcher further includes an interleaver for interleaving the data frames received by the corresponding frame matcher and applying the interleaved data to a corresponding radio frame segmenter.	Each radio frame matcher in Apple's 3G products includes an interleaver for interleaving the data frames received by the corresponding frame matcher and applying the interleaved data to a corresponding radio frame segmenter. *See, e.g.,* TS 25.212 v6.0.0: As the following figure shows, the interleaver interleaves the data frames received by the corresponding frame matcher. The interleaved data from the interleaver are applied to a corresponding radio frame segmenter.

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11. Annotation added) The interleaver interleaves data in the manner described below. “(3) Write the input bit sequence into the R1 × C1 matrix row by row starting with bit $x_{i,1}$ in column 0

	of row 0 and ending with bit $x_{i,(R1\times C1)}$ in column C1 - 1 of row R1 - 1: (4)Perform the inter-column permutation for the matrix based on the pattern $\langle P1_{C1}(j)\rangle_{j\in\{0,1,\ldots,C1-1\}}$ shown in table 4, where $P1_{C1}$ (j) is the original column position of the j-th permuted column. After permutation of the columns, the bits are denot by y_{ik}: "The bits input to the 1st i is the TrC and T_i the number of bits. Hence, $z_{i,k} = t_{i,k}$ and $Z_i = T_i$. The bis output from the 1st interleaving are denoted by $d_{i,1}, d_{i,2}, d_{i,3}, \ldots, d_{i,T_i}$, and $d_{i,k} = y_{i,k}$." (V6.0.0, paragraph, 4.2.5.3, page 23.)
3. The channel coding and multiplexing apparatus of claim 1, wherein each radio frame matcher further includes a rate matcher for adjusting the data rate of a radio frame received from a radio frame segmenter by one of puncturing and repeating parts of the radio frame to match the data rate of the radio frame to that of a physical channel frame.	Each radio frame matcher in Apple's 3G products further includes a rate matcher for adjusting the data rate of a radio frame received from a radio frame segmenter by one of puncturing and repeating parts of the radio frame to match the data rate of the radio frame to that of a physical channel frame. *See, e.g.,* TS 25.212 v6.0.0:

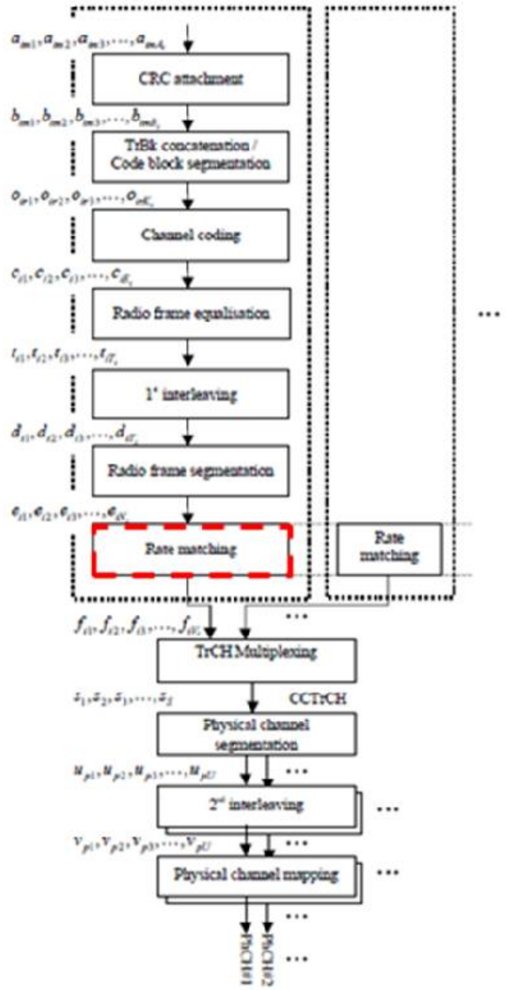


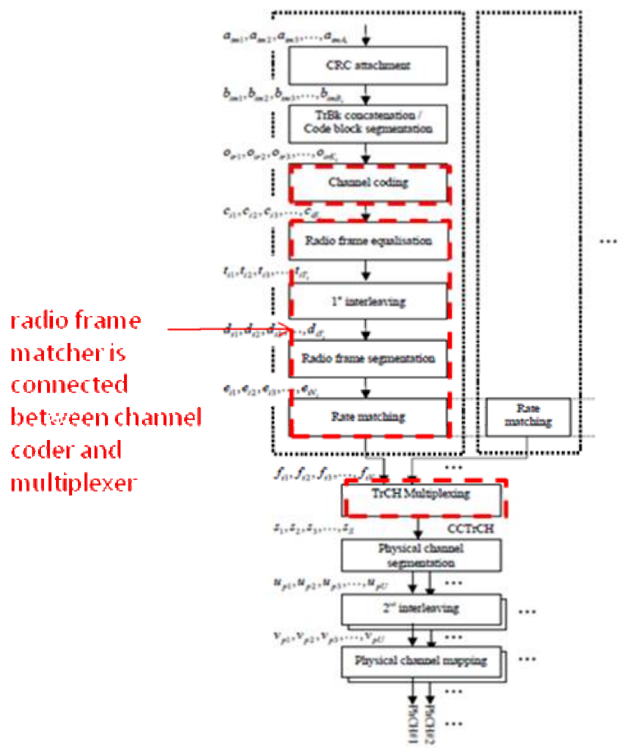
Figure 1: Transport channel multiplexing structure for uplink

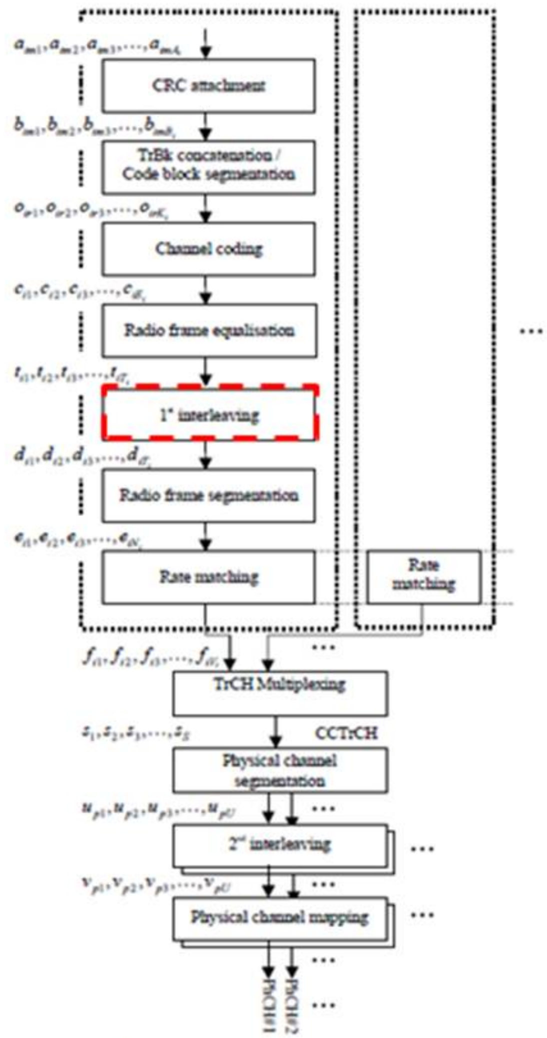
(V6.0.0, paragraph 4.2, page 11. Annotation added.)

The radio frame matcher in Apple's 3G products adjusts the data rate of a radio frame received from a radio frame segmenter by either puncturing (when there are too many bits) or repeating parts of the radio frame (when there are not enough bits) to match the data rate of the radio frame to that of a physical

	channel frame. "Rate matching means that bits on a transport channel are repeated or punctured. Higher layers assign a rate-matching attribute for each transport channel. This attribute is semi-static and can only be changed through higher layer signaling. The rate-matching attribute is used when the number of bits to be repeated or punctured is calculated. The number of bits on a transport channel can vary between different transmission time intervals. In the downlink the transmission is interrupted if the number of bits is lower than maximum. When the number of bits between different transmission time intervals in uplink is changed, bits are repeated or punctured to ensure that the total bit rate after TrCH multiplexing is identical to the total channel bit rate of the allocated dedicated physical channels." (V6.0.0, paragraph 4.2.7, page 24.) Puncturing or repeating of bits follows the following rate matching rule specified in V.6.0.0. "The rate matching rule is as follows: if puncturing is to be performed $e = e_{ini}$ -- initial error between current and desired puncturing ratio $m = 1$ -- index of current bit do while $m <= X_i$ $e = e - e_{minus}$ -- update error if $e <= 0$ then -- check if bit number m should be punctured set bit $x_{i,m}$ to δ where $\delta \notin \{0, 1\}$ $e = e + e_{plus}$ -- update error end if $m = m + 1$ -- next bit

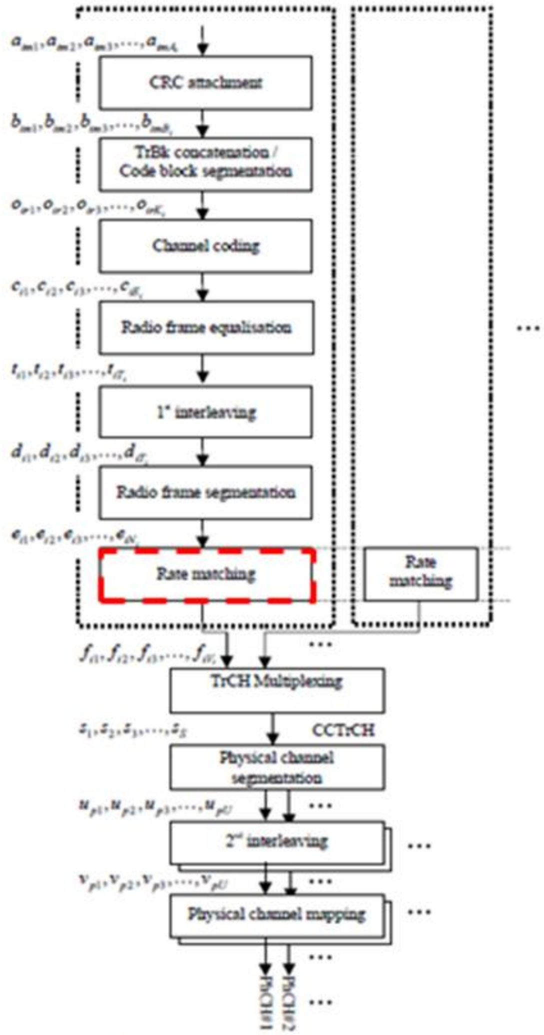
	end do else $e = e_{ini}$ -- initial error between current and desired puncturing ratio m = 1 -- index of current bit do while m <= X_i $e = e – e_{minus}$ -- update error do while e <= 0 -- check if bit number m should be repeated repeat bit $x_{i,m}$ $e = e + e_{plus}$ *-- update error* end do *m = m + 1* -- *next bit* end do end if A repeated bit is placed directly after the original one." (V6.0.0, paragraph 4.2.7.5, pages 40-41.)
4. The channel coding and multiplexing apparatus of claim 1, wherein the radio frame matchers are connected between channel coders and the multiplexer in an uplink frame transmitting device, and each of the radio frame matchers of the uplink channel	The radio frame matchers in Apple's 3G products are connected between channel coders and the multiplexer in an uplink frame transmitting device. *See, e.g.,* TS 25.212 v6.0.0: Apple's 3G products have channel coders that connect the radio frame matchers and the multiplexer in an uplink frame transmitting device as the following figure shows.

transmitting device comprises:	 Figure 1: Transport channel multiplexing structure for uplink (V6.0.0, paragraph 4.2, page 11. Annotations added.)
[a] an interleaver for interleaving the data frames received by the corresponding frame matcher;	Each of the radio frame matchers of the uplink channel transmitting device in Apple's 3G products includes an interleaver for interleaving the data frames received by the corresponding frame matcher. *See, e.g.,* TS 25.212 v6.0.0: As the following figure shows, the interleaver interleaves the data frames received by the corresponding frame matcher.

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 1. Annotation added) The interleaver interleaves data in the manner described below.

	"(3) Write the input bit sequence into the R1 × C1 matrix row by row starting with bit $x_{i,1}$ in column 0 of row 0 and ending with bit $x_{i,(R1\times C1)}$ in column C1 - 1 of row R1 - 1: $$\begin{bmatrix} x_{i,1} & x_{i,2} & x_{i,3} & \dots & x_{i,C1} \\ x_{i,(C1+1)} & x_{i,(C1+2)} & x_{i,(C1+3)} & \dots & x_{i,(2\times C1)} \\ \vdots & \vdots & \vdots & \dots & \vdots \\ x_{i,((R1-1)\times C1+1)} & x_{i,((R1-1)\times C1+2)} & x_{i,((R1-1)\times C1+3)} & \dots & x_{i,(R1\times C1)} \end{bmatrix}$$ (4)Perform the inter-column permutation for the matrix based on the pattern $\langle P1_{C1}(j)\rangle_{j\in\{0,1,\dots,C1-1\}}$ shown in table 4, where $P1_{C1}(j)$ is the original column position of the j-th permuted column. After permutation of the columns, the bits are denoted by y_{ik}: $$\begin{bmatrix} y_{i,1} & y_{i,(R1+1)} & y_{i,(2\times R1+1)} & \dots & y_{i,((C1-1)\times R1+1)} \\ y_{i,2} & y_{i,(R1+2)} & y_{i,(2\times R1+2)} & \dots & y_{i,((C1-1)\times R1+2)} \\ \vdots & \vdots & \vdots & \dots & \vdots \\ y_{i,R1} & y_{i,(2\times R1)} & y_{i,(3\times R1)} & \dots & y_{i,(C1\times R1)} \end{bmatrix}$$" (V6.0.0, paragraph 4.2.5.2, page 23.) "The bits input to the 1st interleaving are denoted by $t_{i,1}, t_{i,2}, t_{i,3}, \dots, t_{i,T_i}$, where i is the TrCH number and T_i the number of bits. Hence, $z_{i,k} = t_{i,k}$ and $Z_i = T_i$. The bits output from the 1st interleaving are denoted by $d_{i,1}, d_{i,2}, d_{i,3}, \dots, d_{i,T_i}$, and $d_{i,k} = y_{i,k}$." (V6.0.0, paragraph, 4.2.5.3, page 23.)
[b] a radio frame segmenter for determining the bit number of a radio frame according to the size of the data frames received by the corresponding frame matcher and a radio frame TTI and dividing the data	Each of the radio frame matchers of the uplink channel transmitting device in Apple's 3G products includes a radio frame segmenter for determining the bit number of a radio frame according to the size of the data frames received by the corresponding frame matcher and a radio frame TTI and dividing the data frames by a variable, said variable being a function of the radio frame TTI. *See, e.g.,* TS 25.212 v6.0.0: As the following passage explains, the i^{th} transport channel receives $x_{i1}, x_{i2}, x_{i3} \dots x_{iXi}$ where X_i is the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and

frames by a variable, said variable being a function of the radio frame TTI; and	mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) As the above passage also shows, the bit number of a radio frame is Y_i. The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel i maps the first Y_i bits of the received data frame (*i.e.*, $y_{i,1,k} - x_{i,k}$, $k=1,2,\ldots,Y_i$). The second radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,2,k} - x_{i,Yi+k}$, $k=1,2,\ldots,Y_i$), the third radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,3,k} - x_{i,2Yi+k}$, $k=1,2,\ldots,Y_i$), and so on. The bit number of a radio frame is Y_i is determined by $Y_i = (X_i / F_i)$, where variable F_i is the output bit sequences per TTI, which thus is a function of the radio frame TTI.
[c] a rate matcher for adjusting the data rate of a radio frame received from the radio frame segmenter by one of puncturing and repeating parts of the radio frame to match the data rate of the radio frame to that of a physical channel frame.	Each of the radio frame matchers of the uplink channel transmitting device in Apple's 3G products further includes a rate matcher for adjusting the data rate of a radio frame received from the radio frame segmenter by one of puncturing and repeating parts of the radio frame to match the data rate of the radio frame to that of a physical channel frame. *See, e.g.,* TS 25.212 v6.0.0:

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11. Annotation added.) The radio frame matcher in Apple's 3G products adjusts the data rate of a radio frame received from a radio frame segmenter by either puncturing (when there are too many bits) or repeating parts of the radio

frame (when there are not enough bits) to match the data rate of the radio frame to that of a physical channel frame.

"Rate matching means that bits on a transport channel are repeated or punctured. Higher layers assign a rate-matching attribute for each transport channel. This attribute is semi-static and can only be changed through higher layer signaling. The rate-matching attribute is used when the number of bits to be repeated or punctured is calculated.

The number of bits on a transport channel can vary between different transmission time intervals. In the downlink the transmission is interrupted if the number of bits is lower than maximum. When the number of bits between different transmission time intervals in uplink is changed, bits are repeated or punctured to ensure that the total bit rate after TrCH multiplexing is identical to the total channel bit rate of the allocated dedicated physical channels." (V6.0.0, paragraph 4.2.7, page 24.)

Puncturing or repeating of bits follows the following rate matching rule specified in V.6.0.0.

"The rate matching rule is as follows:

  if puncturing is to be performed

    $e = e_{ini}$ -- initial error between current and desired puncturing ratio

    $m = 1$ -- index of current bit

    do while $m <= X_i$

      $e = e - e_{minus}$ -- update error

      if $e <= 0$ then -- check if bit number m should be punctured

        set bit $x_{i,m}$ to δ where $\delta \notin \{0, 1\}$

        $e = e + e_{plus}$ -- update error

      end if

      $m = m + 1$ -- next bit

	end do else $e = e_{ini}$ -- initial error between current and desired puncturing ratio m = 1 -- index of current bit do while m <= X_i $e = e – e_{minus}$ -- update error do while e <= 0 -- check if bit number m should be repeated repeat bit $x_{i,m}$ $e = e + e_{plus}$ *-- update error* end do *m = m + 1* -- *next bit* end do end if A repeated bit is placed directly after the original one." (V6.0.0, paragraph 4.2.7.5, pages 40-41.)
5. The channel coding and multiplexing apparatus of claim 1, wherein the radio frame matchers are connected between channel coders and a multiplexer in a downlink channel transmitting device, and each of the radio frame matchers of the downlink channel	In Apple's 3G products, the radio frame matchers are connected between channel coders and a multiplexer in a downlink channel transmitting device. *See, e.g.,* TS 25.212 v6.0.0: Apple's 3G products have channel coders that connect the radio frame matchers and the multiplexer in a downlink channel transmitting device as the following figure shows.

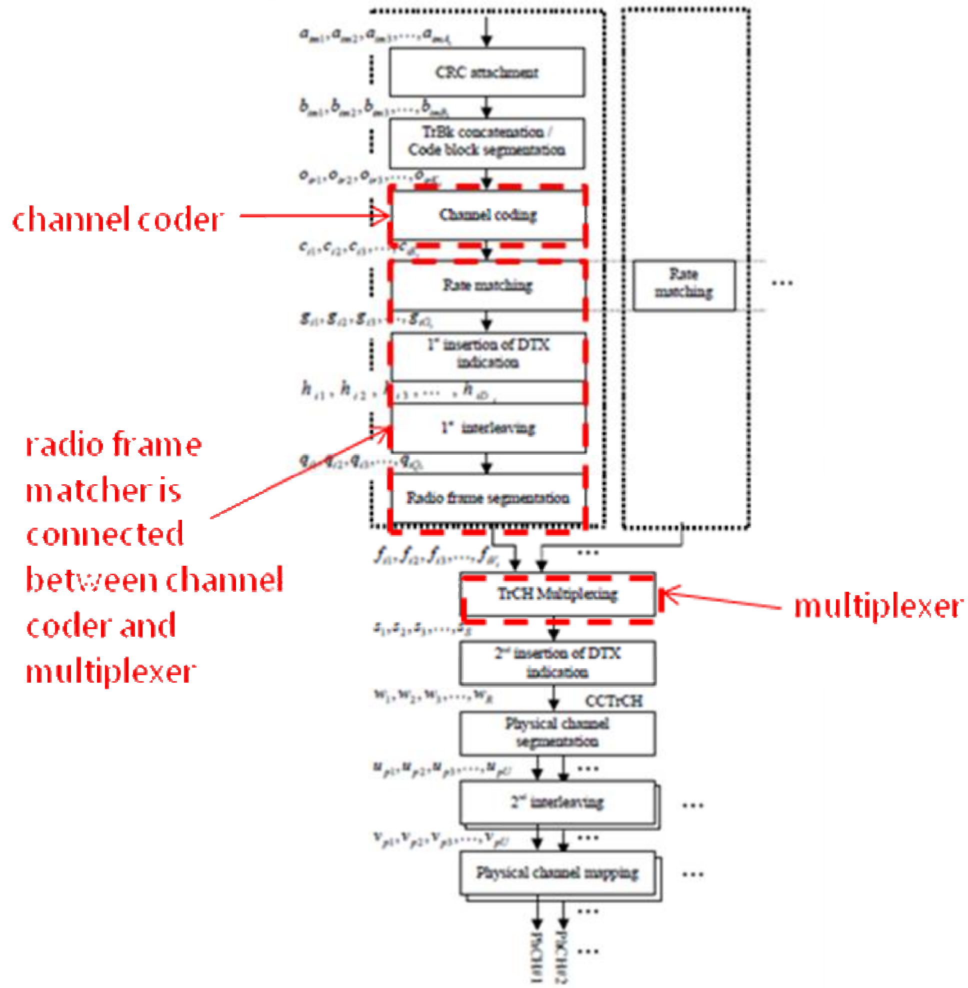
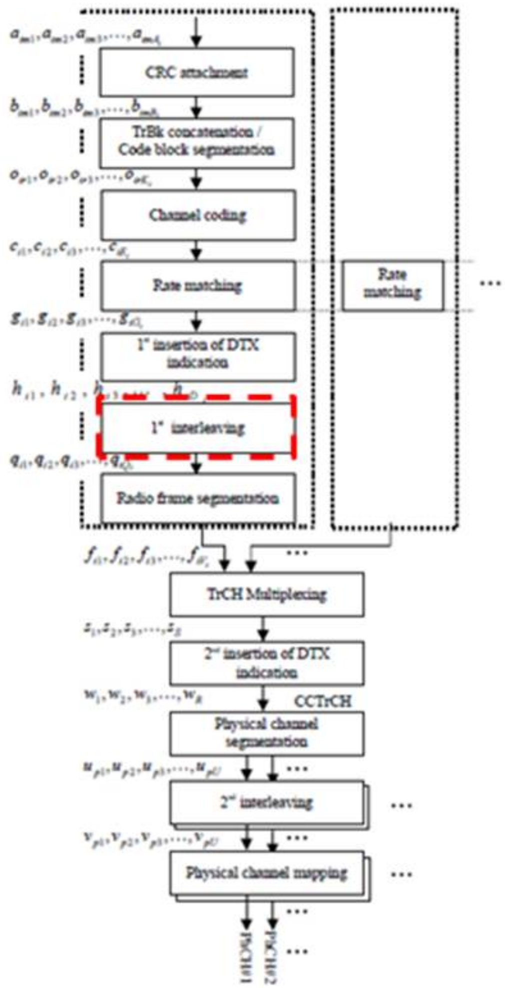
<table>
<tr><td>transmitting device comprises:</td><td>

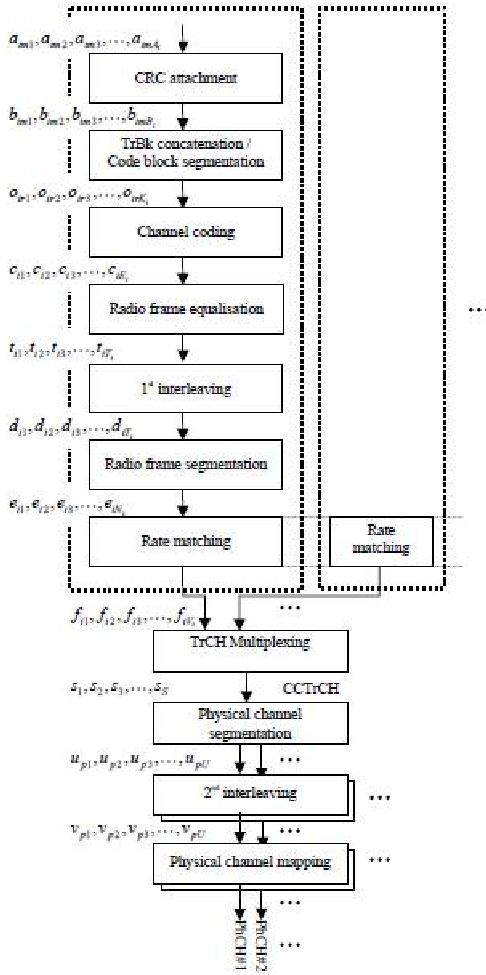
Figure 2: Transport channel multiplexing structure for downlink
(V6.0.0, paragraph 4.2, page 12. Annotation added.)</td></tr>
<tr><td>[a] an interleaver for interleaving the data frames received by the corresponding frame</td><td>Each of the radio frame matchers of the downlink channel transmitting device in Apple's 3G products includes an interleaver for interleaving the data frames received by the corresponding frame matcher. See, e.g., TS 25.212 v6.0.0:</td></tr>
</table>

matcher;	As the following figure shows, the interleaver interleaves the data frames received by the corresponding frame matcher.  Figure 2: Transport channel multiplexing structure for downlink (V6.0.0, paragraph 4.2, page 12. Annotation added)

	The interleaver in the downlink transmitting device interleaves data in the manner described below. "(3) Write the input bit sequence into the R1 × C1 matrix row by row starting with bit $x_{i,1}$ in column 0 of row 0 and ending with bit $x_{i,(R1\times C1)}$ in column C1 - 1 of row R1 - 1: $$\begin{bmatrix} x_{i,1} & x_{i,2} & x_{i,3} & \ldots & x_{i,C1} \\ x_{i,(C1+1)} & x_{i,(C1+2)} & x_{i,(C1+3)} & \ldots & x_{i,(2\times C1)} \\ \vdots & \vdots & \vdots & \ldots & \vdots \\ x_{i,((R1-1)\times C1+1)} & x_{i,((R1-1)\times C1+2)} & x_{i,((R1-1)\times C1+3)} & \ldots & x_{i,(R1\times C1)} \end{bmatrix}$$ (4)Perform the inter-column permutation for the matrix based on the pattern $\langle P1_{C1}(j) \rangle_{j\in\{0,1,\ldots,C1-1\}}$ shown in table 4, where $P1_{C1}$ (j) is the original column position of the j-th permuted column. After permutation of the columns, the bits are denoted by y_{ik}: $$\begin{bmatrix} y_{i,1} & y_{i,(R1+1)} & y_{i,(2\times R1+1)} & \ldots & y_{i,((C1-1)\times R1+1)} \\ y_{i,2} & y_{i,(R1+2)} & y_{i,(2\times R1+2)} & \ldots & y_{i,((C1-1)\times R1+2)} \\ \vdots & \vdots & \vdots & \ldots & \vdots \\ y_{i,R1} & y_{i,(2\times R1)} & y_{i,(3\times R1)} & \ldots & y_{i,(C1\times R1)} \end{bmatrix}$$" (V6.0.0, paragraph 4.2.5.2, page 23.) "If fixed positions of the TrCHs in a radio frame is used then the bits input to the 1st interleaving are denoted by $h_{i1}, h_{i2}, h_{i3}, \ldots, h_{iD_i}$, where i is the TrCH number. Hence, $z_{ik} = h_{ik}$ and $Z_i = D_i$. If flexible positions of the TrCHs in a radio frame is used then the bits input to the 1st interleaving are denoted by $g_{i1}, g_{i2}, g_{i3}, \ldots, g_{iG_i}$, where i is the TrCH number. Hence, $z_{ik} = g_{ik}$ and $Z_i = G_i$. The bits output from the 1st interleaving are denoted by $q_{i1}, q_{i2}, q_{i3}, \ldots, q_{iQ_i}$, where i is the TrCH number and Q_i is the number of bits. Hence, $q_{ik} = y_{ik}$, $Q_i = F_iH_i$ if fixed positions are used, and $Q_i = G_i$ if flexible positions are used." (V6.0.0, paragraph, 4.2.5.4, page 23.)
[b] a radio frame segmenter for determining the bit number of a radio frame according to the	Each of the radio frame matchers of the downlink channel transmitting device in Apple's 3G products includes a radio frame segmenter for determining the bit number of a radio frame according to the size of the data frames received by the corresponding frame matcher and a radio frame TTI and dividing the data frame by a variable, said variable being a function of the radio frame TTI. *See, e.g.,* TS 25.212 v6.0.0:

size of the data frames received by the corresponding frame matcher and a radio frame TTI and dividing the data frame by a variable, said variable being a function of the radio frame TTI.	As the following passage explains, the i^{th} transport channel receives $x_{i1}, x_{i2}, x_{i3}...x_{iXi}$ where X_i is the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1\ldots F_i$, $k = 1\ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) As the above passage also shows, the bit number of a radio frame is Y_i. The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel i maps the first Y_i bits of the received data frame (*i.e.*, $y_{i,1,k} - x_{i,k}$, $k=1,2,\ldots,Y_i$). The second radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,2,k} - x_{i,Yi+k}$, $k=1,2,\ldots,Y_i$), the third radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,3,k} - x_{i,2Yi+k}$, $k=1,2,\ldots,Y_i$), and so on. The bit number of a radio frame is Y_i is determined by $Y_i = (X_i / F_i)$, where variable F_i is the output bit sequences per TTI, which thus is a function of the radio frame TTI.
6. A channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have one or more transmission time	See claim 1. Apple's 3G products comprise a channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of multi-code physical channels.

intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of multi-code physical channels, the apparatus comprising:	*See, e.g.,* TS 25.212 v6.0.0: "Data stream from/to MAC and higher layers (Transport block / Transport block set) is encoded/decoded to offer transport services over the radio transmission link. Channel coding scheme is a combination of error detection, error correcting, rate matching, interleaving and transport channels mapping onto/splitting from physical channels." (V6.0.0, paragraph 4.1, page 9.)

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11.) As specified in V.6.0.0, Apple's 3G products receive data frames that have one or more transmission time intervals (TTIs).

"All transport blocks in a TTI are serially concatenated. If the number of bits in a TTI is larger than *Z*, the maximum size of a code block in question, then code block segmentation is performed after the concatenation of the transport blocks. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)

As it can be seen from the following figure, data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of physical channels.

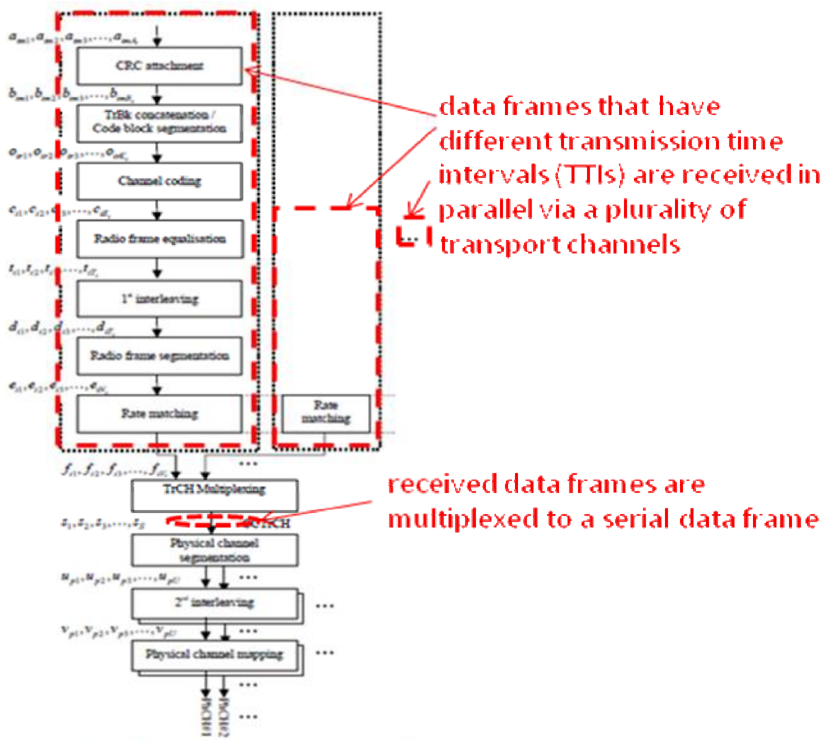


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotations added.)

"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and

	mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 43.) Apple's 3G products have multi-code physical channels that are used in CDMA communication systems. "For all modes, some bits of the input flow are mapped to each code until the number of bits on the code is *U*." (V.6.0.0, paragraph 4.2.10, page 45.) V.6.0.0 further states that "[t]he PhCH for both uplink and downlink is defined in [2]." (V.6.0.0, paragraph 4.2.12, page 45.) [2] is a document entitled "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Physical channels and mapping of transport channels onto physical channels (FDD) (Release 6)," which is dated December 2003. This document states in paragraph 5.2.1 on page 10 that "[t]here are three types of uplink dedicated physical channels, the uplink Dedicated Physical Data Channel (uplink DPDCH), the uplink Dedicated Physical Control Channel (uplink DPCCH), and the uplink Dedicated Control Channel associated with HS-DSCH transmission (uplink HS-DPCCH). The DPDCH, the DPCCH and the HS-DPCCH are I/Q code multiplexed (see [4])," which illustrates the multi-code physical channels used in Apple's 3G products.
[a] a number of radio frame matchers, each radio frame matcher having a radio frame segmenter for segmenting the data frames into radio frames;	Apple's 3G products have a number of radio frame matchers, each radio frame matcher having a radio frame segmenter for segmenting the data frames into radio frames. *See, e.g.,* TS 25.212 v6.0.0: The transport channels are denoted in the figure below as TrCH.

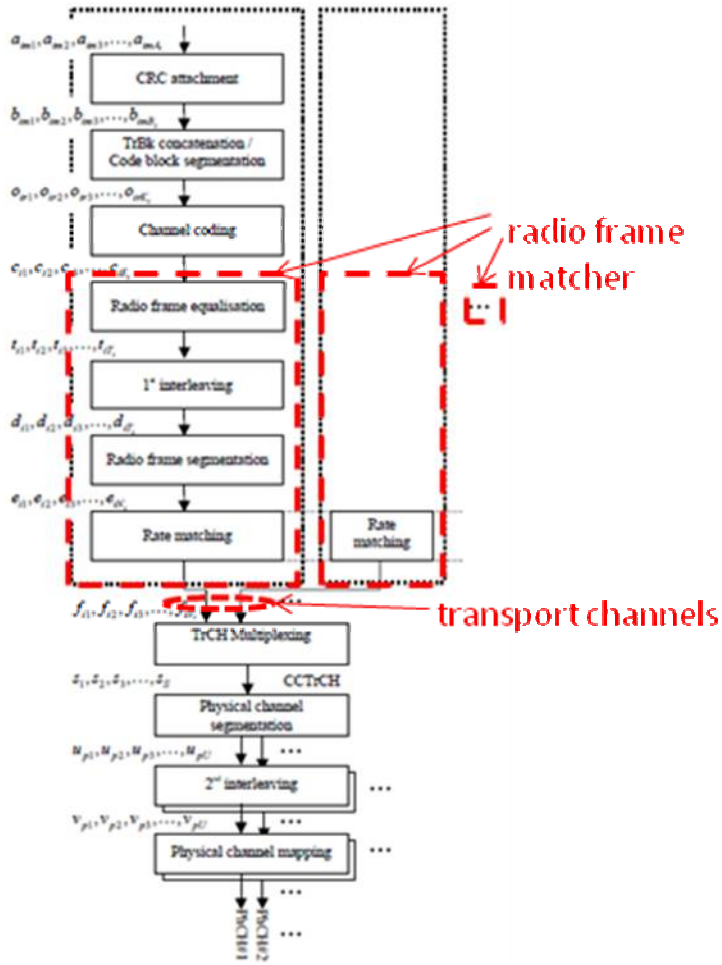


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotations added.)

Each radio frame matcher in Apple's 3G products has a radio frame segmenter.

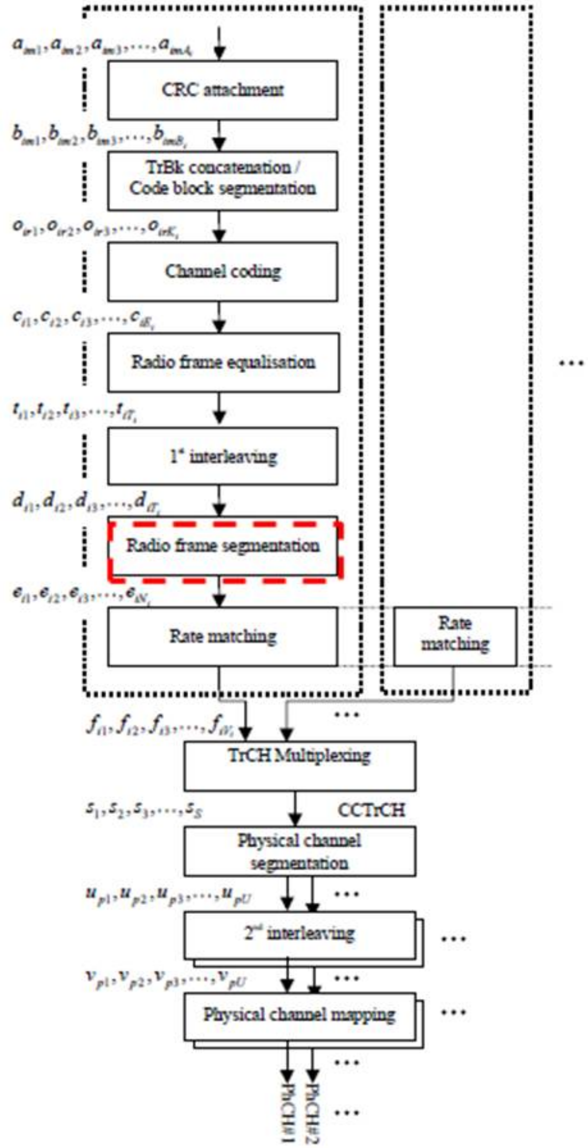
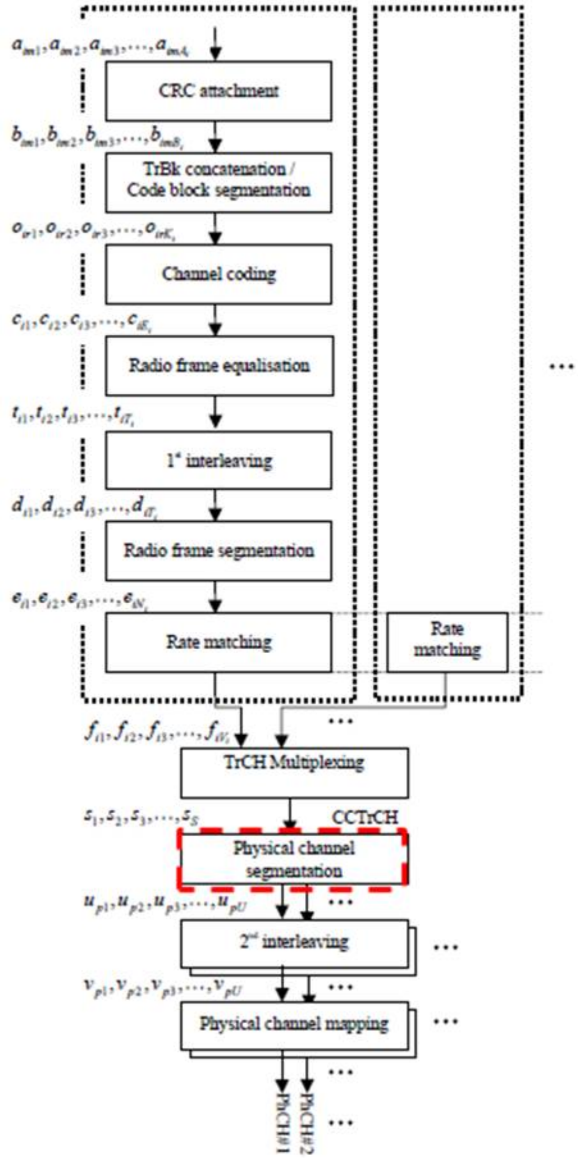


Figure 1: Transport channel multiplexing structure for uplink

	(V6.0.0, paragraph 4.2, page 11. Annotation added.) Each radio frame matcher in Apple's 3G products receives the data frames and segments the data frames into radio frames. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)\cdot Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) "The input bit sequence to the radio frame segmentation is denoted by $d_{i1}, d_{i2}, d_{i3}, \ldots, d_{iT_i}$, where i is the TrCH number and T_i the number of bits. Hence, $x_{ik} = d_{ik}$ and $X_i = T_i$. The output bit sequence corresponding to radio frame n_i is denoted by $e_{i1}, e_{i2}, e_{i3}, \ldots, e_{iN_i}$, where i is the TrCH number and N_i is the number of bits. Hence, $e_{i,k} = y_{i,n_ik}$ and $N_i = Y_i$." (V6.0.0, paragraph 4.2.6.1, page 24.)
[b] a multiplexer for multiplexing the radio frames into a serial data frame; and	Apple's 3G products have a multiplexer for multiplexing the radio frames into a serial data frame. See claim 1[b].

[c] a physical channel segmenter adapted to segment the serial data frame by the number of the physical channels and outputting the segmented physical channel frames to corresponding physical channels,	Apple's 3G products have a physical channel segmenter adapted to segment the serial data frame by the number of the physical channels and outputting the segmented physical channel frames to corresponding physical channels. *See, e.g.,* TS 25.212 v6.0.0:

	 **Figure 1: Transport channel multiplexing structure for uplink**

	(V6.0.0, paragraph 4.2, page 11. Annotation added.) The physical channel segmenter is adapted to segment the serial data frame by the number of the physical channels and outputting the segmented physical channel frames to corresponding physical channels. "When more than one PhCH is used, physical channel segmentation divides the bits among the different PhCHs." (V6.0.0, paragraph 4.2.10, page 43.) "Bits on first PhCH after physical channel segmentation: $u_{1,k} = x_{f(k)}$ $k = 1, 2, \ldots, U$ Bits on second PhCH after physical channel segmentation: $u_{2,k} = x_{f(k+U)}$ $k = 1, 2, \ldots, U$ … Bits on the P^{th} PhCH after physical channel segmentation: $u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2, \ldots, U$ where f is such that : - for modes other than compressed mode by puncturing, $x_{f(k)} = x_k$, i.e. $f(k) = k$, for all k. - for compressed mode by puncturing, bit $u_{1,1}$ corresponds to the bit x_k with smallest index k when the bits p are not counted, bit $u_{1,2}$ corresponds to the bit x_k with second smallest index k when the bits p are not counted, and so on for bits $u_{1,3}, \ldots u_{1,U}, u_{2,1}, u_{2,2}, \ldots u_{2,U}, \ldots u_{P,1}, u_{P,2}, \ldots u_{P,U}$." (V6.0.0, paragraph 4.2.10, pages 43-44.)
[d] wherein the segmented physical channel frames for a physical channel #1 are output as $e_{1,j}=d_j$, the segmented physical channel frames for a physical channel #2 are	In Apple's 3G products, the segmented physical channel frames for a physical channel #1 are output as $e_{1,j}=d_j$, the segmented physical channel frames for a physical channel #2 are output as $e_{2,j}=d_{(j+P/M)}$ and the segmented physical channel frames for a physical channel #M are output as $e_{M,j}=d_{(j+(M-1)P/M}$, and wherein the bits of the serial data frame output from the multiplexer are $d_1, d_2, \ldots, d_p$, the number of physical channels is M, the size of the serial data frame output from the multiplexer is P and j=1, 2, . . . , P/M. *See, e.g.,* TS 25.212 v6.0.0:

<table>
<tr>
<td>output as $e_{2,j}=d_{(j+P/M)}$ and the segmented physical channel frames for a physical channel #M are output as $e_{M,j}=d_{(j+(M-1)P/M)}$, and wherein the bits of the serial data frame output from the multiplexer are $d_1, d_2, \ldots, d_p$, the number of physical channels is M, the size of the serial data frame output from the multiplexer is P and j=1, 2, . . . , P/M.</td>
<td>

"The bits input to the physical channel segmentation are denoted by $x_1, x_2, x_3, \ldots, x_X$, where X is the number of bits input to the physical channel segmentation block. The number of PhCHs is denoted by P. The bits after physical channel segmentation are denoted $u_{p,1}, u_{p,2}, u_{p,3}, \ldots, u_{p,U}$, where p is PhCH number and U is the number of bits in one radio frame for each PhCH, i.e. $U = (X - N_{TGL} - (N_{data,*} - N'_{data,*})) / P$ for compressed mode by puncturing, and $U = \frac{X}{P}$ otherwise." (V6.0.0, paragraph 4.2.10, page 43.)

"Bits on first PhCH after physical channel segmentation:
$u_{1,k} = x_{f(k)}$ $k = 1, 2, \ldots, U$
Bits on second PhCH after physical channel segmentation:
$u_{2,k} = x_{f(k+U)}$ $k = 1, 2, \ldots, U$
…
Bits on the P^{th} PhCH after physical channel segmentation:
$u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2, \ldots, U$
where f is such that :

- for modes other than compressed mode by puncturing, $x_{f(k)} = x_k$, i.e. $f(k) = k$, for all k.
- for compressed mode by puncturing, bit $u_{1,1}$ corresponds to the bit x_k with smallest index k when the bits p are not counted, bit $u_{1,2}$ corresponds to the bit x_k with second smallest index k when the bits p are not counted, and so on for bits $u_{1,3}, \ldots u_{1,U}, u_{2,1}, u_{2,2}, \ldots u_{2,U}, \ldots u_{P,1}, u_{P,2}, \ldots u_{P,U}$."

(V6.0.0, paragraph 4.2.10, pages 43-44.)

Based on the above passages from V.6.0.0, the following correspondence is made between the claim elements and the above-cited notation from V.6.0.0.

<table>
<tr><th>Claim Element</th><th>Notation for Claim Element</th><th>Notation from V.6.0.0</th></tr>
<tr><td>"number of physical channels"</td><td>M</td><td>P</td></tr>
<tr><td>"size of the serial data frame output from the multiplexer" (i.e., number of input bits to physical channel segmenter to be segmented by physical channel segmenter)</td><td>P</td><td>X</td></tr>
<tr><td>"serial data frame output from the</td><td>$d_1, d_2, \ldots d_P$</td><td>$x_1, x_2, \ldots x_X$</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td>
<table>
<tr><td>multiplexer” (i.e., input bits to physical channel segmenter)</td><td></td><td></td></tr>
<tr><td>position of a bit in a segmented physical channel frame</td><td>j</td><td>k</td></tr>
<tr><td>“the segmented physical channel frames for a physical channel #1 are output”</td><td>$e_{1,j}$</td><td>$u_{1,k}$</td></tr>
<tr><td>the segmented physical channel frames for a physical channel #2 are output”</td><td>$e_{2,j}$</td><td>$u_{2,k}$</td></tr>
<tr><td>“the segmented physical channel frames for a physical channel #M are output”</td><td>$e_{M,j}$</td><td>$u_{P,k}$

Note: The number of physical channels is “M” for the claim and “P” for V.6.0.0.</td></tr>
</table>

Based on the correspondence shown above, it is clear that “$u_{1,k} = x_{f(k)}$ $k = 1, 2, \ldots, U$” (where U=X/P) shows the same “segmented physical channel frames for a physical channel #1” as the claimed “$e_{1,j}=d_j$,” “$u_{2,k} = x_{f(k+U)}$ $k = 1, 2, \ldots, U$” shows the same “segmented physical channel frames for a physical channel #2” as the claimed “$e_{2,j}=d_{(j+P/M)}$,” and “$u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2, \ldots, U$” shows the same “segmented physical channel frames for a physical channel #M” as the claimed “as $e_{M,j}=d_{(j+(M-1)P/M}$.”
</td>
</tr>
<tr>
<td>7. A channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame, the apparatus comprising:</td>
<td>Apple's 3G products comprise a channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame.

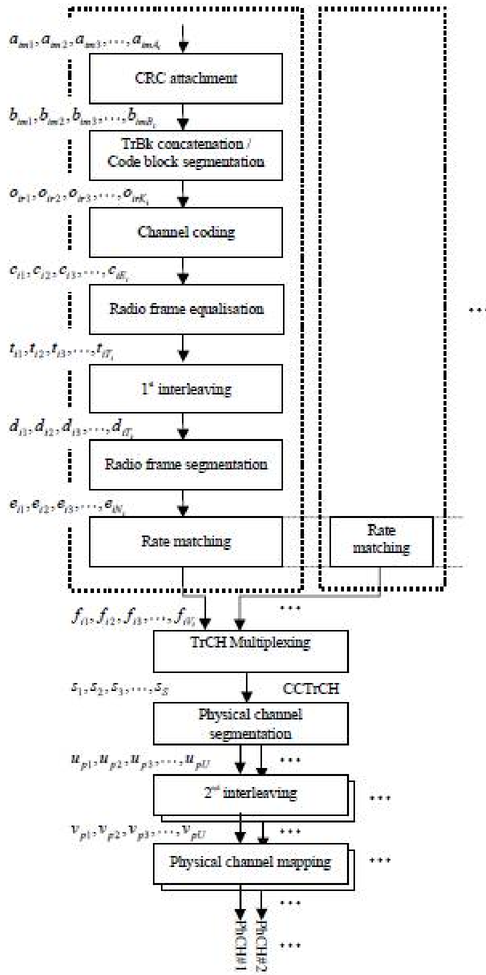
See, e.g.,

Apple iPhone user guide re iOS 3.1: (iPhone 3G or later, p. 21):</td>
</tr>
</table>

	3G — 3G — Shows that your carrier's 3G network is available, and iPhone can connect to the Internet over 3G. Available on iPhone 3G or later. See "How iPhone Connects to the Internet" on page 40. http://www.apple.com/iphone/specs.html (iPhone 4): **Cellular and wireless** ■ GSM model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz) ■ CDMA model: CDMA EV-DO Rev. A (800, 1900 MHz) ■ 802.11b/g/n Wi-Fi (802.11n 2.4GHz only) ■ Bluetooth 2.1 + EDR wireless technology **Location** ■ Assisted GPS ■ Digital compass ■ Wi-Fi ■ Cellular iPad iOS 3.2 user guide (iPad):

	## Cellular Data Use Cellular Data settings (on iPad Wi-Fi + 3G only) to turn Data Roaming on or off, change your account information, or add a Personal Identification Number (PIN) to lock the micro-SIM card. **Turn the cellular data network on or off:** Choose Cellular Data, then turn Cellular Data on or off. **Turn data roaming on or off:** Choose Data Roaming, then turn data roaming on or off. **View your account information:** To see or change your account information, tap View Account. **Chapter 17** Settings http://www.apple.com/ipad/specs/ (iPad 2):

	Wireless and Cellular ▪ Wi-Fi (802.11a/b/g/n) ▪ Bluetooth 2.1 + EDR technology ▪ Wi-Fi + 3G model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz) ▪ Wi-Fi + 3G for Verizon model: CDMA EV-DO Rev. A (800, 1900 MHz) ▪ Data only[8] ▪ Wi-Fi (802.11a/b/g/n) ▪ Bluetooth 2.1 + EDR technology Learn more about Wi-Fi + 3G ▸ Carriers at&t verizon Apple's 3G products contain a baseband processor for processing UMTS ("3G") signals compliant with the multiplexing and channel coding standards specified in at least 3GPP Release 6 (3GPP Technical Specification 25.212 v6.0.0 ("TS 25.212 v6.0.0")). *See, e.g.*, TS 25.212 v6.0.0: "Data stream from/to MAC and higher layers (Transport block / Transport block set) is encoded/decoded to offer transport services over the radio transmission link. Channel coding scheme is a combination of error detection, error correcting, rate matching, interleaving and transport channels mapping onto/splitting from physical channels." (V6.0.0, paragraph 4.1, page 9.)

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11.) As specified in V.6.0.0, Apple's 3G products receive data frames that have different transmission time intervals (TTIs).

"All transport blocks in a TTI are serially concatenated. If the number of bits in a TTI is larger than *Z*, the maximum size of a code block in question, then code block segmentation is performed after the concatenation of the transport blocks. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)

As it can be seen from the following figure, data frames that have different transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame.

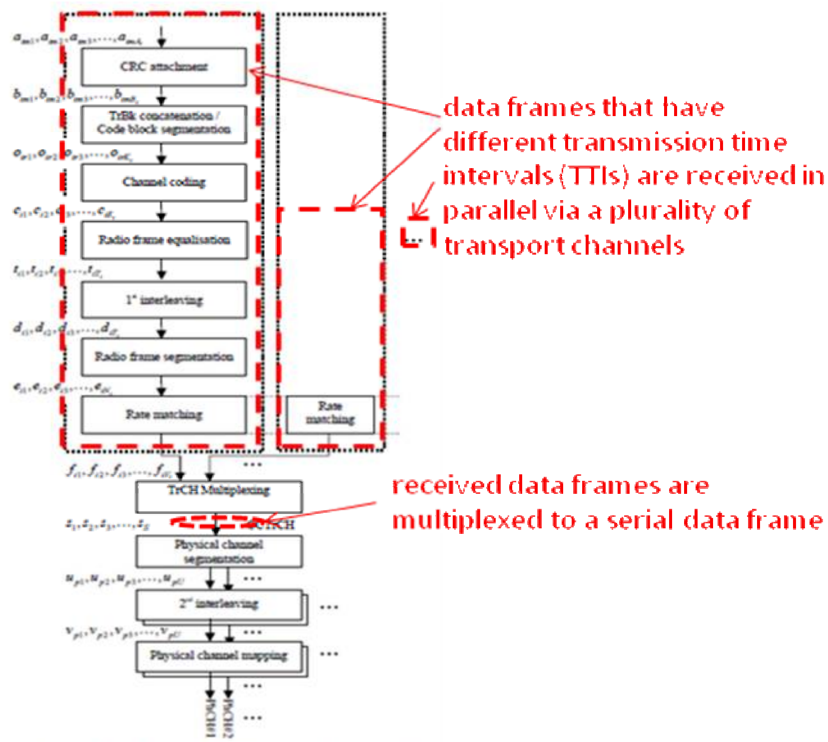


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotations added.)

"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size

	equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)\cdot Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.)
[a] a number of radio frame matchers, each of the radio frame matchers adapted to determine a number of filler bits and inserting the determined number of filler bits into the data frames, and each of the radio frame matchers having a radio frame segmenter for segmenting the data frames having the inserted number of filler bits into radio frames; and	Apple's 3G products have a number of radio frame matchers, each of the radio frame matchers adapted to determine a number of filler bits and inserting the determined number of filler bits into the data frames, and each of the radio frame matchers having a radio frame segmenter for segmenting the data frames having the inserted number of filler bits into radio frames. *See, e.g.*, TS 25.212 v6.0.0: The transport channels are denoted in the figure below as TrCH. Each of the radio frame matchers generates a transport channel and thus the number of radio frame matchers is at least equal to the number of the transport channels.

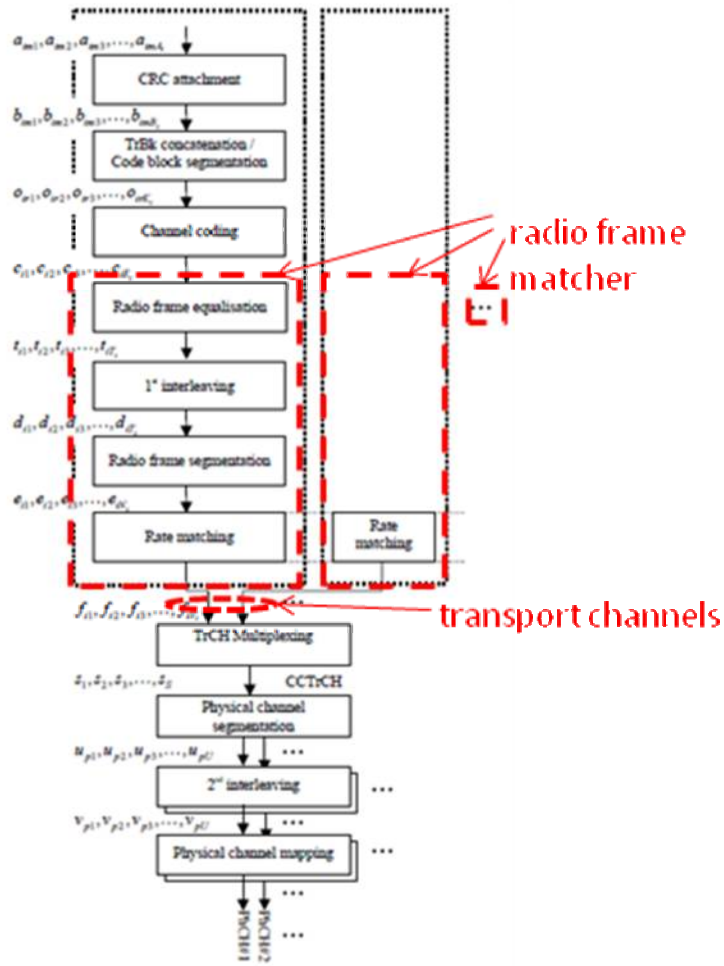
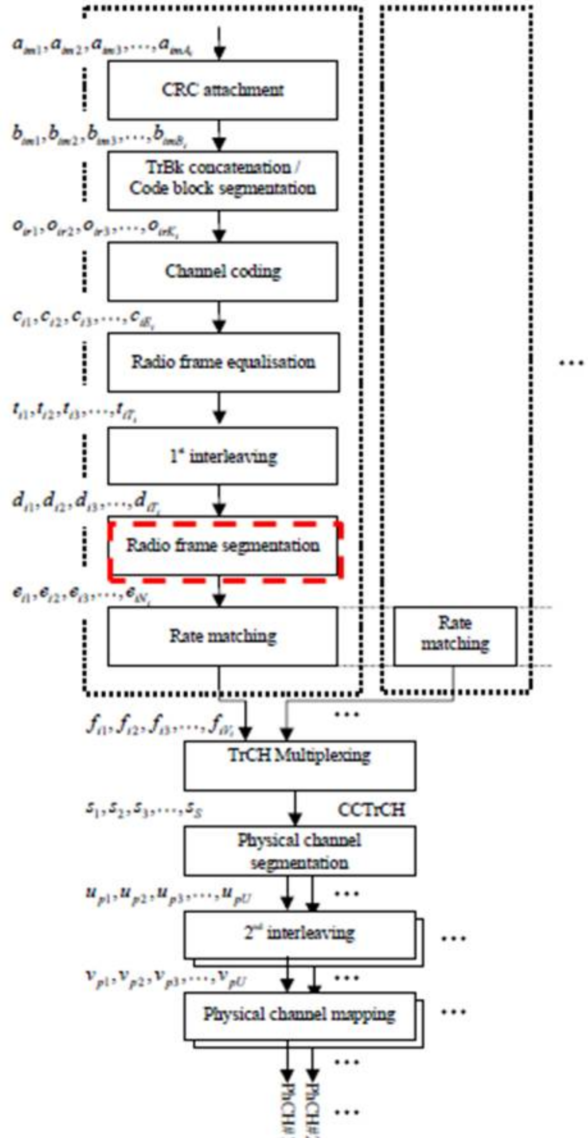


Figure 1: Transport channel multiplexing structure for uplink

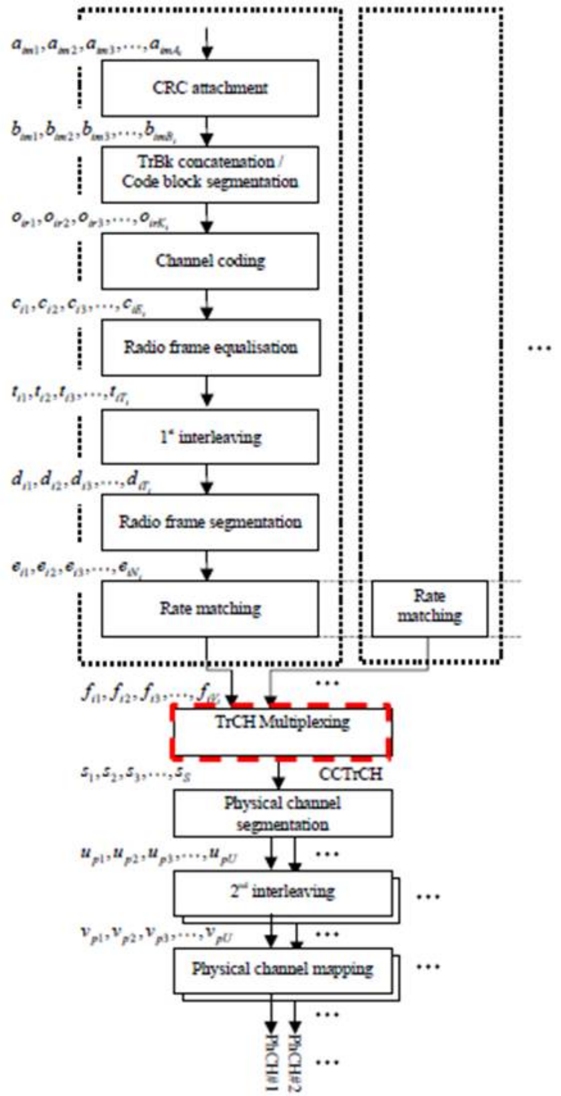
(V6.0.0, paragraph 4.2, page 11. Annotations added.)

"The input bit sequence to the radio frame segmentation is denoted by $d_{i1}, d_{i2}, d_{i3}, \ldots, d_{iT_i}$, where i is the TrCH number and T_i the number of bits. Hence, $x_{ik} = d_{ik}$ and $X_i = T_i$.
The output bit sequence corresponding to radio frame n_i is denoted by $e_{i1}, e_{i2}, e_{i3}, \ldots, e_{iN_i}$, where i is the

	TrCH number and N_i is the number of bits. Hence, $e_{i,k} = y_{i,n_ik}$ and $N_i = Y_i$." (V6.0.0, paragraph 4.2.6.1, page 24.) Each of the radio frame matchers in Apple's 3G products is adapted to determine a number of filler bits and insert the determined number of filler bits into the data frames. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik}$, for k = 1… E_i; and - t_{ik} = {0, 1} for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.) Each radio frame matcher in Apple's 3G products has a radio frame segmenter.

	 **Figure 1: Transport channel multiplexing structure for uplink**

	(V6.0.0, paragraph 4.2, page 11. Annotation added.) The radio frame segmenter receives the data frames having the inserted number of filler bits into radio frames and segments the data frames. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)\cdot Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) "The input bit sequence to the radio frame segmentation is denoted by $d_{i1}, d_{i2}, d_{i3}, \ldots, d_{iT_i}$, where i is the TrCH number and T_i the number of bits. Hence, $x_{ik} = d_{ik}$ and $X_i = T_i$. The output bit sequence corresponding to radio frame n_i is denoted by $e_{i1}, e_{i2}, e_{i3}, \ldots, e_{iN_i}$, where i is the TrCH number and N_i is the number of bits. Hence, $e_{i,k} = y_{i,n_ik}$ and $N_i = Y_i$." (V6.0.0, paragraph 4.2.6.1, page 24.)
[b] a multiplexer for multiplexing the radio frames into the serial data frame.	Apple's 3G products have a multiplexer for multiplexing the radio frames into the serial data frame. *See, e.g.*, TS 25.212 v6.0.0:

	 Figure 1: Transport channel multiplexing structure for uplink (V6.0.0, paragraph 4.2, page 11. Annotation added.)

	The multiplexer in Apple's 3G products receives radio frames from the rate matcher and multiplexes the radio frames to the serial data frame. "Every 10 ms, one radio frame from each TrCH is delivered to the TrCH multiplexing. These radio frames are serially multiplexed into a coded composite transport channel (CCTrCH). The bits input to the TrCH multiplexing are denoted by $f_{i1}, f_{i2}, f_{i3}, \ldots, f_{iV_i}$, where i is the TrCH number and V_i is the number of bits in the radio frame of TrCH i. The number of TrCHs is denoted by I. The bits output from TrCH multiplexing are denoted by $s_1, s_2, s_3, \ldots, s_S$, where S is the number of bits, i.e. $S = \sum_i V_i$. The TrCH multiplexing is defined by the following relations: $s_k = f_{1k} \quad k = 1, 2, \ldots, V_1$ $s_k = f_{2,(k-V_1)} \quad k = V_1+1, V_1+2, \ldots, V_1+V_2$ $s_k = f_{3,(k-(V_1+V_2))} \quad k = (V_1+V_2)+1, (V_1+V_2)+2, \ldots, (V_1+V_2)+V_3$ … $s_k = f_{I,(k-(V_1+V_2+\ldots+V_{I-1}))} \quad k = (V_1+V_2+\ldots+V_{I-1})+1, (V_1+V_2+\ldots+V_{I-1})+2, \ldots, (V_1+V_2+\ldots+V_{I-1})+V_I$" (V6.0.0, paragraph 4.2.8, pages 41-42.)
8. The channel coding and multiplexing apparatus of claim 7, wherein each radio frame segmenter determines the bit number of the radio frames according to the size of the corresponding data frame, a radio frame TTI, and the number of filler bits, and divides the	Each radio frame segmenter in Apple's 3G products determines the bit number of the radio frames according to the size of the corresponding data frame, a radio frame TTI, and the number of filler bits, and divides the corresponding data frame by the bit number of the radio frames. *See, e.g.*, TS 25.212 v6.0.0: As the following passage explains, the i^{th} transport channel receives $x_{i1}, x_{i2}, x_{i3} \ldots x_{iXi}$ where X_i is the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame. The received data frame by the radio frame segmenter contains the inserted filler bits. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and

corresponding data frame by the bit number of the radio frames.	mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) As the above passage also shows, the bit number of a radio frame is Y_i. The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel i maps the first Y_i bits of the received data frame (*i.e.*, $y_{i,1,k} - x_{i,k}$, $k=1,2,\ldots,Y_i$). The second radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,2,k} - x_{i,Y_i+k}$, $k=1,2,\ldots,Y_i$), the third radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,3,k} - x_{i,2Y_i+k}$, $k=1,2,\ldots,Y_i$), and so on.
9. The channel coding and multiplexing apparatus of claim 7, wherein each radio frame matcher further includes an interleaver for interleaving the data frames received by the corresponding frame matcher and applying the interleaved data frames to a corresponding radio frame segmenter.	Each radio frame matcher in Apple's 3G products further includes an interleaver for interleaving the data frames received by the corresponding frame matcher and applying the interleaved data frames to a corresponding radio frame segmenter. *See, e.g.*, TS 25.212 v6.0.0: As the following figure shows, the interleaver interleaves the data frames received by the corresponding frame matcher. The interleaved data from the interleaver are applied to a corresponding radio frame segmenter.

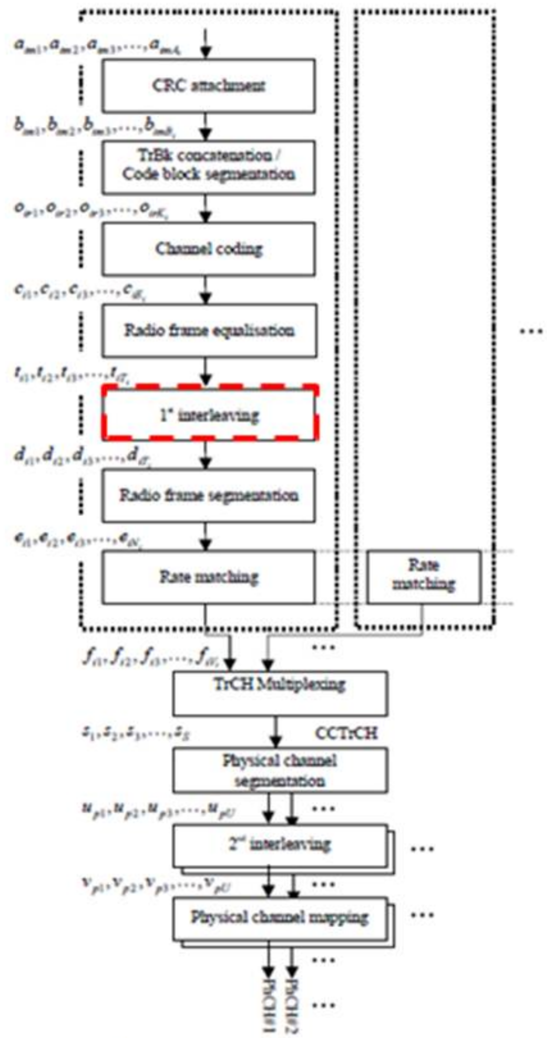


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotation added)

The interleaver interleaves data in the manner described below.

	"(3) Write the input bit sequence into the R1 × C1 matrix row by row starting with bit $x_{i,1}$ in column 0 of row 0 and ending with bit $x_{i,(\mathrm{R1}\times\mathrm{C1})}$ in column C1 - 1 of row R1 - 1: (4)Perform the inter-column permutation for the matrix based on the pattern $\left\langle \mathrm{P1}_{\mathrm{C1}}(j) \right\rangle_{j\in\{0,1,\ldots,\mathrm{C1}-1\}}$ shown in table 4, where $\mathrm{P1}_{\mathrm{C1}}$ (*j*) is the original column position of the *j*-th permuted column. After permutation of the columns, the bits are denot by y_{ik}: "The bits input to the 1st *i* is the TrC and T_i the number of bits. Hence, $z_{i,k} = t_{i,k}$ and $Z_i = T_i$. The bis output from the 1st interleaving are denoted by $d_{i,1}, d_{i,2}, d_{i,3}, \ldots, d_{i,T_i}$, and $d_{i,k} = y_{i,k}$." (V6.0.0, paragraph, 4.2.5.3, page 23.)
10. The channel coding and multiplexing apparatus of claim 7, wherein each radio frame matcher further includes a rate matcher for adjusting the data rate of a radio frame received from a radio frame segmenter by one of puncturing and repeating parts of the radio frame to match the data rate of the radio frame to that of a physical channel frame.	Each radio frame matcher in Apple's 3G products further includes a rate matcher for adjusting the data rate of a radio frame received from a radio frame segmenter by one of puncturing and repeating parts of the radio frame to match the data rate of the radio frame to that of a physical channel frame. *See, e.g.*, TS 25.212 v6.0.0:

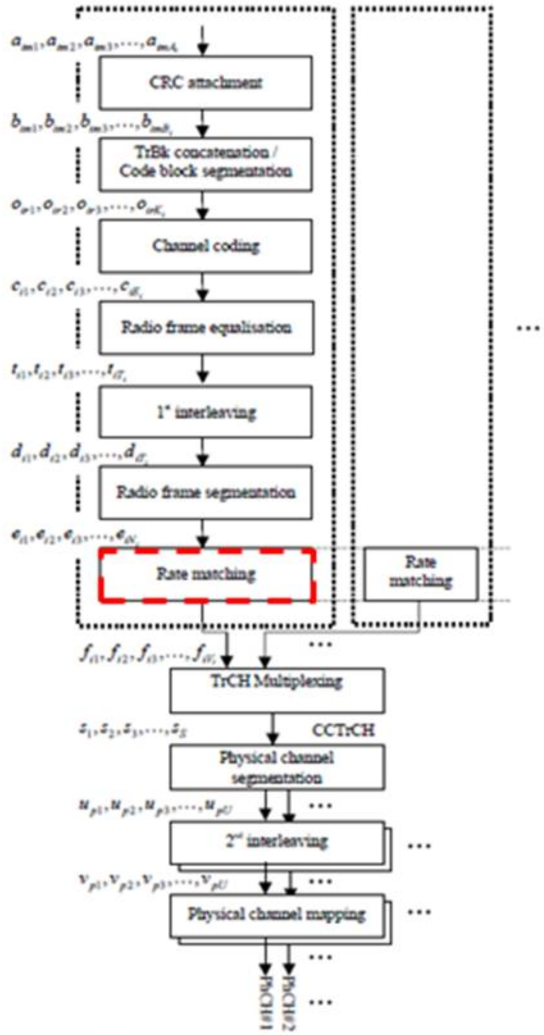


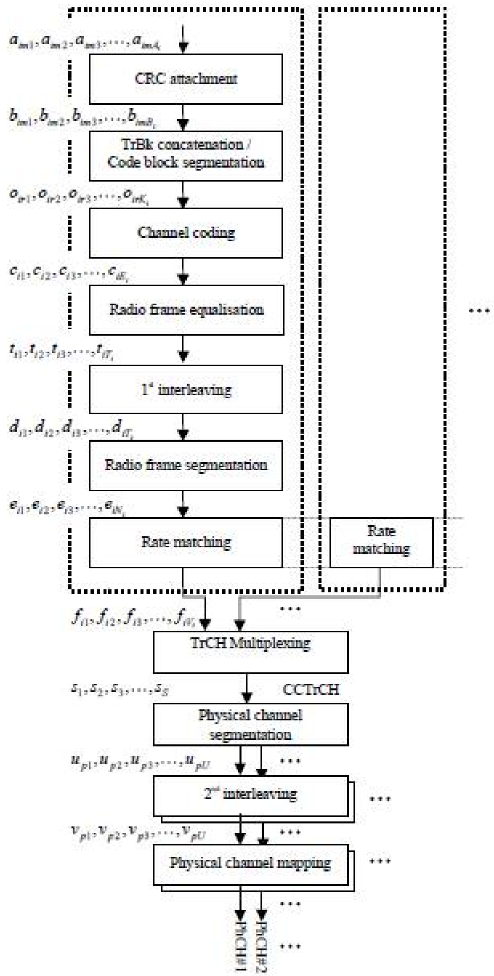
Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotation added.)

The radio frame matcher in Apple's 3G products adjusts the data rate of a radio frame received from a radio frame segmenter by either puncturing (when there are too many bits) or repeating parts of the radio

	frame (when there are not enough bits) to match the data rate of the radio frame to that of a physical channel frame. "Rate matching means that bits on a transport channel are repeated or punctured. Higher layers assign a rate-matching attribute for each transport channel. This attribute is semi-static and can only be changed through higher layer signaling. The rate-matching attribute is used when the number of bits to be repeated or punctured is calculated. The number of bits on a transport channel can vary between different transmission time intervals. In the downlink the transmission is interrupted if the number of bits is lower than maximum. When the number of bits between different transmission time intervals in uplink is changed, bits are repeated or punctured to ensure that the total bit rate after TrCH multiplexing is identical to the total channel bit rate of the allocated dedicated physical channels." (V6.0.0, paragraph 4.2.7, page 24.) Puncturing or repeating of bits follows the following rate matching rule specified in V.6.0.0. "The rate matching rule is as follows: if puncturing is to be performed $e = e_{ini}$ -- initial error between current and desired puncturing ratio $m = 1$ -- index of current bit do while $m <= X_i$ $e = e - e_{minus}$ -- update error if $e <= 0$ then -- check if bit number m should be punctured set bit $x_{i,m}$ to δ where $\delta \notin \{0, 1\}$ $e = e + e_{plus}$ -- update error end if $m = m + 1$ -- next bit

	end do else $e = e_{ini}$ -- initial error between current and desired puncturing ratio m = 1 -- index of current bit do while m <= X_i $e = e - e_{minus}$ -- update error do while e <= 0 -- check if bit number m should be repeated repeat bit $x_{i,m}$ $e = e + e_{plus}$ -- *update error* end do *m = m + 1* -- *next bit* end do end if A repeated bit is placed directly after the original one." (V6.0.0, paragraph 4.2.7.5, pages 40-41.)
11. A channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of multi-code	See claim 7. Apple's 3G products comprise a channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of multi-code physical channels. *See, e.g.*, TS 25.212 v6.0.0: "Data stream from/to MAC and higher layers (Transport block / Transport block set) is encoded/decoded to offer transport services over the radio transmission link. Channel coding scheme is a combination of

physical channels, the apparatus comprising:	error detection, error correcting, rate matching, interleaving and transport channels mapping onto/splitting from physical channels.” (V6.0.0, paragraph 4.1, page 9.)  **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11.)

	As specified in V.6.0.0, Apple's 3G products receive data frames that have one or more transmission time intervals (TTIs). "All transport blocks in a TTI are serially concatenated. If the number of bits in a TTI is larger than *Z*, the maximum size of a code block in question, then code block segmentation is performed after the concatenation of the transport blocks. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.) As it can be seen from the following figure, data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of physical channels.

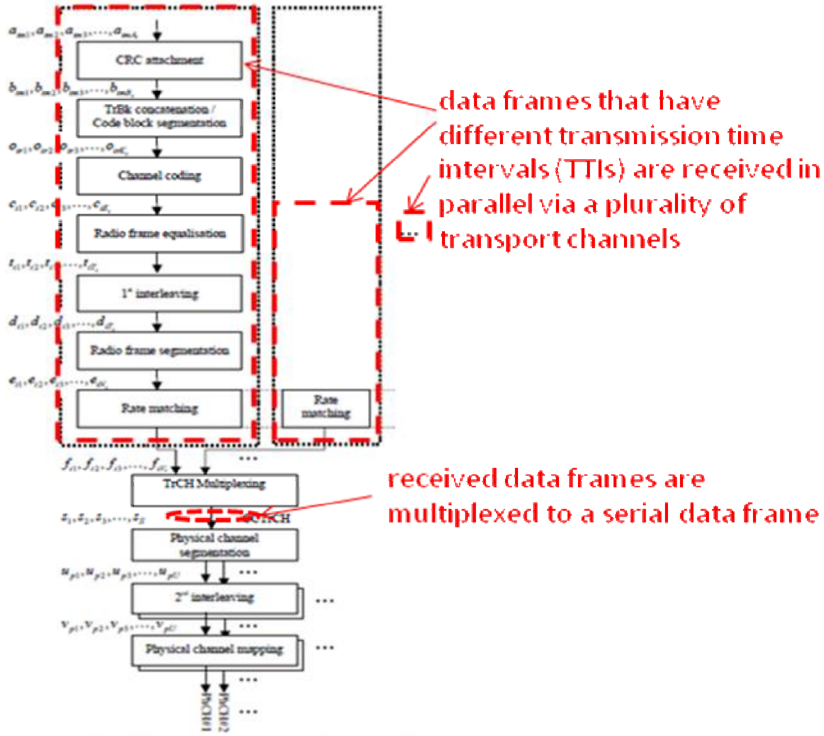


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotations added.)

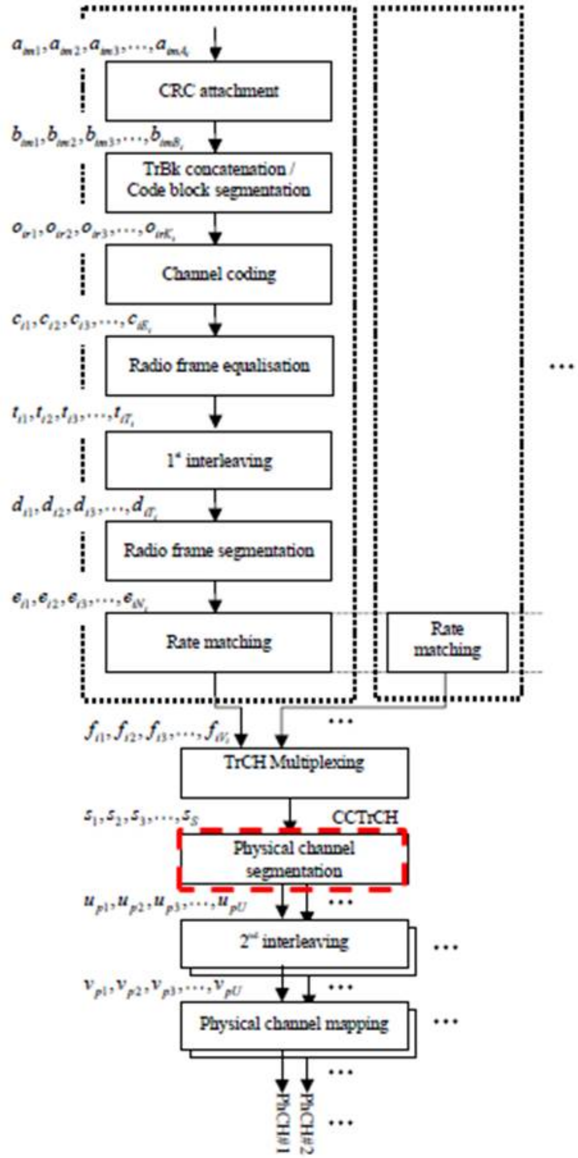
"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i.
The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows:

$$y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}\,,\; n_i = 1 \ldots F_i,\; k = 1 \ldots Y_i$$

where

	$Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 43.) Apple's 3G products have multi-code physical channels that are used in CDMA communication systems. "For all modes, some bits of the input flow are mapped to each code until the number of bits on the code is *U*." (V.6.0.0, paragraph 4.2.10, page 45.) V.6.0.0 further states that "[t]he PhCH for both uplink and downlink is defined in [2]." (V.6.0.0, paragraph 4.2.12, page 45.) [2] is a document entitled "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Physical channels and mapping of transport channels onto physical channels (FDD) (Release 6)," which is dated December 2003. This document states in paragraph 5.2.1 on page 10 that "[t]here are three types of uplink dedicated physical channels, the uplink Dedicated Physical Data Channel (uplink DPDCH), the uplink Dedicated Physical Control Channel (uplink DPCCH), and the uplink Dedicated Control Channel associated with HS-DSCH transmission (uplink HS-DPCCH). The DPDCH, the DPCCH and the HS-DPCCH are I/Q code multiplexed (see [4])," which illustrates the multi-code physical channels used in Apple's 3G products.
[a] a number of radio frame matchers, each of the radio frame matchers determining a number of filler bits and inserting the determined number of filler bits into the data frames and each of the radio frame matchers having a radio frame segmenter for segmenting the data frames having the inserted number of filler bits into radio frames;	Apple's 3G products have a number of radio frame matchers, each of the radio frame matchers determining a number of filler bits and inserting the determined number of filler bits into the data frames and each of the radio frame matchers having a radio frame segmenter for segmenting the data frames having the inserted number of filler bits into radio frames. See claim 7[a].
[b] a multiplexer for multiplexing the radio	Apple's 3G products have a multiplexer for multiplexing the radio frames into a serial data frame.

frames into a serial data frame; and	See claim 7[b].
[c] a physical channel segmenter for segmenting the multiplexed serial data frame by the number of the physical channels and outputting the segmented physical channel frames to corresponding physical channels.	Apple's 3G products have a physical channel segmenter for segmenting the multiplexed serial data frame by the number of the physical channels and outputting the segmented physical channel frames to corresponding physical channels. *See, e.g.*, TS 25.212 v6.0.0:

	 **Figure 1: Transport channel multiplexing structure for uplink**

	(V6.0.0, paragraph 4.2, page 11. Annotation added.) The physical channel segmenter segments the multiplexed serial data frame by the number of the physical channels and outputs the segmented physical channel frames to corresponding physical channels. "When more than one PhCH is used, physical channel segmentation divides the bits among the different PhCHs." (V6.0.0, paragraph 4.2.10, page 43.) "Bits on first PhCH after physical channel segmentation: $u_{1,k} = x_{f(k)}$ $k = 1, 2, \ldots, U$ Bits on second PhCH after physical channel segmentation: $u_{2,k} = x_{f(k+U)}$ $k = 1, 2, \ldots, U$ … Bits on the P^{th} PhCH after physical channel segmentation: $u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2, \ldots, U$ where *f* is such that : - for modes other than compressed mode by puncturing, $x_{f(k)} = x_k$, i.e. $f(k) = k$, for all k. - for compressed mode by puncturing, bit $u_{1,1}$ corresponds to the bit x_k with smallest index k when the bits p are not counted, bit $u_{1,2}$ corresponds to the bit x_k with second smallest index k when the bits p are not counted, and so on for bits $u_{1,3}, \ldots u_{1,U}, u_{2,1}, u_{2,2}, \ldots u_{2,U}, \ldots u_{P,1}, u_{P,2}, \ldots u_{P,U}$." (V6.0.0, paragraph 4.2.10, pages 43-44.)
12. A channel coding and multiplexing method for a CDMA communication system in which data frames that have one or more transmission time intervals (TTIs) are	Apple infringes this claim because it has performed each and every step of this claim, including but not limited to through testing and use by its employees. Apple also infringes this claim by selling Apple 3G products to customers and encouraging those customers to use the products in a manner that meets each and every step of this claim. Apple's 3G products practice a channel coding and multiplexing method for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in

received in parallel via a plurality of transport channels and multiplexed into a serial data frame, the method comprising:	parallel via a plurality of transport channels and multiplexed into a serial data frame. See claim 7.
[a] receiving data frames;	Apple's 3G products practice receiving data frames. A data frame corresponds to data transmitted in a transmission time interval (TTI). *See, e.g.*, TS 25.212 v6.0.0: "All transport blocks in a TTI are serially concatenated. If the number of bits in a TTI is larger than *Z*, the maximum size of a code block in question, then code block segmentation is performed after the concatenation of the transport blocks. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)
[b] determining a number of filler bits;	Apple's 3G products practice determining a number of filler bits. *See, e.g.*, TS 25.212 v6.0.0: "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where *i* is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik,}$ for k = 1… E_i; and - $t_{ik} = \{0, 1\}$ for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
[c] inserting the number of	Apple's 3G products practice inserting the number of filler bits into the data frames.

filler bits into the data frames;	*See, e.g.*, TS 25.212 v6.0.0: "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik,}$ for k = 1… E_i; and - $t_{ik} = \{0, 1\}$ for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
[d] segmenting the data frames including the filler bits into radio frames in a number of radio frame matchers; and	Apple's 3G products practice segmenting the data frames including the filler bits into radio frames in a number of radio frame matchers. Each radio frame segmenter determines the bit number of a radio frame according to the size of the corresponding data frame, a radio frame TTI. *See, e.g.*, TS 25.212 v6.0.0: As the following passage explains, the i^{th} transport channel receives $x_{i1}, x_{i2}, x_{i3} \ldots x_{iXi}$ where X_i is the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame. The received data frame by the radio frame segmenter contains the inserted filler bits. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio

	frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_i k} = x_{i,((n_i-1) Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) As the above passage also shows, the bit number of a radio frame is Y_i. The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel i maps the first Y_i bits of the received data frame (*i.e.,* $y_{i,1,k} - x_{i,k}$, $k=1,2,\ldots,Y_i$). The second radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.,* $y_{i,2,k} - x_{i,Yi+k}$, $k=1,2,\ldots,Y_i$), the third radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.,* $y_{i,3,k} - x_{i,2Yi+k}$, $k=1,2,\ldots,Y_i$), and so on.
[e] multiplexing the radio frames into the serial data frame.	Apple's 3G products practice multiplexing the radio frames into the serial data frame. *See, e.g.*, TS 25.212 v6.0.0:

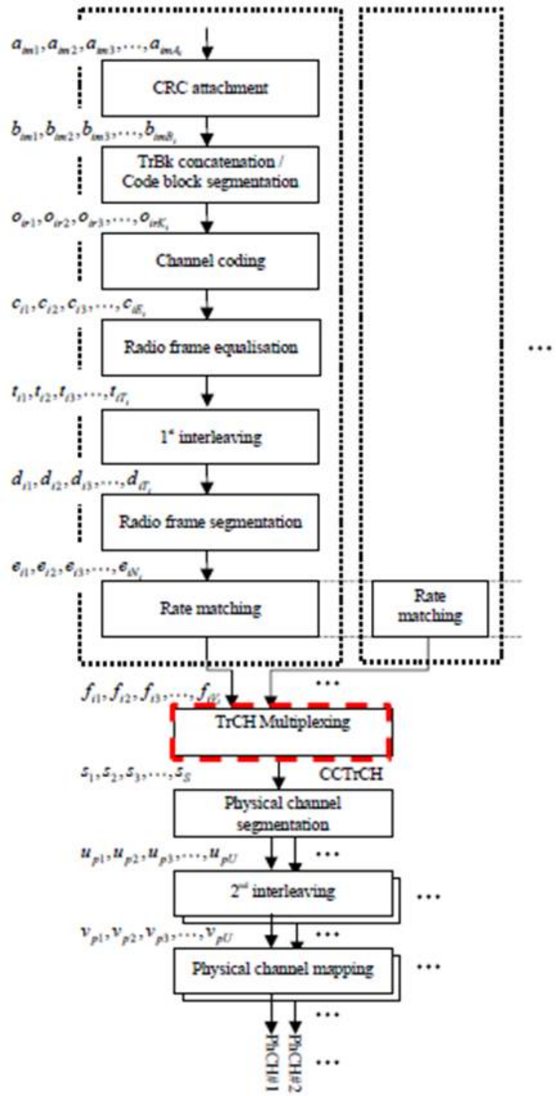
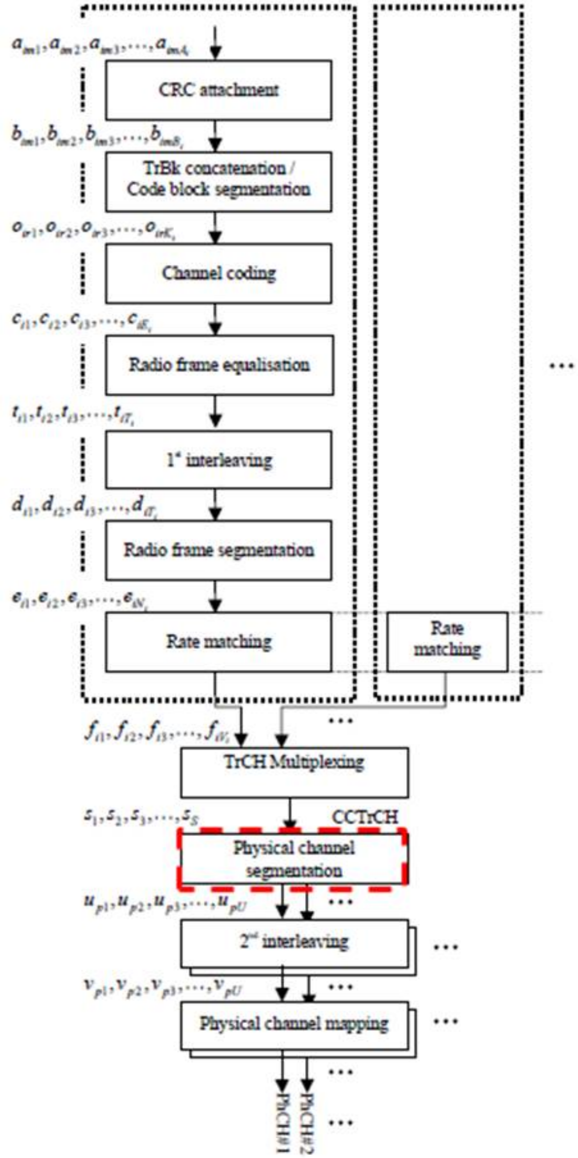


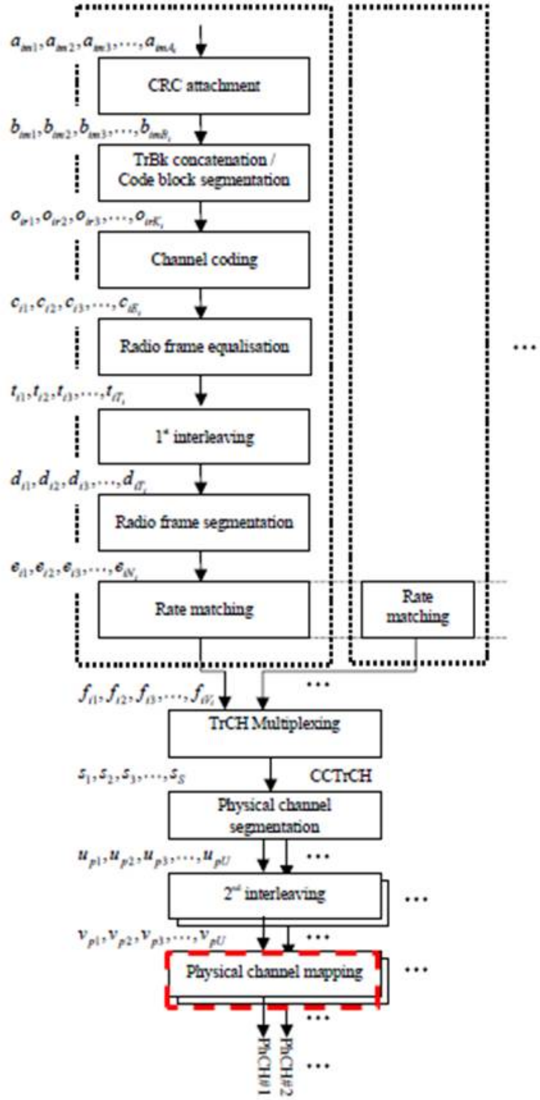
Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotation added.)

	The multiplexer in the Accused Product receives radio frames from the rate matcher and multiplexes the radio frames to the serial data frame. "Every 10 ms, one radio frame from each TrCH is delivered to the TrCH multiplexing. These radio frames are serially multiplexed into a coded composite transport channel (CCTrCH). The bits input to the TrCH multiplexing are denoted by $f_{i1}, f_{i2}, f_{i3}, \ldots, f_{iV_i}$, where *i* is the TrCH number and V_i is the number of bits in the radio frame of TrCH *i*. The number of TrCHs is denoted by *I*. The bits output from TrCH multiplexing are denoted by $s_1, s_2, s_3, \ldots, s_S$, where *S* is the number of bits, i.e. $S = \sum_i V_i$. The TrCH multiplexing is defined by the following relations: $s_k = f_{1k} \quad k = 1, 2, \ldots, V_1$ $s_k = f_{2,(k-V_1)} \quad k = V_1+1, V_1+2, \ldots, V_1+V_2$ $s_k = f_{3,(k-(V_1+V_2))} \quad k = (V_1+V_2)+1, (V_1+V_2)+2, \ldots, (V_1+V_2)+V_3$ … $s_k = f_{I,(k-(V_1+V_2+\ldots+V_{I-1}))} \quad k = (V_1+V_2+\ldots+V_{I-1})+1, (V_1+V_2+\ldots+V_{I-1})+2, \ldots, (V_1+V_2+\ldots+V_{I-1})+V_I$" (V6.0.0, paragraph 4.2.8, pages 41-42.)
13. The channel coding and multiplexing method of claim 12, further comprising: segmenting the serial data frame by the number of the physical channels; and	See claim 12. Apple's 3G products further practice segmenting the serial data frame by the number of the physical channels. *See, e.g.*, TS 25.212 v6.0.0:

	 **Figure 1: Transport channel multiplexing structure for uplink**

	(V6.0.0, paragraph 4.2, page 11. Annotation added.) "When more than one PhCH is used, physical channel segmentation divides the bits among the different PhCHs." (V6.0.0, paragraph 4.2.10, page 43.)
[a] assigning the segmented physical channel frames to the corresponding physical channels.	Apple's 3G products further practice assigning the segmented physical channel frames to the corresponding physical channels. *See, e.g.*, TS 25.212 v6.0.0:

	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11. Annotation added.)

	"The PhCH for both uplink and downlink is defined in [2]. The bits input to the physical channel mapping are denoted by $v_{p,1}, v_{p,2}, \ldots, v_{p,U}$, where p is the PhCH number and U is the number of bits in one radio frame for one PhCH. The bits $v_{p,k}$ are mapped to the PhCHs so that the bits for each PhCH are transmitted over the air in ascending order with respect to k." (V6.0.0, paragraph 4.2.12, page 45.) "In uplink, the PhCHs used during a radio frame are either completely filled with bits that are transmitted over the air or not used at all. The only exception is when the UE is in compressed mode. The transmission can then be turned off during consecutive slots of the radio frame." (V6.0.0, paragraph 4.2.12.1, page 45.)
14. A channel coding and multiplexing apparatus for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed into a serial data frame, the apparatus comprising:	See claim 7.
[a] a plurality of radio frame matchers, each of the radio frame matchers adapted to determine a number of filler bits and to insert the determined number of the filler bits into the data frames and, each of the radio frame matchers comprising a radio frame segmenter for segmenting the data frames having the inserted	Apple's 3G products have a plurality of radio frame matchers, each of the radio frame matchers adapted to determine a number of filler bits and to insert the determined number of the filler bits into the data frames and, each of the radio frame matchers comprising a radio frame segmenter for segmenting the data frames having the inserted number of filler bits into radio frames. See clam 7[a].

number of filler bits into radio frames; and	
[b] a multiplexer for multiplexing the radio frames into a serial data frame,	Apple's 3G products have a multiplexer for multiplexing the radio frames into a serial data frame. See claim 7[b].
[c] wherein the number of filler bits is determined such that the filler bit inserted data frames can be segmented into equally sized radio frames.	The radio frame matcher in Apple's 3G products determines the number of filler bits such that the filler bit inserted data frames can be segmented into equally sized radio frames. *See, e.g.*, TS 25.212 v6.0.0: "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik},$ for k = 1… E_i; and - $t_{ik} = \{0, 1\}$ for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
15. A channel coding and multiplexing method for a CDMA communication system in which data frames that have one or more transmission time intervals (TTIs) are	Apple infringes this claim because it has performed each and every step of this claim, including but not limited to through testing and use by its employees. Apple also infringes this claim by selling Apple 3G products to customers and encouraging those customers to use the products in a manner that meets each and every step of this claim. See claim 12.

received in parallel via a plurality of transport channels and multiplexed into a serial data frame, the method comprising:	
[a] receiving data frames;	See claim 12[a].
[b] determining a number of filler bits;	See claim 12[b].
[c] inserting the number filler bits into the data frames;	See claim 12[c].
[d] segmenting the data frames including the filler bits into radio frames in a number of radio frame matchers; and	See claim 7[d].
[e] multiplexing the radio frames into the serial data frame,	See claim 7[e].
[f] wherein the number of filler bits is determined such that the filler bit inserted data frames can be segmented into equally sized radio frames.	See claim 14[c].
16. A channel coding and multiplexing method for a CDMA communication system, in which data	Apple infringes this claim because it has performed each and every step of this claim, including but not limited to through testing and use by its employees. Apple also infringes this claim by selling Apple 3G products to customers and encouraging those customers to use the products in a manner that meets each and every step of this claim.

frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of multi-code physical channels, the method comprising:	Apple's 3G products practice a channel coding and multiplexing method for a CDMA communication system, in which data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of multi-code physical channels. *See, e.g.*, TS 25.212 v6.0.0: "Data stream from/to MAC and higher layers (Transport block / Transport block set) is encoded/decoded to offer transport services over the radio transmission link. Channel coding scheme is a combination of error detection, error correcting, rate matching, interleaving and transport channels mapping onto/splitting from physical channels." (V6.0.0, paragraph 4.1, page 9.)

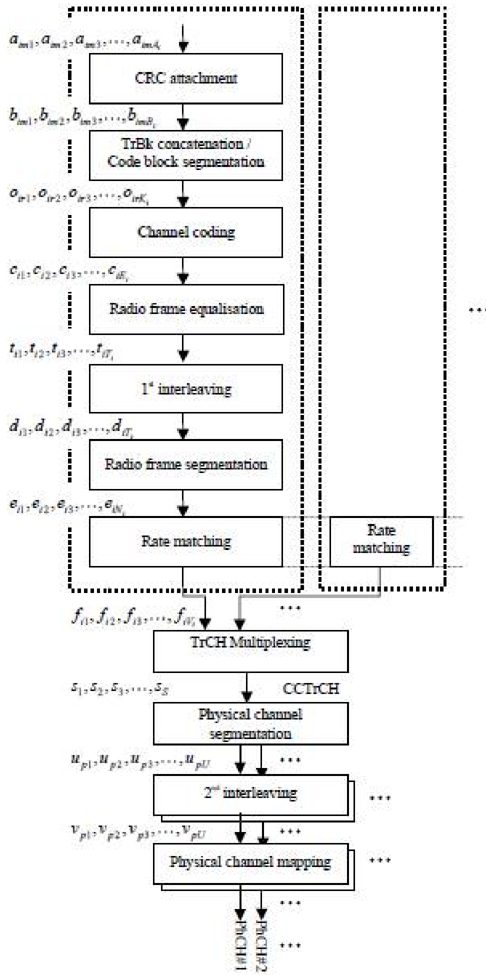


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11.)

As specified in V.6.0.0, Apple's 3G products receive data frames that have one or more transmission time intervals (TTIs).

"All transport blocks in a TTI are serially concatenated. If the number of bits in a TTI is larger than *Z*, the maximum size of a code block in question, then code block segmentation is performed after the concatenation of the transport blocks. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)

As it can be seen from the following figure, data frames that have one or more transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and converted to data frames of physical channels.

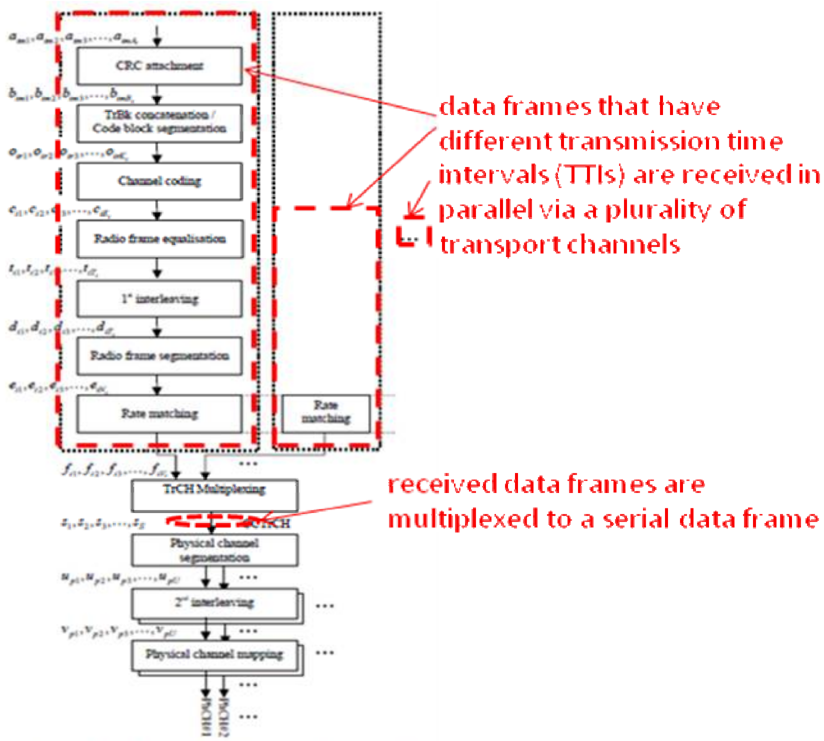


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotations added.)

"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and

	mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 43.) Apple's 3G products have multi-code physical channels that are used in CDMA communication systems. "For all modes, some bits of the input flow are mapped to each code until the number of bits on the code is *U*." (V.6.0.0, paragraph 4.2.10, page 45.) V.6.0.0 further states that "[t]he PhCH for both uplink and downlink is defined in [2]." (V.6.0.0, paragraph 4.2.12, page 45.) [2] is a document entitled "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Physical channels and mapping of transport channels onto physical channels (FDD) (Release 6)," which is dated December 2003. This document states in paragraph 5.2.1 on page 10 that "[t]here are three types of uplink dedicated physical channels, the uplink Dedicated Physical Data Channel (uplink DPDCH), the uplink Dedicated Physical Control Channel (uplink DPCCH), and the uplink Dedicated Control Channel associated with HS-DSCH transmission (uplink HS-DPCCH). The DPDCH, the DPCCH and the HS-DPCCH are I/Q code multiplexed (see [4])," which illustrates the multi-code physical channels used in Apple's 3G products.
[a] segmenting the received data frames into radio frames in a number of radio frame matchers;	Apple's 3G products practice segmenting the received data frames into radio frames in a number of radio frame matchers. Each radio frame segmenter determines the bit number of a radio frame according to the size of the corresponding data frame, a radio frame TTI. *See, e.g.*, TS 25.212 v6.0.0: As the following passage explains, the i^{th} transport channel receives $x_{i1}, x_{i2}, x_{i3} \ldots x_{iXi}$ where X_i is the size of

	the data frames received by the corresponding frame matcher and the TTI of a radio frame. The received data frame by the radio frame segmenter contains the inserted filler bits. "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of F_i. The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{iX_i}$ where i is the TrCH number and X_i is the number bits. The F_i output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \ldots, y_{i,n_iY_i}$ where n_i is the radio frame number in current TTI and Y_i is the number of bits per radio frame for TrCH i. The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The n_i -th segment is mapped to the n_i -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) As the above passage also shows, the bit number of a radio frame is Y_i. The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel i maps the first Y_i bits of the received data frame (*i.e.*, $y_{i,1,k} - x_{i,k}$, $k=1,2,\ldots,Y_i$). The second radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,2,k} - x_{i,Yi+k}$, $k=1,2,\ldots,Y_i$), the third radio frame of transport channel i maps the next Y_i bits of the received data frame (*i.e.*, $y_{i,3,k} - x_{i,2Yi+k}$, $k=1,2,\ldots,Y_i$), and so on.
[b] multiplexing the radio frames into a serial data frame; and	Apple's 3G products practice multiplexing the radio frames into a serial data frame. *See, e.g.*, TS 25.212 v6.0.0:

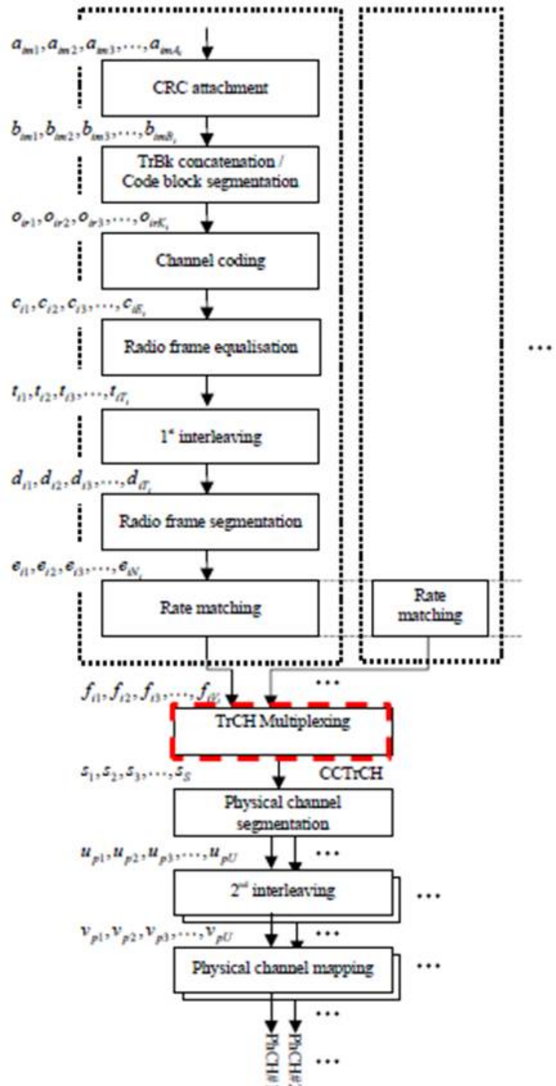


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 11. Annotation added.)

	The multiplexer in the Accused Product receives radio frames from the rate matcher and multiplexes the radio frames to the serial data frame. "Every 10 ms, one radio frame from each TrCH is delivered to the TrCH multiplexing. These radio frames are serially multiplexed into a coded composite transport channel (CCTrCH). The bits input to the TrCH multiplexing are denoted by $f_{i1}, f_{i2}, f_{i3}, \ldots, f_{iV_i}$, where i is the TrCH number and V_i is the number of bits in the radio frame of TrCH i. The number of TrCHs is denoted by I. The bits output from TrCH multiplexing are denoted by $s_1, s_2, s_3, \ldots, s_S$, where S is the number of bits, i.e. $S = \sum_i V_i$. The TrCH multiplexing is defined by the following relations: $s_k = f_{1k}$ $k = 1, 2, \ldots, V_1$ $s_k = f_{2,(k-V_1)}$ $k = V_1+1, V_1+2, \ldots, V_1+V_2$ $s_k = f_{3,(k-(V_1+V_2))}$ $k = (V_1+V_2)+1, (V_1+V_2)+2, \ldots, (V_1+V_2)+V_3$ … $s_k = f_{I,(k-(V_1+V_2+\ldots+V_{I-1}))}$ $k = (V_1+V_2+\ldots+V_{I-1})+1, (V_1+V_2+\ldots+V_{I-1})+2, \ldots, (V_1+V_2+\ldots+V_{I-1})+V_I$" (V6.0.0, paragraph 4.2.8, pages 41-42.)
[c] segmenting the serial data frame by the number of the physical channels and outputting the segmented physical channel frames to corresponding physical channels,	Apple's 3G products practice segmenting the serial data frame by the number of the physical channels and outputting the segmented physical channel frames to corresponding physical channels.

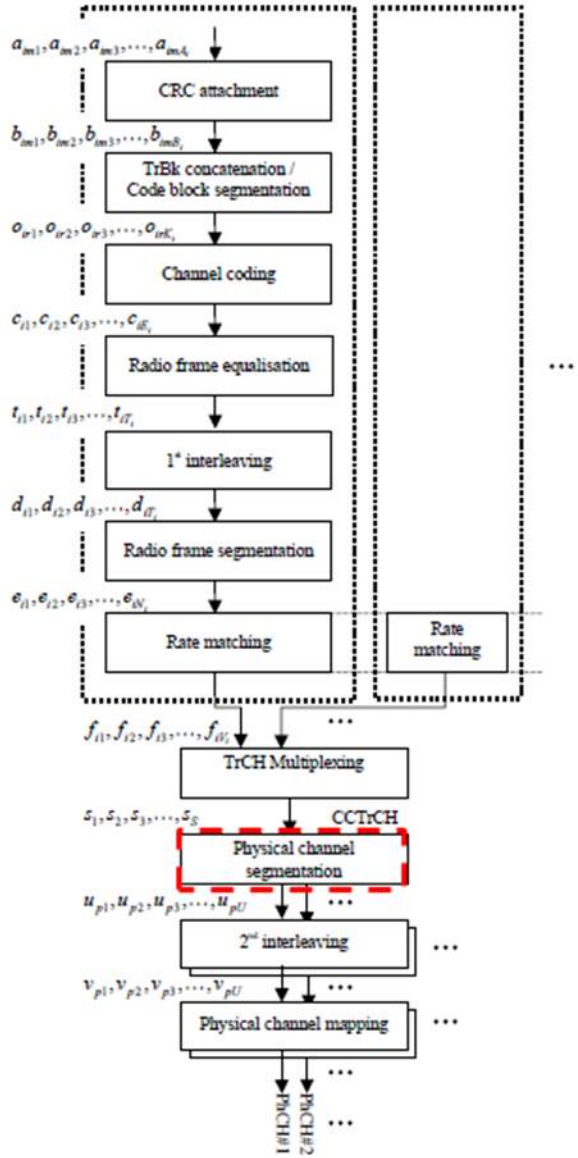
	

Figure 1: Transport channel multiplexing structure for uplink

	(V6.0.0, paragraph 4.2, page 11. Annotation added.) The physical channel segmenter segments the serial data frame by the number of the physical channels and outputs the segmented physical channel frames to corresponding physical channels. "When more than one PhCH is used, physical channel segmentation divides the bits among the different PhCHs." (V6.0.0, paragraph 4.2.10, page 43.) "Bits on first PhCH after physical channel segmentation: $u_{1,k} = x_{f(k)}$ $k = 1, 2, \ldots, U$ Bits on second PhCH after physical channel segmentation: $u_{2,k} = x_{f(k+U)}$ $k = 1, 2, \ldots, U$ … Bits on the P^{th} PhCH after physical channel segmentation: $u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2, \ldots, U$ where *f* is such that : - for modes other than compressed mode by puncturing, $x_{f(k)} = x_k$, i.e. $f(k) = k$, for all *k*. - for compressed mode by puncturing, bit $u_{1,1}$ corresponds to the bit x_k with smallest index *k* when the bits p are not counted, bit $u_{1,2}$ corresponds to the bit x_k with second smallest index *k* when the bits p are not counted, and so on for bits $u_{1,3}, \ldots u_{1,U}, u_{2,1}, u_{2,2}, \ldots u_{2,U}, \ldots u_{P,1}, u_{P,2}, \ldots u_{P,U}$." (V6.0.0, paragraph 4.2.10, pages 43-44.)
[d] wherein the segmented physical channel frames for physical channel #1 are output as $e_{1,j}=d_j$, the segmented physical channel frames for physical channel #2 are	In Apple's 3G products, the segmented physical channel frames for a physical channel #1 are output as $e_{1,j}=d_j$, the segmented physical channel frames for a physical channel #2 are output as $e_{2,j}=d_{(j+P/M)}$ and the segmented physical channel frames for a physical channel #M are output as $e_{M,j}=d_{(j+(M-1)P/M}$, and wherein the bits of the serial data frame output from the multiplexer are $d_1, d_2, \ldots, d_p$, the number of physical channels is M, the size of the serial data frame output from the multiplexer is P and j=1, 2, . . . , P/M.

output as $e_{2,j}=d_{(j+P/M)}$ and the segmented physical channel frames for physical channel #M are output as $e_{M,j}=d_{(j+(M-1)P/M}$, and wherein the bits of the serial data frame output from the multiplexer are $d_1, d_2, \ldots, d_p$, the number o physical channels is M, the size of the serial data frame output from the multiplexing step is P and j=1,2, . . . , P/M.	"The bits input to the physical channel segmentation are denoted by $x_1, x_2, x_3, \ldots, x_X$, where *X* is the number of bits input to the physical channel segmentation block. The number of PhCHs is denoted by *P*. The bits after physical channel segmentation are denoted $u_{p,1}, u_{p,2}, u_{p,3}, \ldots, u_{p,U}$, where *p* is PhCH number and *U* is the number of bits in one radio frame for each PhCH, i.e. $U= (X - N_{TGL} - (N_{data,*} - N'_{data,*})) / P$ for compressed mode by puncturing, and $U = \frac{X}{P}$ otherwise." (V6.0.0, paragraph 4.2.10, page 43.) "Bits on first PhCH after physical channel segmentation: $u_{1,k} = x_{f(k)}$ $k = 1, 2, \ldots, U$ Bits on second PhCH after physical channel segmentation: $u_{2,k} = x_{f(k+U)}$ $k = 1, 2, \ldots, U$ … Bits on the P^{th} PhCH after physical channel segmentation: $u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2, \ldots, U$ where *f* is such that : - for modes other than compressed mode by puncturing, $x_{f(k)} = x_k$, i.e. $f(k) = k$, for all *k*. - for compressed mode by puncturing, bit $u_{1,1}$ corresponds to the bit x_k with smallest index *k* when the bits p are not counted, bit $u_{1,2}$ corresponds to the bit x_k with second smallest index *k* when the bits p are not counted, and so on for bits $u_{1,3}, \ldots u_{1,U}, u_{2,1}, u_{2,2}, \ldots u_{2,U}, \ldots u_{P,1}, u_{P,2}, \ldots u_{P,U}$." (V6.0.0, paragraph 4.2.10, pages 43-44.) Based on the above passages from V.6.0.0, the following correspondence is made between the claim elements and the above-cited notation from V.6.0.0.

Claim Element	Notation for Claim Element	Notation from V.6.0.0
"number of physical channels"	M	P
"size of the serial data frame output from the multiplexer" (i.e., number of input bits to physical channel segmenter to be segmented by physical channel segmenter)	P	X
"serial data frame output from the multiplexer" (i.e., input bits to	$d_1, d_2, \ldots d_P$	$x_1, x_2, \ldots x_X$

physical channel segmenter)		
position of a bit in a segmented physical channel frame	j	k
"the segmented physical channel frames for a physical channel #1 are output"	$e_{1,j}$	$u_{1,k}$
the segmented physical channel frames for a physical channel #2 are output"	$e_{2,j}$	$u_{2,k}$
"the segmented physical channel frames for a physical channel #M are output"	$e_{M,j}$	$u_{P,k}$ Note: The number of physical channels is "M" for the claim and "P" for V.6.0.0.

Based on the correspondence shown above, it is clear that *"$u_{1,k} = x_{f(k)}$ $k = 1, 2, \ldots, U$"* (where U=X/P) shows the same "segmented physical channel frames for a physical channel #1" as the claimed "$e_{1,j}$=d_j," *"$u_{2,k} = x_{f(k+U)}$ $k = 1, 2, \ldots, U$"* shows the same "segmented physical channel frames for a physical channel #2" as the claimed "$e_{2,j}$=$d_{(j+P/M)}$," and "*$u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2, \ldots, U$*" shows the same "segmented physical channel frames for a physical channel #M" as the claimed "as $e_{M,j}$=$d_{(j+(M-1)P/M}$."

17. The channel coding and multiplexing apparatus of claim 7, wherein one filler bit is added to the end of each radio frame having frame time index t>=T_i-r_i+1 where r_i indicates the number of filler bits and T_i indicates a TTI.	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index t>=Ti-ri+1 where ri indicates the number of filler bits and Ti indicates a TTI. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik,}$ for k = 1… E_i; and - $t_{ik} = \{0, 1\}$ for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
18. The channel coding and multiplexing apparatus of claim 11, wherein one filler bit is added to the end of each radio frame having frame time index t>=T_i-r_i+1 where r_i indicates the number of filler bits and T_i indicates a TTI.	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index t>=Ti-ri+1 where ri indicates the number of filler bits and Ti indicates a TTI. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik,}$ for k = 1… E_i; and - $t_{ik} = \{0, 1\}$ for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation."

	(V6.0.0, paragraph 4.2.4, page 21.)
19. The channel coding and multiplexing apparatus of claim 12, wherein one filler bit is added to the end of each radio frame having frame time index $t>=T_i-r_i+1$ where r_i indicates the number of filler bits and T_i indicates a TTI.	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index t>=Ti-ri+1 where ri indicates the number of filler bits and Ti indicates a TTI. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik,}$ for k = 1… E_i; and - t_{ik} = {0, 1} for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
20. The channel coding and multiplexing apparatus of claim 14, wherein one filler bit is added to the end of each radio frame having frame time index $t>=T_i-r_i+1$ where r_i indicates the number of filler bits and T_i indicates a TTI.	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index t>=Ti-ri+1 where ri indicates the number of filler bits and Ti indicates a TTI. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik,}$ for k = 1… E_i; and - t_{ik} = {0, 1} for k= E_i +1… T_i, if $E_i < T_i$; where

	- $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
21. The channel coding and multiplexing apparatus of claim 15, wherein one filler bit is added to the end of each radio frame having frame time index $t>=T_i-r_i+1$ where r_i indicates the number of filler bits and T_i indicates a TTI.	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index t>=Ti-ri+1 where ri indicates the number of filler bits and Ti indicates a TTI. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in F_i data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \ldots, c_{iE_i}$, where i is TrCH number and E_i the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \ldots, t_{iT_i}$, where T_i is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik}$, for k = 1… E_i; and - $t_{ik} = \{0, 1\}$ for k= E_i +1… T_i, if $E_i < T_i$; where - $T_i = F_i * N_i$; and - $N_i = \lceil E_i / F_i \rceil$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)