Mueller Exhibit 58

EXHIBIT B

SAMSUNG'S PATENT L.R. 3-1(A)-(D) DISCLOSURES FOR U.S. PATENT NO. 7,050,410

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)-C))**
1. An uplink transmitting device in a mobile communication system, comprising:	Apple's 3G products[1] comprise an uplink transmitting device in a mobile communication system. *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 (802.11a/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		

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")).

V.6.0.0 specifies the uplink transmitting technique in a mobile communication system as the following diagram shows.

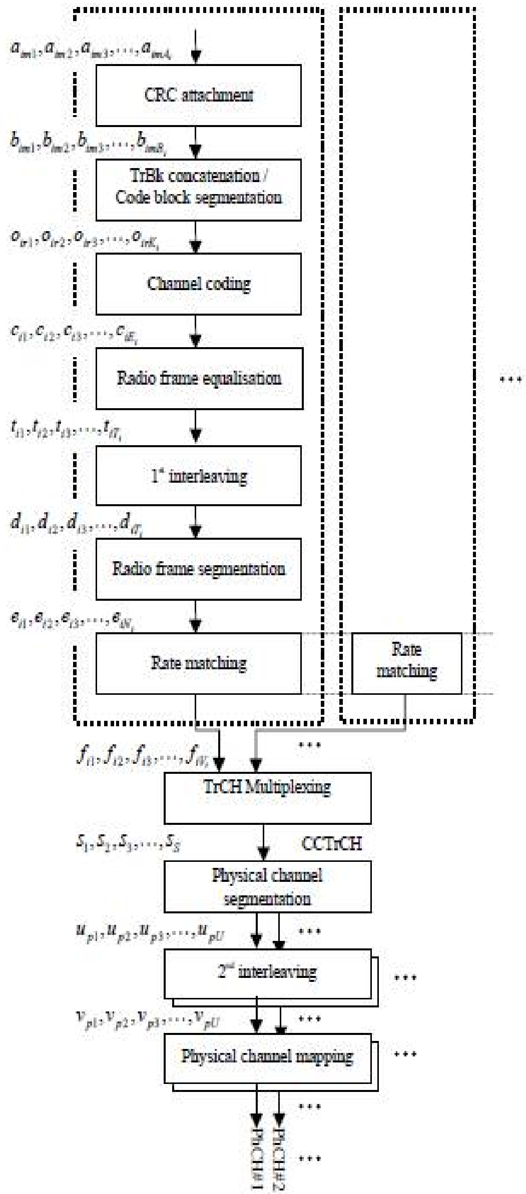


Figure 1: Transport channel multiplexing structure for uplink

[a] an encoder for receiving a first information bit stream and for outputting three streams, a second information bit stream, a first parity stream, and a second parity stream, by encoding the first information bit stream;	Apple's 3G products have an encoder for receiving a first information bit stream and for outputting three streams, a second information bit stream, a first parity stream, and a second parity stream, by encoding the first information bit stream. *See, e.g.,* TS 25.212 v6.0.0: For example, Apple's 3G products are compliant with V6.0.0, which specifies the channel coding block in uplink transmission. "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.)

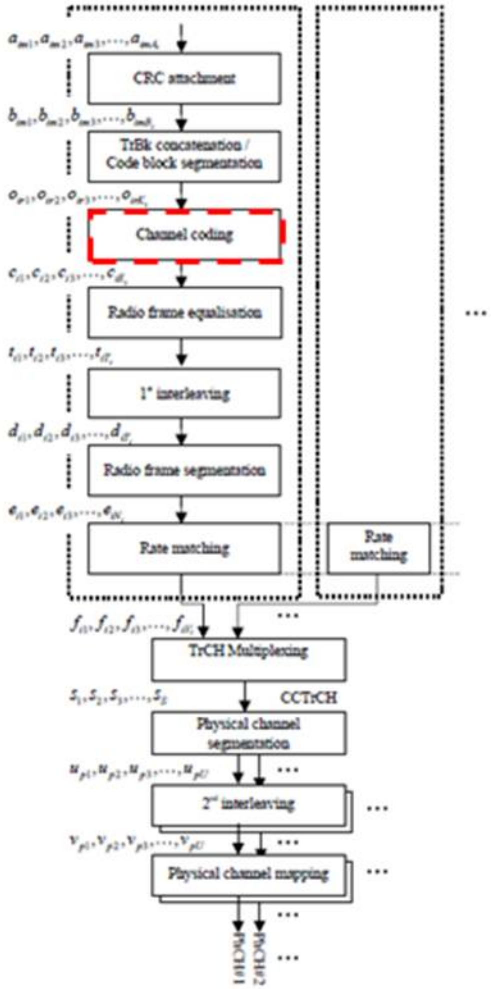
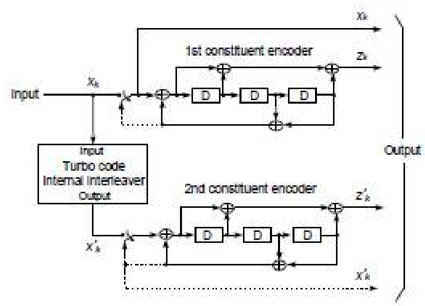
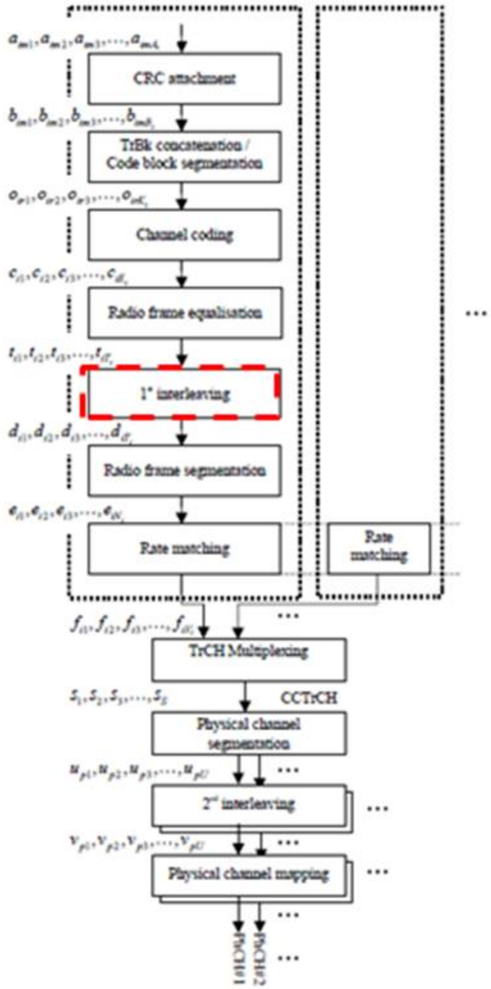


Figure 1: Transport channel multiplexing structure for uplink

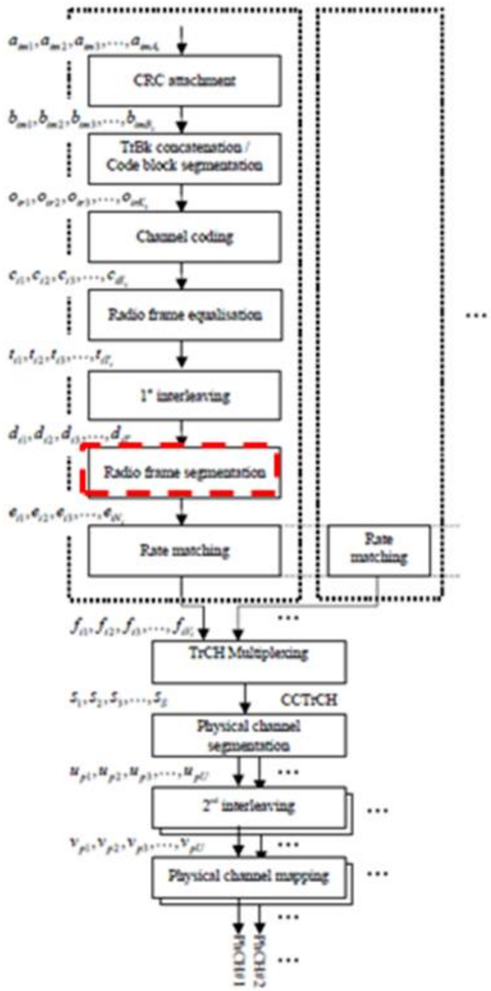
(V6.0.0, paragraph 4.2, page 11. Annotation added)

Apple's 3G products receive a first information bit stream $(o_{ir1}, o_{ir2}, \ldots, o_{irK_i})$, and output three streams, a second information bit stream $(x_1, x_2, \ldots, x_K)$, a first parity stream $(z_1, z_2, \ldots, z_K)$, and a second parity stream $(z'_1, z'_2, \ldots, z'_K)$ by encoding the first information bit stream.

	"Code blocks are delivered to the channel coding block. They are denoted by $o_{ir1}, o_{ir2}, o_{ir3}, \ldots, o_{irK_i}$, where *i* is the TrCH number, *r* is the code block number, and K_i is the number of bits in each code block. The number of code blocks on TrCH *i* is denoted by C_i. After encoding the bits are denoted by $y_{ir1}, y_{ir2}, y_{ir3}, \ldots, y_{irY_i}$, where Y_i is the number of encoded bits. The relation between o_{irk} and y_{irk} and between K_i and Y_i is dependent on the channel coding scheme. The following channel coding schemes can be applied to TrCHs: - convolutional coding; - turbo coding." (V6.0.0, paragraph 4.2.3, page 15.) "Output from the Turbo coder is $x_1, z_1, z'_1, x_2, z_2, z'_2, \ldots, x_K, z_K, z'_K$, where $x_1, x_2, \ldots, x_K$ are the bits input to the Turbo coder i.e. both first 8-state constituent encoder and Turbo code internal interleaver, and *K* is the number of bits, and $z_1, z_2, \ldots, z_K$ and $z'_1, z'_2, \ldots, z'_K$ are the bits output from first and second 8-state constituent encoders, respectively." (V6.0.0, paragraph, 4.2.3.2.1, page 16.)  **Figure 4: Structure of rate 1/3 Turbo coder (dotted lines apply for trellis termination only)** (V6.0.0, paragraph 4.2.3.2.1, page 17.)
[b] an interleaver for interleaving the encoded streams by a predetermined	Apple's 3G products have an interleaver for interleaving the encoded streams by a predetermined interleaving rule. *See, e.g.,* TS 25.212 v6.0.0:

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

	$$\begin{bmatrix} x_{i,1} & x_{i,2} & x_{i,3} & \ldots & x_{i,\mathrm{C1}} \\ x_{i,(\mathrm{C1}+1)} & x_{i,(\mathrm{C1}+2)} & x_{i,(\mathrm{C1}+3)} & \ldots & x_{i,(2\times\mathrm{C1})} \\ \vdots & \vdots & \vdots & \ldots & \vdots \\ x_{i,((\mathrm{R1}-1)\times\mathrm{C1}+1)} & x_{i,((\mathrm{R1}-1)\times\mathrm{C1}+2)} & x_{i,((\mathrm{R1}-1)\times\mathrm{C1}+3)} & \ldots & x_{i,(\mathrm{R1}\times\mathrm{C1})} \end{bmatrix}$$ (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 denoted by y_{ik}: $$\begin{bmatrix} y_{i,1} & y_{i,(\mathrm{R1}+1)} & y_{i,(2\times\mathrm{R1}+1)} & \ldots & y_{i,((\mathrm{C1}-1)\times\mathrm{R1}+1)} \\ y_{i,2} & y_{i,(\mathrm{R1}+2)} & y_{i,(2\times\mathrm{R1}+2)} & \ldots & y_{i,((\mathrm{C1}-1)\times\mathrm{R1}+2)} \\ \vdots & \vdots & \vdots & \ldots & \vdots \\ y_{i,\mathrm{R1}} & y_{i,(2\times\mathrm{R1})} & y_{i,(3\times\mathrm{R1})} & \ldots & y_{i,(\mathrm{C1}\times\mathrm{R1})} \end{bmatrix}\text{,}$$" (V6.0.0, paragraph 4.2.5.2, page 23) "The bits input to the 1st interleaving are denoted by $t_{i,1}, t_{i,2}, t_{i,3}, \ldots, t_{i,T_i}$, 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 $d_{i,1}, d_{i,2}, d_{i,3}, \ldots, d_{i,T_i}$, and $d_{i,k} = y_{i,k}$." (V6.0.0, paragraph, 4.2.5.3, page 23.)
[c] a radio frame segmenter for receiving the interleaved stream from the interleaver and mapping the received interleaved stream onto at least one consecutive	Apple's 3G products have a radio frame segmenter for receiving the interleaved stream from the interleaver and mapping the received interleaved stream onto at least one consecutive radio frame. *See, e.g.,* TS 25.212 v6.0.0:

radio frame;	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11. Annotation added) The radio frame segmenter in Apple's 3G products maps the received interleaved stream onto at least one consecutive radio frame when the transmission time interval is longer than 10 ms. In this case, the input bit sequence is mapped onto consecutive F_i 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 $y_{i,n_i 1}, y_{i,n_i 2}, y_{i,n_i 3}, \ldots, y_{i,n_i Y_i}$ 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.)
[d] a demultiplexer for separating each of the at least one radio frames received from the radio frame segmenter into a third information bit stream, and first and second parity streams from the demultiplexer; and	As part of the rate matching function (shown in the figure below), a demultiplexing operation is performed in Apple's 3G products. The demultiplexer in Apple's 3G products separates each of the at least one radio frames received from the radio frame segmenter into a third information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs), and first (x_{2ik}, *i.e.,* first parity bits) and second (x_{3ik}, *i.e.,* second parity) parity streams from the demultiplexer. *See, e.g.,* TS 25.212 v6.0.0:

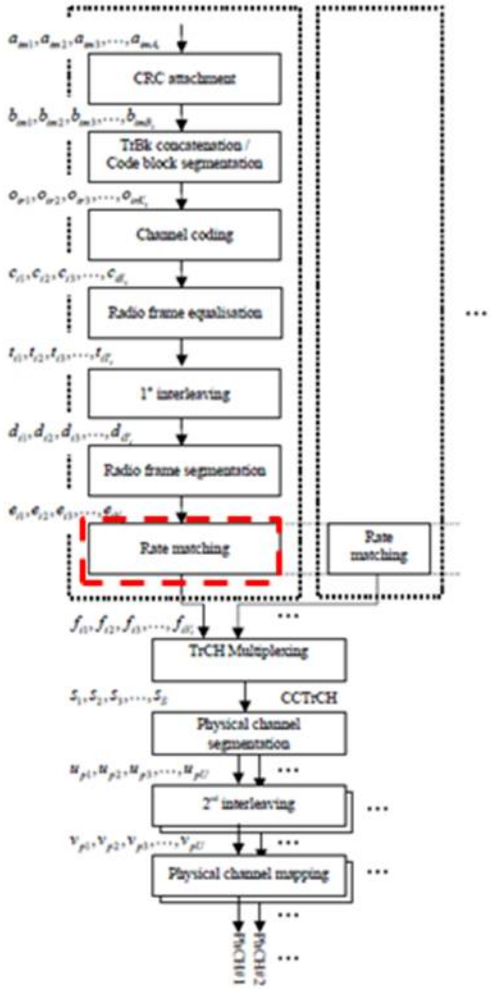


Figure 1: Transport channel multiplexing structure for uplink

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

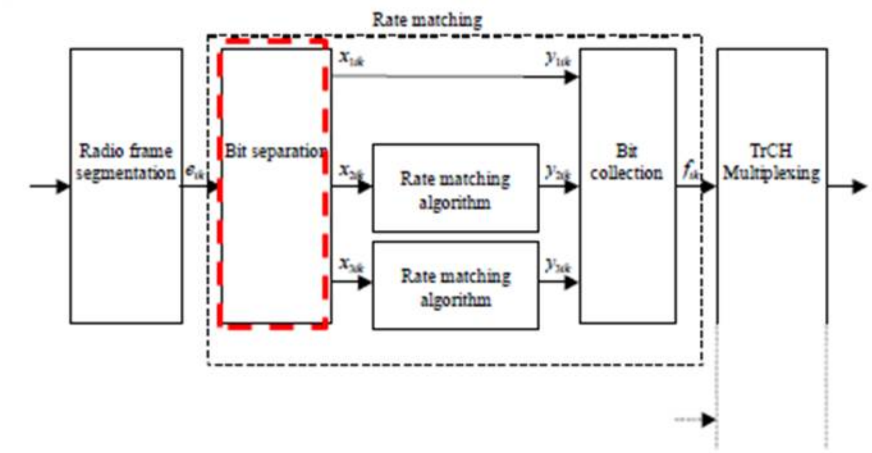


Figure 5: Puncturing of turbo encoded TrCHs in uplink

(V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)

"The first sequence contains:

- All of the systematic bits that are from turbo encoded TrCHs.
- From 0 to 2 first and/or second parity bits that are from turbo encoded TrCHs. These bits come into the first sequence when the total number of bits in a block after radio frame segmentation is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

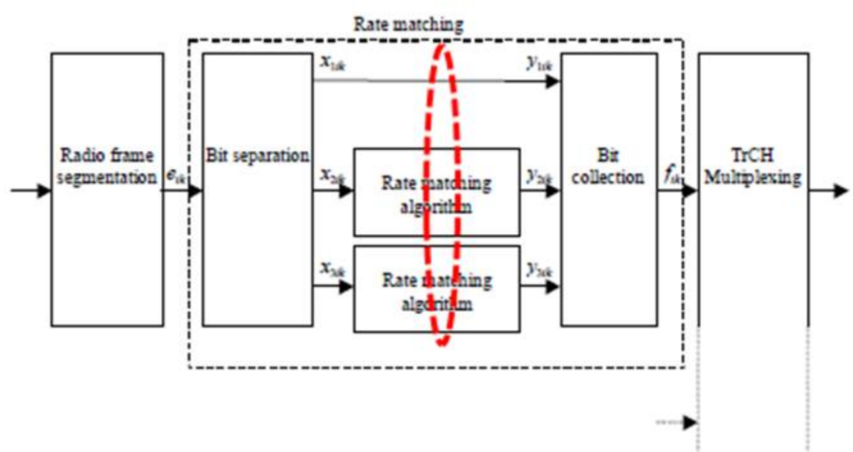
The second sequence contains:

- All of the first parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The third sequence contains:

- All of the second parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The second and third sequences shall be of equal length, whereas the first sequence can contain from 0 to 2 more bits. Puncturing is applied only to the second and third sequences."
(V6.0.0, paragraph 4.2.7.3, pages 35-36.)

	"For turbo encoded TrCHs with puncturing (Y_i=X_i): $z_{i,3(k-1)+1+(\alpha_1+\beta_{n_i}) \bmod 3} = y_{1,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3\lfloor N_i/3 \rfloor+k} = y_{1,i,\lfloor N_i/3 \rfloor+k}$ k = 1, …, N_i mod 3 Note: When (N_i mod 3) = 0 this row is not needed. $z_{i,3(k-1)+1+(\alpha_2+\beta_{n_i}) \bmod 3} = y_{2,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3(k-1)+1+(\alpha_3+\beta_{n_i}) \bmod 3} = y_{3,i,k}$ k = 1, 2, 3, …, Y_i After the bit collection, bits $z_{i,k}$ with value δ, where $\delta \notin \{0, 1\}$, are removed from the bit sequence." (V6.0.0, paragraph 4.2.7.3.2, page 38.)
[e] a rate matcher for bypassing the third information bit stream and for puncturing a part of the first and second parity streams from the demultiplexer according to a given rate matching rule.	Apple's 3G products have a rate matcher for bypassing the third information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs) and for puncturing a part of the first (x_{2ik}) and second (x_{3ik}) parity streams from the demultiplexer according to a given rate matching rule. *See, e.g.,* TS 25.212 v6.0.0:  **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 37. Annotation added.) "The systematic bits of turbo encoded TrCHs shall not be punctured, the other bits may be punctured. The systematic bits, first parity bits, and second parity bits in the bit sequence input to the rate matching block are therefore separated into three sequences." (V.6.0.0, paragraph 4.2.7.3, page 34.)

	"The first sequence contains: - All of the systematic bits that are from turbo encoded TrCHs. - From 0 to 2 first and/or second parity bits that are from turbo encoded TrCHs. These bits come into the first sequence when the total number of bits in a block after radio frame segmentation is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The second sequence contains: - All of the first parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The third sequence contains: - All of the second parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The second and third sequences shall be of equal length, whereas the first sequence can contain from 0 to 2 more bits. Puncturing is applied only to the second and third sequences." (V6.0.0, paragraph 4.2.7.3, pages 35-36.)
2. The transmitting device of claim 1, wherein the interleaved stream is mapped onto consecutive radio frames when a transmission time interval (TTI) is longer than 10 ms.	While uplink transmitting, the radio frame segmentation in Apple's 3G products receives the interleaved stream from the interleaver and maps the interleaved stream onto consecutive F_i radio frames when a transmission time interval (TTI) is longer than 10 ms. *See, e.g.,* TS 25.212 v6.0.0:

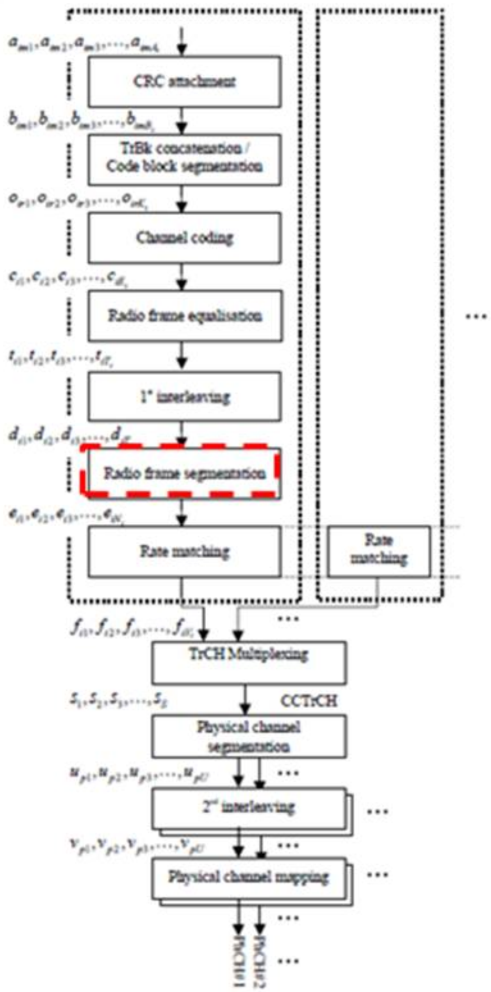


Figure 1: Transport channel multiplexing structure for uplink

(V6.0.0, paragraph 4.2, page 10. Annotation 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.)
3. The transmitting device of claim 1, wherein the transmission time interval (TTI) is one of 10, 20, 40, and 80 ms.	Apple's 3G products conform to V6.0.0 which specifies the transmission time interval (TTI) to be one of 10, 20, 40, and 80 ms. *See, e.g.,* TS 25.212 v6.0.0: "Data arrives to the coding/multiplexing unit in form of transport block sets once every transmission time interval. The transmission time interval is transport-channel specific from the set {10 ms, 20 ms, 40 ms, 80 ms}." (V6.0.0, paragraph 4.2, page 10.)
4. The transmitting device of claim 1, wherein the interleaving rule is a bit reverse method.	Apple's 3G products follow the same interleaving rule described as the bit reverse method specified in the '410 patent. *See, e.g.,* TS 25.212 v6.0.0: The following is the column permutation pattern given in V6.0.0, which confirms the interleaving rule specified in V6.0.0. As it can be seen from the following table from V6.0.0, the Apple 3G products conform to the bit reverse method discussed in the '410 patent.

Table 4 Inter-column permutation patterns for 1st interleaving

TTI	Number of columns C1	Inter-column permutation patterns <$P1_{C1}(0)$, $P1_{C1}(1)$, …, $P1_{C1}(C1-1)$>
10 ms	1	<0>
20 ms	2	<0,1>
40 ms	4	<0,2,1,3>
80 ms	8	<0,4,2,6,1,5,3,7>

	(V.6.0.0, paragraph 4.2.5.2, page 23.) "$P1_{Fi}$ (x) defines the inter column permutation function for a TTI of length $F_i \times$10ms, as defined in Table 4 in section 4.2.5.2. $P1_{Fi}$ (x) is the Bit Reversal function of x on $\log_2(F_i)$ bits." (V6.0.0, paragraph 4.2.5.1, page 22.)
5. The transmitting device of claim 1, wherein an arrangement of information bits and parity bits in each of the at least one radio frames has a regular pattern.	In Apple's 3G products, the arrangement of information bits and parity bits at the output of the channel encoder has a regular pattern. "Output from the Turbo coder is $x_1, z_1, z'_1, x_2, z_2, z'_2, \ldots, x_K, z_K, z'_K$, where $x_1, x_2, \ldots, x_K$ are the bits input to the Turbo coder i.e. both first 8-state constituent encoder and Turbo code internal interleaver, and K is the number of bits, and $z_1, z_2, \ldots, z_K$ and $z'_1, z'_2, \ldots, z'_K$ are the bits output from first and second 8-state constituent encoders, respectively." (V6.0.0, paragraph 4.2.3.2.1, page 16-17.) Before these bits from the channel encoder are put into a radio frame, they are interleaved at the interleaver according to a specified permutation pattern. After the permutation is done at the interleaver, the resulting bit patterns have a newly permuted regularity. Thus, the arrangement of information bits and parity bits in the radio frames has a regular pattern.
6. The transmitting device of claim 2, wherein the consecutive radio frames have initial bits determined by the TTI.	In Apple's 3G products, initial bits in the each of the consecutive radio frames are determined by the TTI. As described above, the number of consecutive radio frames is a function of the TTI. Then, depending on the number of bits (p) to be inserted, the initial bits are inserted in the beginning of each of the consecutive radio frames as the following passage indicates. *See, e.g.,* TS 25.212 v6.0.0: "C[x], x= 0 to F_i– 1, the number of bits p which have to be inserted in each of the $F_i$segments of the TTI, where x is the column number before permutation, i.e. in each column of the first interleaver. C[$P1_{Fi}$(x)] is equal to $Np_{i,\max}^{m \times F_i + x}$ for x equal 0 to F_i–1 for fixed positions. It is noted $Np_i^{m \times F_i + x}$ in the following initialisation step." (V6.0.0, paragraph 4.2.5.1, page 22.) The algorithm shown below indicates how the initial bits are inserted in each of the F_i segments of the TTI number *m*. "col = 0 **while** col < F_i **do** -- here col is the column number after column permutation C[$P1_{Fi}$ (col)] = $Np_i^{m \times F_i + col}$ -- initialisation of number of bits p to be inserted in each of the F_i

	segments of the TTI number *m*
	cbi[$P1_{Fi}$ (col)] = 0 -- initialisation of counter of number of bits p inserted in each of the F_i segments of the TTI
	col = col +1
	end do
	n = 0, m = 0
	while n < X_i **do** -- from here col is the column number before column permutation
	col = *n* mod F_i
	if cbi[col] < C[col] **do**
	$x_{i,n}$ = p -- insert one p bit
	cbi[col] = cbi[col]+1 -- update counter of number of bits p inserted
	else -- no more p bit to insert in this segment
	$x_{i,n} = z_{i,,m}$
	m = m+1
	endif
	n = n +1
	end do"
	(V6.0.0, paragraph 4.2.5.1, page 22.)

7. The transmitting device of claim 5, wherein the demultiplexer separates bits of the radio frame into the third information bit stream, and the first and second parity streams from the	As part of the rate matching function (shown in the figure below), a demultiplexing operation is performed in Apple's 3G products. The demultiplexer in Apple's 3G products separates each of the at least one radio frames received from the radio frame segmenter into a third information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs), and first (x_{2ik}, *i.e.,* first parity bits) and second (x_{3ik}, *i.e.,* second parity) parity streams from the demultiplexer. *See, e.g.,* TS 25.212 v6.0.0:

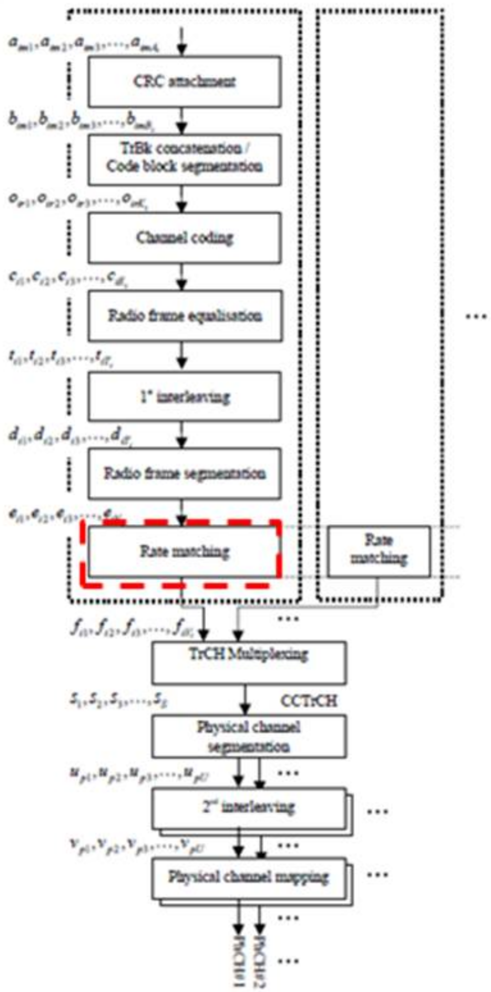
<table>
<tr>
<td>demultiplexer according to the regular pattern.</td>
<td>


Figure 1: Transport channel multiplexing structure for uplink

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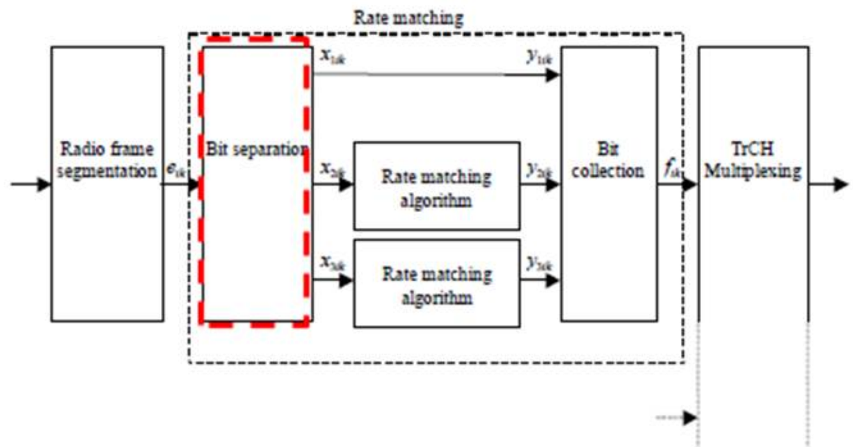


Figure 5: Puncturing of turbo encoded TrCHs in uplink

(V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)

"The first sequence contains:

- All of the systematic bits that are from turbo encoded TrCHs.
- From 0 to 2 first and/or second parity bits that are from turbo encoded TrCHs. These bits come into the first sequence when the total number of bits in a block after radio frame segmentation is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The second sequence contains:

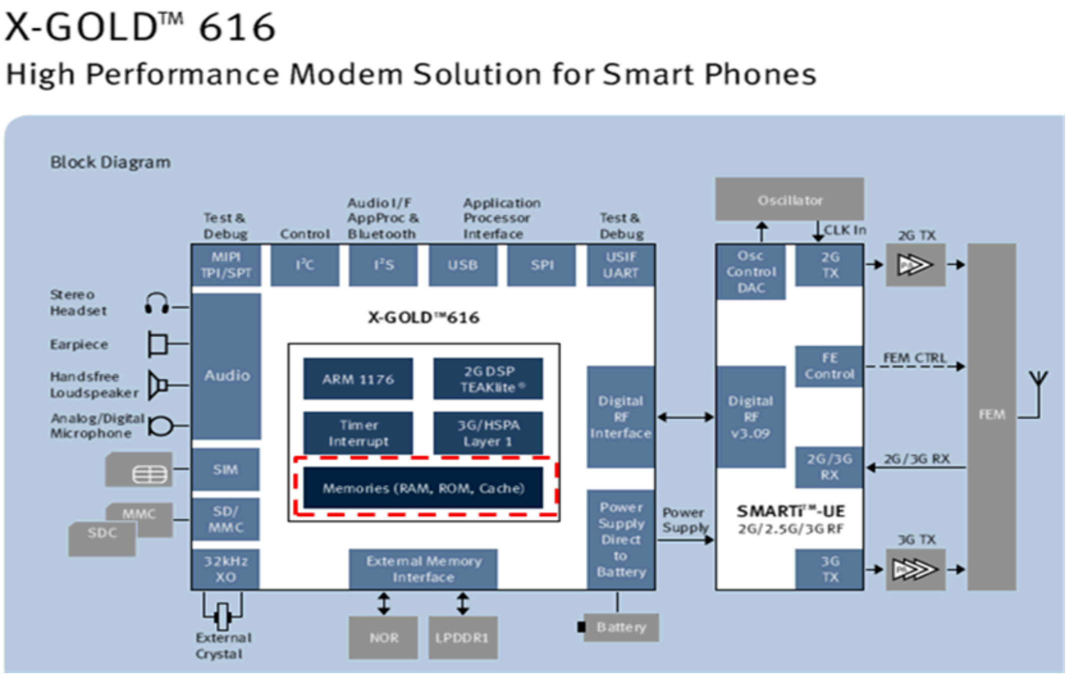
- All of the first parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

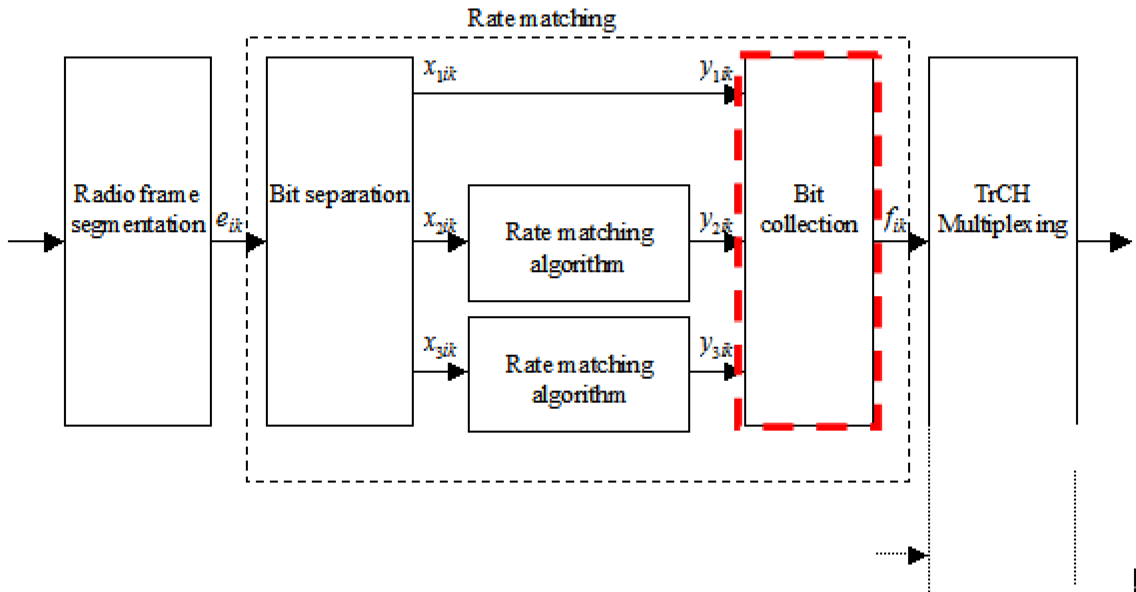
The third sequence contains:

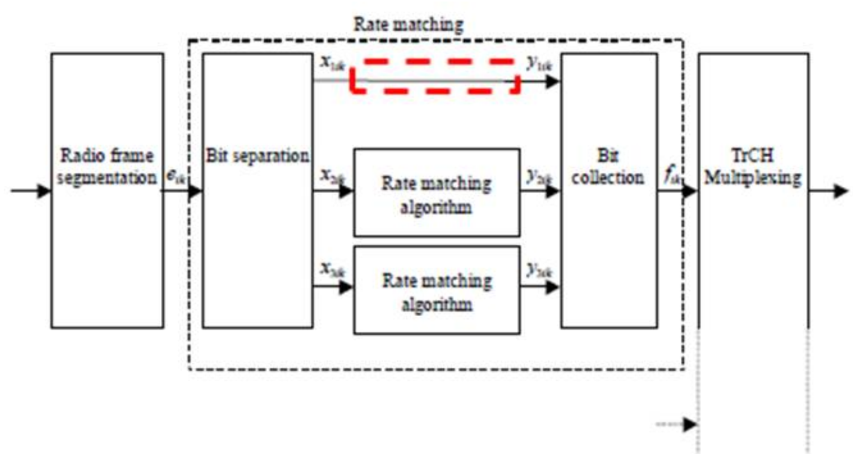
- All of the second parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The second and third sequences shall be of equal length, whereas the first sequence can contain from 0 to 2 more bits. Puncturing is applied only to the second and third sequences."
(V6.0.0, paragraph 4.2.7.3, pages 35-36.)

	"For turbo encoded TrCHs with puncturing (Y_i=X_i): $z_{i,3(k-1)+1+(\alpha_1+\beta_{n_i}) \bmod 3} = y_{1,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3\lfloor N_i/3 \rfloor+k} = y_{1,i,\lfloor N_i/3 \rfloor+k}$ k = 1, …, N_i mod 3 Note: When (N_i mod 3) = 0 this row is not needed. $z_{i,3(k-1)+1+(\alpha_2+\beta_{n_i}) \bmod 3} = y_{2,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3(k-1)+1+(\alpha_3+\beta_{n_i}) \bmod 3} = y_{3,i,k}$ k = 1, 2, 3, …, Y_i After the bit collection, bits $z_{i,k}$ with value δ, where $\delta \notin \{0, 1\}$, are removed from the bit sequence." (V6.0.0, paragraph 4.2.7.3.2, page 38.) Before these bits from the channel encoder are put into a radio frame, they are interleaved at the interleaver according to a specified permutation pattern. After the permutation is done at the interleaver, the resulting bit patterns have a newly permuted regularity. Thus, the arrangement of information bits and parity bits in the radio frames has a regular pattern.
8. The transmitting device of claim 7, further comprising: a memory for storing initial symbols of the consecutive radio frames; and	Apple's 3G products have a baseband signal processor that implements uplink transmission, which includes a memory for storing initial symbols of the consecutive radio frames. For example, X-GOLDTM 616 from Infineon is a baseband processor used in some of Apple's 3G products. The following figure from the 616 Datasheet shows a memory for storing initial symbols of the consecutive radio frames.

	 (616 Datasheet, page 2. Annotation added.)
a controller for controlling the demultiplexer according to the regular pattern and the stored initial bits of the at least one radio frames.	Apple's 3G products have a baseband signal processor that implements uplink transmission, which includes a controller for controlling the demultiplexer according to the regular pattern and the stored initial bits of the at least one radio frames. For example, X-GOLDTM 616 from Infineon is a baseband processor used in some of Apple's 3G products.
9. The transmitting device of claim 8, further	Apple's 3G products have a baseband signal processor that implements uplink transmission, which includes a multiplexer for multiplexing the outputs of the rate matcher under a control of the controller. For example, X-GOLDTM 616 from Infineon is a baseband processor used in some of Apple's 3G products.

comprising: a multiplexer for multiplexing the outputs of the rate matcher under a control of the controller.	*See, e.g.,* TS 25.212 v6.0.0:  **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)
10. The transmitting device of claim 1, wherein the interleaver interleaving the encoded streams at a TTI	Apple's 3G products have the interleaver interleaving the encoded streams at a TTI (Transmission Time Interval) after inserting filler bits into the encoded streams in order to equalize a size of the at least one 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

(Transmission Time Interval) after inserting filler bits into the encoded streams in order to equalize a size of the at least one radio frames.	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.)
11. The transmitting device of claim 1, wherein the rate matcher comprises: a first component rate matcher for rate-matching the information bits;	Apple's 3G products have the rate matcher with a first component rate matcher for rate-matching the information bits. *See, e.g.,* TS 25.212 v6.0.0:  **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)
[a] a second component rate matcher for	Apple's 3G products have the rate matcher with a second component rate matcher which rate-matches the first parity bits.

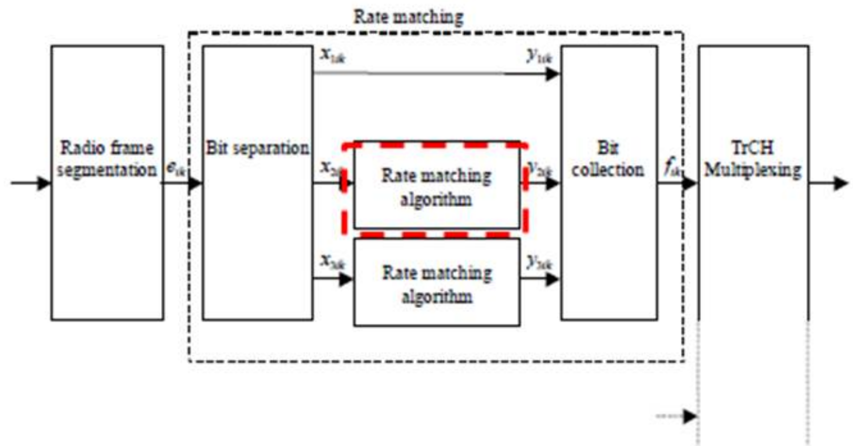
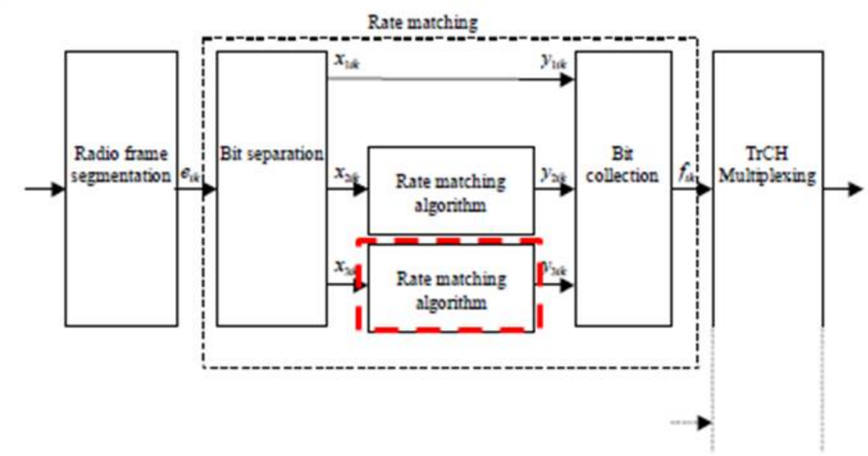
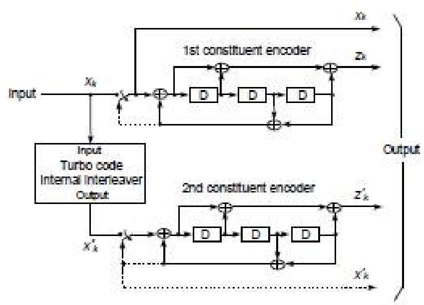
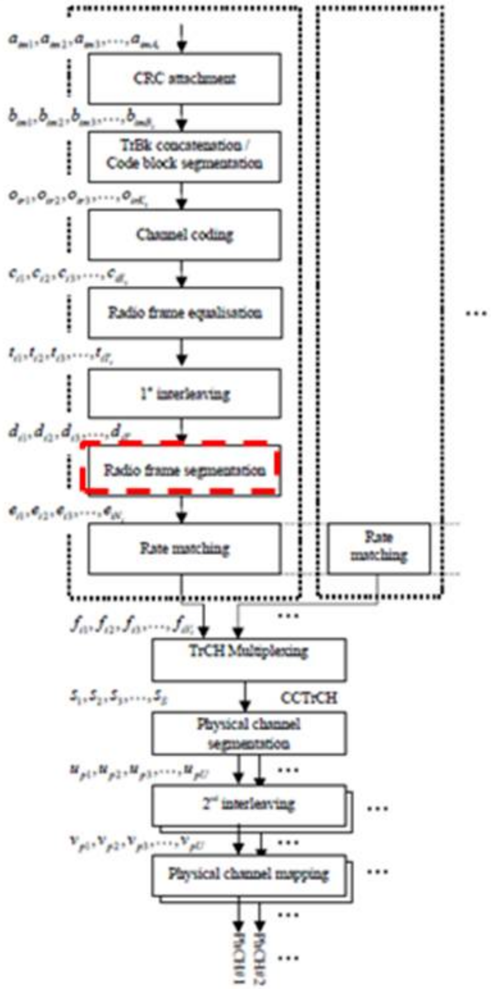
<table>
<tr><td>rate-matching the first parity bits; and</td><td>

Figure 5: Puncturing of turbo encoded TrCHs in uplink
(V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)</td></tr>
<tr><td>[b] a third component rate matcher for rate-matching the second parity bits.</td><td>Apple’s 3G products have the rate matcher with a second component rate matcher which rate-matches the second parity bits. See, e.g., TS 25.212 v6.0.0:</td></tr>
</table>

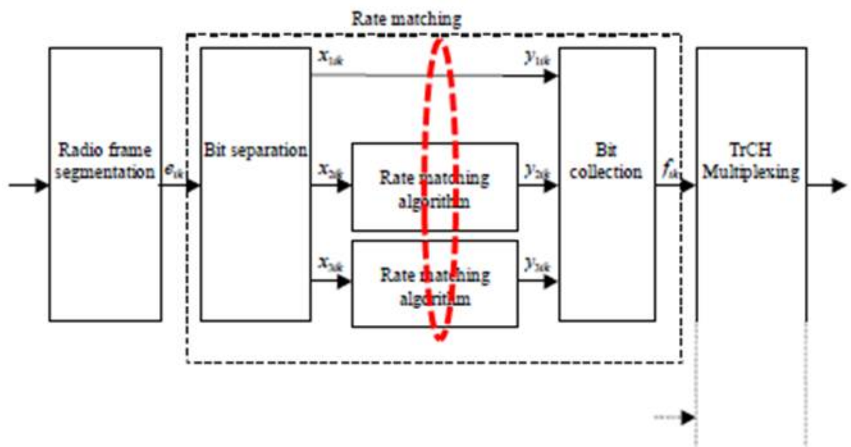
	 **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 35. Annotation added.)
12. A transmitting device in a mobile communication system, comprising:	Apple's 3G products are transmitting devices in a mobile communication system. See claim 1. *See also, e.g.,* TS 25.212 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.)
[a] an encoder for receiving an information bit stream transmitted at a predetermined	Apple's 3G products have an encoder for receiving an information bit stream transmitted at a predetermined transmission time interval (TTI) and for outputting the information bit stream and at least one type of parity stream by encoding the information bit stream in accordance with a coding rate of said encoder. See claim 1[a].

transmission time interval (TTI) and for outputting the information bit stream and at least one type of parity stream by encoding the information bit stream in accordance with a coding rate of said encoder;	*See, e.g.,* TS 25.212 v6.0.0: The information bit stream is received by the encoder at a predetermined transmission time interval (TTI) which is predetermined as one of {10 ms, 20 ms, 40 ms, 80 ms}. "Data arrives to the coding/multiplexing unit in form of transport block sets once every transmission time interval. The transmission time interval is transport-channel specific from the set {10 ms, 20 ms, 40 ms, 80 ms}." (V6.0.0, paragraph 4.2, page 10.) The encoder output at least one type of parity stream by encoding the information bit stream in accordance with a coding rate of the encoder. "The coding rate of Turbo coder is 1/3. " (V6.0.0, paragraph 4.2.3.2.1, page 16.)  Figure 4: Structure of rate 1/3 Turbo coder (dotted lines apply for trellis termination only) (V6.0.0, paragraph 4.2.3.2.1, page 17.)
[b] an interleaver for receiving the information bit stream and the at least one type of parity stream from the encoder,	Apple's 3G products have an interleaver for receiving the information bit stream and the at least one type of parity stream from the encoder, for interleaving the information bit stream and the at least one type of parity stream and for outputting interleaved stream. See claim 1[b].

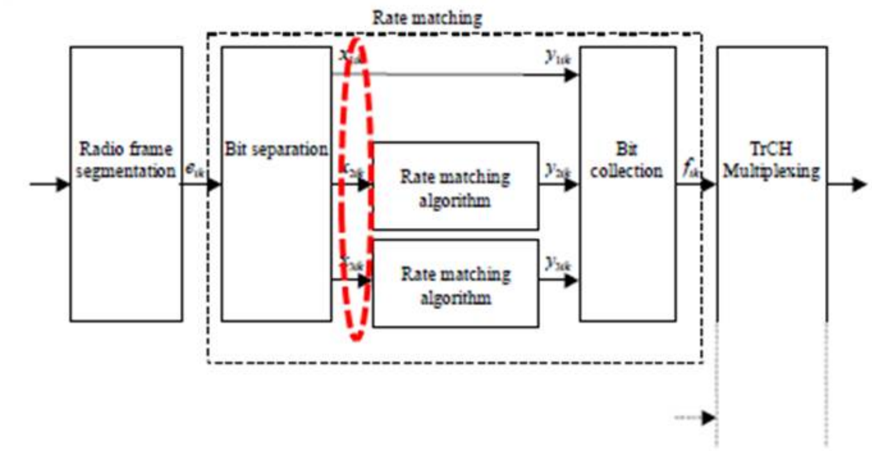
for interleaving the information bit stream and the at least one type of parity stream and for outputting interleaved stream;	
[c] a radio frame segmenter for receiving the interleaved stream from the interleaver, for dividing the received stream into radio frames, and for outputting the radio frames in sequence;	Apple's 3G products have a radio frame segmenter for receiving the interleaved stream from the interleaver, for dividing the received stream into radio frames, and for outputting the radio frames in sequence.

	 Figure 1: Transport channel multiplexing structure for uplink (V3.9.0, paragraph 4.2, page 10. Annotation added) The radio frame segmenter in the Accused Products maps the received interleaved stream dividing the received stream into radio frames, and for outputting the radio frames in sequence.

	"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." (V3.9.0, paragraph 4.2.6, page 23.)
[d] a demultiplexer for receiving the radio frames and for demultiplexing the received radio frames back into the information bit stream and the at least one type of parity stream; and	The demultiplexer in Apple's 3G products demultiplexes each of the radio frames received from the radio frame segmenter into the information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs), and at least one type of parity stream (x_{2ik}, *i.e.,* first parity bits and x_{3ik}, *i.e.,* second parity). See claim 1[d].
[e] a rate matcher for rate matching the streams received from the demultiplexer and outputting	Apple's 3G products have a rate matcher for rate-matching the streams received from the demultiplexer and outputting rate matched streams, said rate matcher having at least one component rate matcher for rate matching a part of the parity stream, a number of the at least one component rate matcher being equal to a number of the parity streams. See claim 1[e]. *See, e.g.,* TS 25.212 v6.0.0:

rate matched streams, said rate matcher having at least one component rate matcher for rate matching a part of the parity stream, a number of the at least one component rate matcher being equal to a number of the parity streams,	As the following figure from V6.0.0 illustrates, the rate matcher has at least one component rate matcher for rate matching a part of the parity stream (x_{2ik}, *i.e.,* first parity bits and x_{3ik}, *i.e.,* second parity), and the number of the component rate matchers is equal to a number of the parity streams. The following figure shows that there are two component rate matchers for two parity streams.  **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.) "The first sequence contains: - All of the systematic bits that are from turbo encoded TrCHs. - From 0 to 2 first and/or second parity bits that are from turbo encoded TrCHs. These bits come into the first sequence when the total number of bits in a block after radio frame segmentation is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The second sequence contains: - All of the first parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The third sequence contains: - All of the second parity bits that are from turbo encoded TrCHs, except those that go into the first sequence

	when the total number of bits is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The second and third sequences shall be of equal length, whereas the first sequence can contain from 0 to 2 more bits. Puncturing is applied only to the second and third sequences." (V6.0.0, paragraph 4.2.7.3, pages 35-36.) "For turbo encoded TrCHs with puncturing (Y_i=X_i): $z_{i,3(k-1)+1+(\alpha_1+\beta_{n_i}) \bmod 3} = y_{1,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3\lfloor N_i/3 \rfloor+k} = y_{1,i,\lfloor N_i/3 \rfloor+k}$ k = 1, …, N_i mod 3 Note: When (N_i mod 3) = 0 this row is not needed. $z_{i,3(k-1)+1+(\alpha_2+\beta_{n_i}) \bmod 3} = y_{2,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3(k-1)+1+(\alpha_3+\beta_{n_i}) \bmod 3} = y_{3,i,k}$ k = 1, 2, 3, …, Y_i After the bit collection, bits $z_{i,k}$ with value δ, where $\delta \notin$ {0, 1}, are removed from the bit sequence." (V6.0.0, paragraph 4.2.7.3.2, page 38.) The rate matcher has at least one component rate matcher for rate matching a part of the parity stream, and the number of the component rate matcher (i.e., two rate matching algorithms in the figure above) is equal to a number of the parity streams (i.e., two parity streams x_{2ik}, and x_{3ik} in the figure above).
[f] wherein the demultiplexer switches each of the parity bits in the radio frames to said at least one component rate matcher corresponding to each of the parity bits.	The demultiplexer in the Apple 3G products switches each of the parity bits in the radio frames to the at least one component rate matcher corresponding to each of the parity bits. *See, e.g.,* TS 25.212 v6.0.0: In the following figure, the bit separation in the rate matcher receives the stream e_{ik} from the radio frame segmentation and switches each of the parity bits (x_{2ik}, and x_{3ik},) in the radio frames to the component rate matchers corresponding to each of the parity bits.

	 **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)
13. The transmitter device of claim 12, wherein bits of the radio frame are separated to the at least one component rate matcher corresponding to each type of parity stream in accordance with a regular pattern for arranging information	In Apple's 3G products, bits of the radio frame are separated to the at least one component rate matcher corresponding to each type of parity stream in accordance with a regular pattern for arranging information bits and parity bits in each radio frame. In Apple's 3G products, bits of the radio frames, e_{ik} are separated by the bit separation in the rate matcher such that each type of parity streams ($x_{2ik},$ and $x_{3ik},$) are sent to the corresponding rate matcher. *See, e.g.,* TS 25.212 v6.0.0:

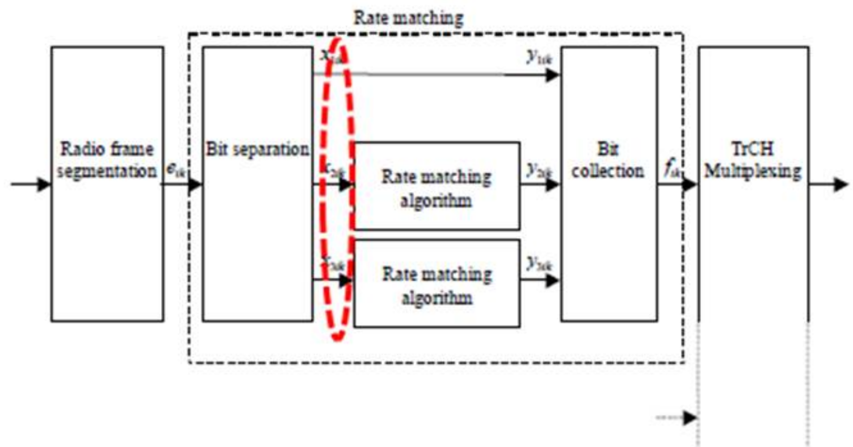
<table>
<tr>
<td>bits and parity bits in each radio frame.</td>
<td>


Figure 5: Puncturing of turbo encoded TrCHs in uplink

(V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)

In Apple’s 3G products, the arrangement of information bits and parity bits has a regular pattern.

“Output from the Turbo coder is $x_1, z_1, z'_1, x_2, z_2, z'_2, \ldots, x_K, z_K, z'_K$, where $x_1, x_2, \ldots, x_K$ are the bits input to the Turbo coder i.e. both first 8-state constituent encoder and Turbo code internal interleaver, and K is the number of bits, and $z_1, z_2, \ldots, z_K$ and $z'_1, z'_2, \ldots, z'_K$ are the bits output from first and second 8-state constituent encoders, respectively.” (V6.0.0, paragraph 4.2.3.2.1, page 15.)

Before these bits from the channel encoder are put into a radio frame, they are interleaved at the interleaver according to a specified permutation pattern. After the permutation is done at the interleaver, the resulting bit patterns have a newly permuted regularity. Thus, the arrangement of information bits and parity bits in the radio frames has a regular pattern.
</td>
</tr>
<tr>
<td>14. The transmitter device of claim 13, wherein the regular pattern is determined</td>
<td>
In Apple’s 3G products, the arrangement of information bits and parity bits in the radio frames in a regular pattern is determined by the TTI. See, e.g., TS 25.212 v6.0.0:

For example, the newly permuted regularity in the output from the interleaver is determined by TTI, which dictates the permutation pattern among the columns. Moreover, the long bit sequence coming out of the interleaver is now put into multiple radio frames each containing 10 ms of the original data and therefore the newly permuted regularity
</td>
</tr>
</table>

by the TTI.	in the output from the interleaver is preserved in each of the radio frames, the number of which is determined by TTI. "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.)
15. The transmitter device of claim 14, wherein the regular pattern is further determined by the coding rate.	In Apple's 3G products, the arrangement of information bits and parity bits in the radio frames in a regular pattern is further determined by the coding rate. *See, e.g.,* TS 25.212 v6.0.0: "Output from the rate 1/3 convolutional coder shall be done in the order output0, output1, output2, output0, output1, output 2, output 0,…,output2. Output from the rate 1/2 convolutional coder shall be done in the order output 0, output 1, output 0, output 1, output 0, …, output 1." (V6.0.0, paragraph 4.2.3.1, page 15.) "Output from the Turbo coder is $x_1, z_1, z'_1, x_2, z_2, z'_2, \ldots, x_K, z_K, z'_K$, where $x_1, x_2, \ldots, x_K$ are the bits input to the Turbo coder i.e. both first 8-state constituent encoder and Turbo code internal interleaver, and K is the number of bits, and $z_1, z_2, \ldots, z_K$ and $z'_1, z'_2, \ldots, z'_K$ are the bits output from first and second 8-state constituent encoders, respectively." (V6.0.0, paragraph 4.2.3.2.1, page 16.)
16. The transmitter device of claim 12, further comprising: a multiplexer for multiplexing	Apple's 3G products have a multiplexer that multiplexes the rate matched streams by switching outputs of the at least one component rate matcher. *See, e.g.,* TS 25.212 v6.0.0: As the following figure shows, the bit collection in the rate matcher receives outputs y_{2ik} and y_{3ik} from the rate matchers and switches these outputs together with the information bits y_{1ik} (x_{2ik}, and x_{3ik}) to form a multiplexed bit stream f_{ik}.

<table>
<tr>
<td>the rate matched streams by switching outputs of the at least one component rate matcher.</td>
<td>

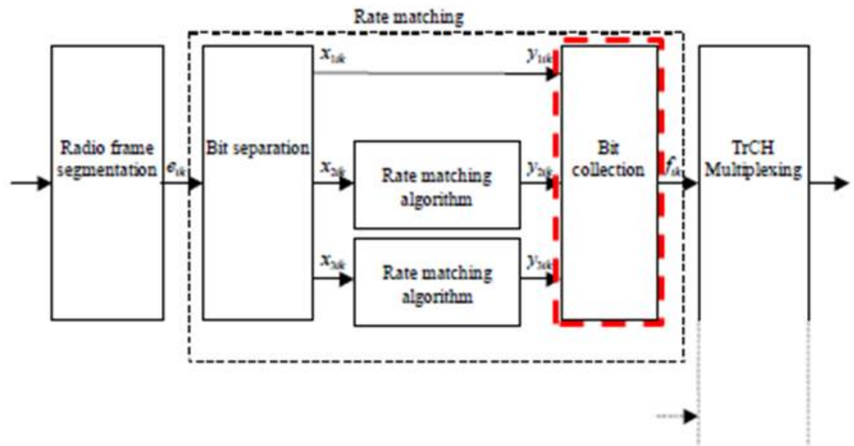
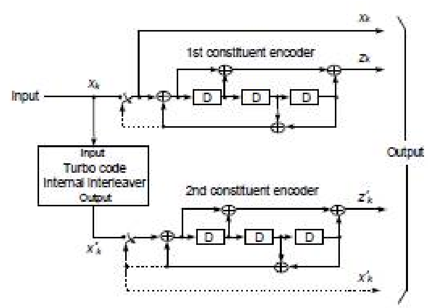
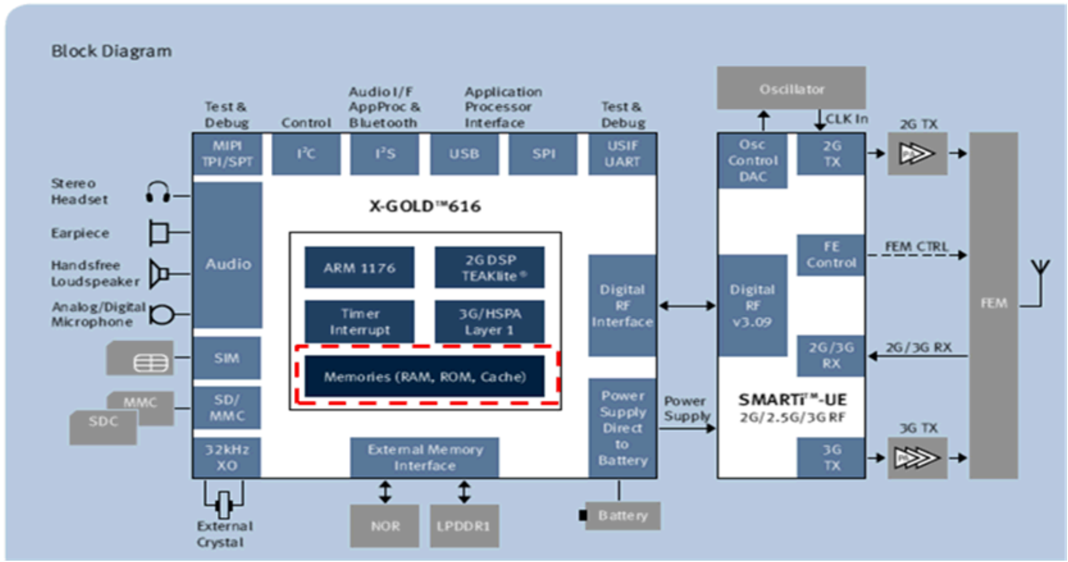
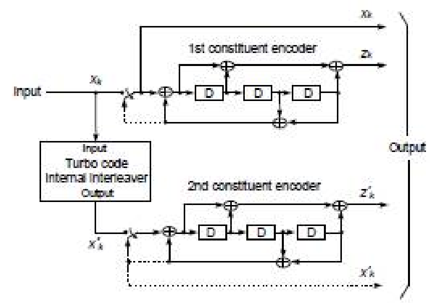


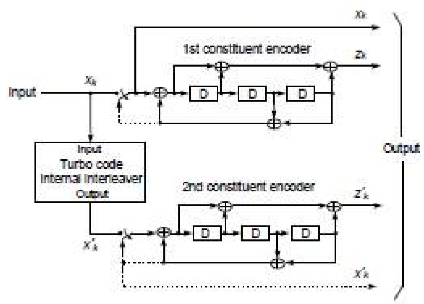
Figure 5: Puncturing of turbo encoded TrCHs in uplink

(V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)
</td>
</tr>
<tr>
<td>17. The transmitter device of claim 16, further comprising: a controller for controlling the switching of the demultiplexer and the multiplexer based on at least one of the TTI and the length of each of the radio</td>
<td>Apple's 3G products have a baseband signal processor that implements uplink transmission, which includes a controller for controlling the switching of the demultiplexer and the multiplexer based on at least one of the TTI and the length of each of the radio frames. The received information bits e_{ik} are organized according to the regular pattern which is based on at least one of the TTI and the length of each of the radio frames. For example, X-GOLDTM 616 from Infineon is a baseband processor used in some of Apple's 3G products.</td>
</tr>
</table>

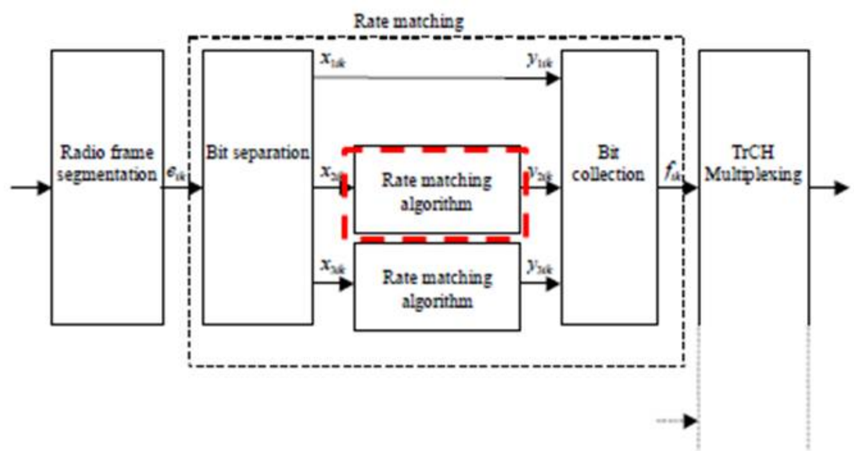
frames.	
18. The transmitter device of claim 12, wherein a length of each of the radio frames is 10 ms.	Apple's 3G products have radio frames of 10 ms for each of the radio frames by segmenting and mapping input bit sequence when the TTI is longer than 10 ms. *See, e.g.,* TS 25.212 v6.0.0: "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive F_i radio frames." (V6.0.0, paragraph 4.2.6, page 24.)
19. The transmitter device of claim 12, wherein the TTI is one of 10, 20, 40 and 80 ms.	In Apple's 3G products, the transmission time interval (TTI) is one of 10, 20, 40, and 80 ms. *See, e.g.,* TS 25.212 v6.0.0: "Data arrives to the coding/multiplexing unit in form of transport block sets once every transmission time interval. The transmission time interval is transport-channel specific from the set {10 ms, 20 ms, 40 ms, 80 ms}." (V6.0.0, paragraph 4.2, page 10.)
20. The transmitter device of claim 12, wherein the coding rate is 1/3.	Apple's 3G products have the coding rate of 1/3 in the encoder. *See, e.g.,* TS 25.212 v6.0.0: "The coding rate of Turbo coder is 1/3. " (V6.0.0, paragraph 4.2.3.2.1, page 16.)  **Figure 4: Structure of rate 1/3 Turbo coder (dotted lines apply for trellis termination only)** (V6.0.0, paragraph 4.2.3.2.1, page 17.)
21. The transmitter device of claim	Apple's 3G products have a baseband signal processor that implements uplink transmission, which includes a memory for storing the regular pattern including an initial symbol corresponding to each of the radio frames. For example, X-GOLDTM 616 from Infineon is a baseband processor used in some of Apple's 3G products. The

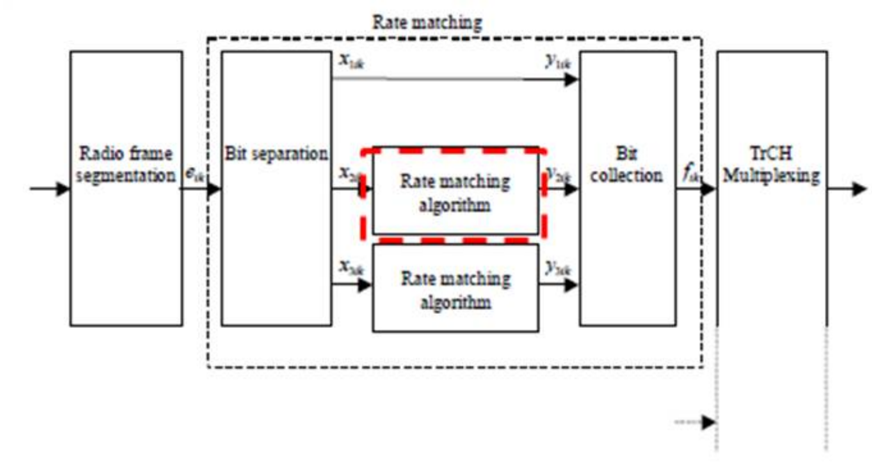
13, further comprising a memory for storing the regular pattern including an initial symbol corresponding to each of the radio frames.	following figure from the 616 Datasheet shows a memory for storing initial symbols of the consecutive radio frames. X-GOLD™ 616 High Performance Modem Solution for Smart Phones  (616 Datasheet, page 2. Annotation added.)
22. The transmitter device of claim 12, wherein the encoder is a turbo encoder.	The encoder in Apple's 3G products is a turbo encoder. *See, e.g.,* TS 25.212 v6.0.0: "The following channel coding schemes can be applied to TrCHs: - convolutional coding; - turbo coding." (V6.0.0, paragraph 4.2.3, page 15.)

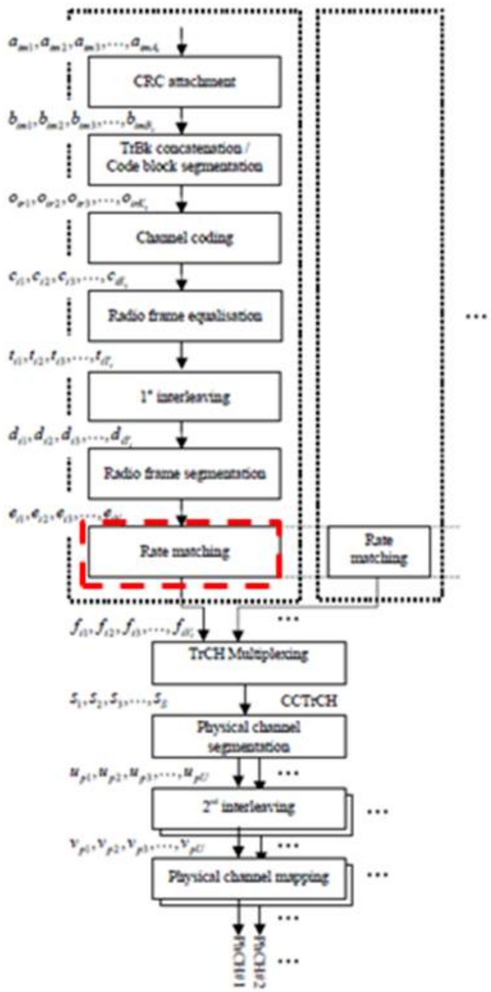
	 **Figure 4: Structure of rate 1/3 Turbo coder (dotted lines apply for trellis termination only)** (V6.0.0, paragraph 4.2.3.2.1, page 17.)
23. A method of transmitting in a mobile communication system, the method comprising the steps of:	Apple infringes this claim because it has performed each and every 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 method of transmitting in a mobile communication system. See claims 1 and 12.
[a] receiving an information bit stream transmitted at a predetermined transmission time interval (TTI);	The method of transmitting in Apple's 3G products includes receiving an information bit stream transmitted at a predetermined transmission time interval (TTI). *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.) "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." (V6.0.0, paragraph 4.2.2, page 14.)
[b] encoding	Apple's 3G products have an encoder for encoding the information bit stream and outputting the encoded information

the information bit stream and outputting the encoded information bit stream and at least one type of parity stream corresponding to the information bit stream, a number of the parity streams corresponding to a coding rate of an encoder;	bit stream and at least one type of parity stream corresponding to the information bit stream, a number of the parity streams corresponding to a coding rate of an encoder.. *See, e.g.,* TS 25.212 v6.0.0: See claim 1[a]. *See, e.g.,* TS 25.212 v6.0.0: The encoder output at least one type of parity stream by encoding the information bit stream in accordance with a coding rate of the encoder. "The coding rate of Turbo coder is 1/3. " (V6.0.0, paragraph 4.2.3.2.1, page 16.)  **Figure 4: Structure of rate 1/3 Turbo coder (dotted lines apply for trellis termination only)** (V6.0.0, paragraph 4.2.3.2.1, page 16.)
[c] interleaving the information bit stream and the parity stream and outputting the interleaved stream;	Apple's 3G products have an interleaver for interleaving the information bit stream and the parity stream and outputting the interleaved stream. See claim 1[b].

[d] dividing the interleaved stream into at least one radio frame and outputting the at least one radio frame, each of the at least one radio frame having a predetermined time frame;	Apple's 3G products have a radio frame segmenter that receives the interleaved stream from the interleaver. The radio frame segmenter in Apple's 3G products divides the interleaved stream into at least one radio frame and outputs the at least one radio frame. Each of the at least one radio frame has a predetermined time frame determined by Y_i, which is the number of bits per radio frame. See claim 1[c].
[e] demultiplexing the received radio frame back into the information bit stream and at least one type of parity stream; and	As part of the rate matching function, a demultiplexing operation is performed in the Accused Products. The demultiplexer in Apple's 3G products demultiplexes each of the radio frames received from the radio frame segmenter back into the information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs), and at least one type of parity stream (x_{2ik}, *i.e.,* first parity bits and x_{3ik}, *i.e.,* second parity). See claim 1[d].
[f] rate matching the demultiplexed streams by a rate matcher;	Apple's 3G products have a rate matcher that rate-matches the demultiplexed streams. See claims 1[e] and 12[e].
[g] wherein parity bits in the radio frame	In Apple's 3G products, the parity bits in the radio frame are switched to a component rate matcher corresponding to each of the at least one parity stream, the component rate matcher having at least one parity component rate matcher for rate matching a part of said at least one parity stream, a number of the at least one parity component rate matcher

are switched to a component rate matcher corresponding to each of the at least one parity stream, said component rate matcher having at least one parity component rate matcher for rate matching a part of said at least one parity stream, a number of the at least one parity component rate matcher being equal to a number of the at least one parity stream.	being equal to a number of the at least one parity stream. *See, e.g.,* TS 25.212 v6.0.0: Apple's 3G products have a component rate matcher that receives and rate-matches the stream of first parity bits.  **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.) Apple's 3G products have another component rate matcher that receives and rate-matches the stream of second parity bits.

	 **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.) The number of the component rate matcher (i.e., two rate matching algorithms in the figure above) is equal to a number of the parity streams (i.e., two parity streams x_{2ik}, and x_{3ik} in the figure above).
24. The method of claim 23, wherein bits of the at least one radio frame are separated to the component rate matcher by the demultiplexer in accordance with a regular pattern for arranging	As part of the rate matching function (shown in the figure below), a demultiplexing operation is performed in Apple's 3G products. See claim 1[d] and 23. *See, e.g.,* TS 25.212 v6.0.0: The demultiplexer in Apple's 3G products separates each of the at least one radio frames received from the radio frame segmenter into the information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs), and first (x_{2ik}, *i.e.,* first parity bits) and second (x_{3ik}, *i.e.,* second parity) parity streams from the demultiplexer.

information bits and parity bits in each radio frame.	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 10. Annotation added)

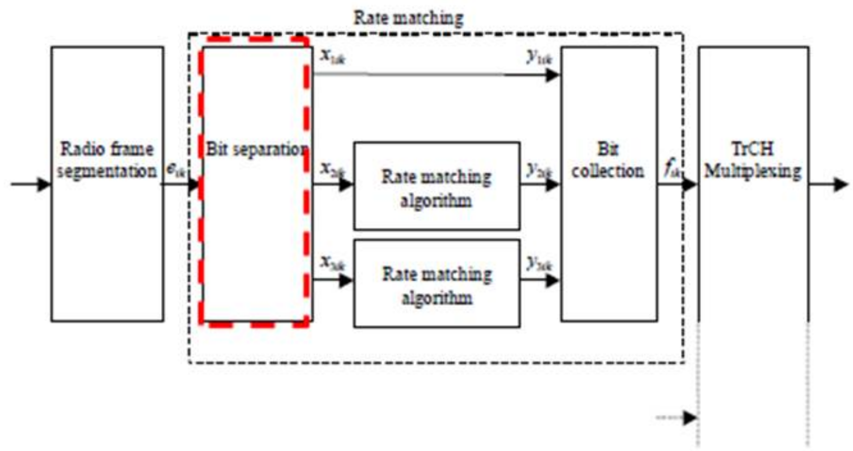


Figure 5: Puncturing of turbo encoded TrCHs in uplink

(V6.0.0, paragraph 4.7.3, page 35. Annotation added.)

"The first sequence contains:

- All of the systematic bits that are from turbo encoded TrCHs.
- From 0 to 2 first and/or second parity bits that are from turbo encoded TrCHs. These bits come into the first sequence when the total number of bits in a block after radio frame segmentation is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The second sequence contains:

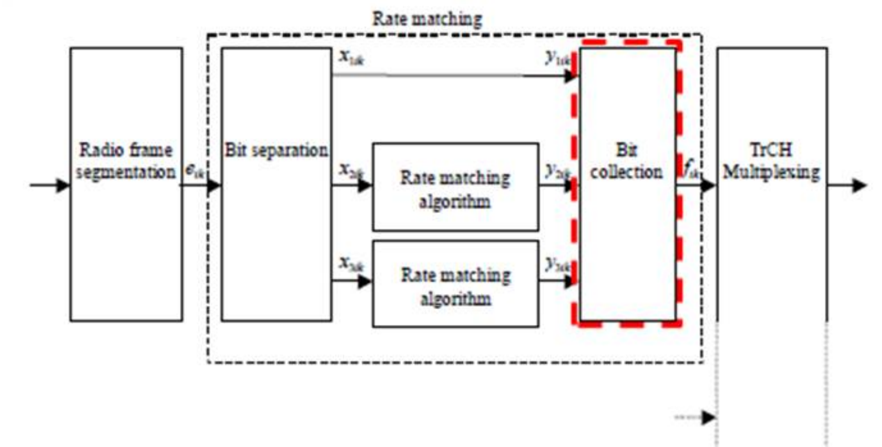
- All of the first parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The third sequence contains:

- All of the second parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The second and third sequences shall be of equal length, whereas the first sequence can contain from 0 to 2 more bits. Puncturing is applied only to the second and third sequences."
(V6.0.0, paragraph 4.2.7.3, pages 34-35.)

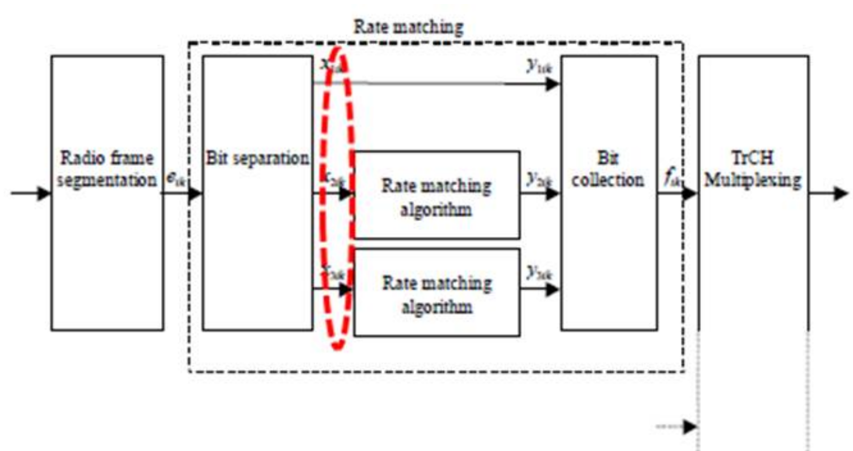
	"For turbo encoded TrCHs with puncturing (Y_i=X_i): $z_{i,3(k-1)+1+(\alpha_1+\beta_{n_i}) \bmod 3} = y_{1,i,k}$ $k = 1, 2, 3, \ldots, Y_i$ $z_{i,3\lfloor N_i/3 \rfloor+k} = y_{1,i,\lfloor N_i/3 \rfloor+k}$ $k = 1, \ldots, N_i \bmod 3$ Note: When (N_i mod 3) = 0 this row is not needed. $z_{i,3(k-1)+1+(\alpha_2+\beta_{n_i}) \bmod 3} = y_{2,i,k}$ $k = 1, 2, 3, \ldots, Y_i$ $z_{i,3(k-1)+1+(\alpha_3+\beta_{n_i}) \bmod 3} = y_{3,i,k}$ $k = 1, 2, 3, \ldots, Y_i$ After the bit collection, bits $z_{i,k}$ with value δ, where $\delta \notin \{0, 1\}$, are removed from the bit sequence." (V6.0.0, paragraph 4.2.7.3.2, page 37.) Before these bits from the channel encoder are put into a radio frame, they are interleaved at the interleaver according to a specified permutation pattern. After the permutation is done at the interleaver, the resulting bit patterns have a newly permuted regularity. Thus, the arrangement of information bits and parity bits in the radio frames has a regular pattern. The demultiplexer utilizes this regular pattern in separating information bits and parity bits.
25. The method of claim 24, wherein the regular pattern is determined by the TTI.	See claims 14 and 23.
26. The method of claim 25, wherein the regular pattern is further determined by the coding rate.	See claims 15 and 23.
27. The method of claim 23, further	Apple's 3G products have a multiplexer that multiplexes the rate matched streams by synchronizing the multiplexing with the multiplexing by switching outputs of the corresponding component rate matchers. See claims 16 and 23.

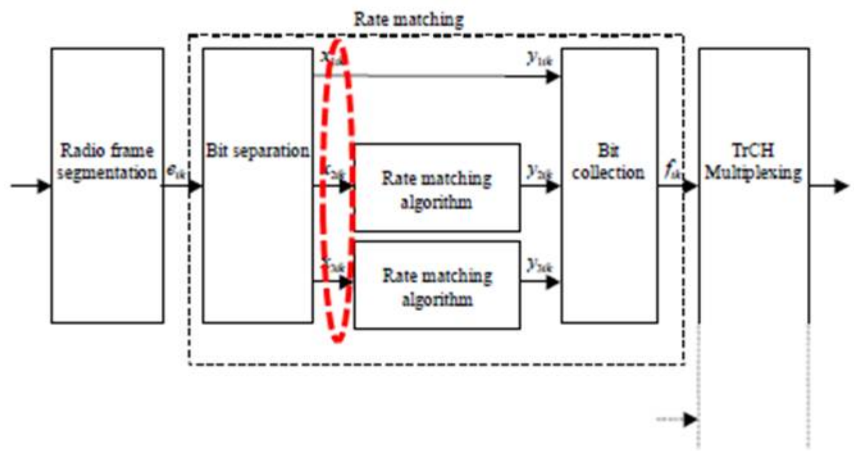
comprising the step of: multiplexing the rate matched streams by synchronizing the multiplexing with the demultiplexing by switching to the corresponding component rate matcher.	As the following figure shows, the bit collection in the rate matcher receives outputs y_{2ik} and y_{3ik} from the rate matchers and switches these outputs together with the information bits y_{1ik} (x_{2ik}, and x_{3ik},) to form a multiplexed bit stream f_{ik}.  Figure 5: Puncturing of turbo encoded TrCHs in uplink (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.) "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*." (V6.0.0, paragraph 4.2.8, page 41.)
28. The method of claim 23, wherein the predetermined	Apple's 3G products have radio frames of the predetermined length 10 ms for each of the radio frame by segmenting and mapping input bit sequence when the TTI is longer than 10 ms. See claims 18 and 23.

length of the radio frame is 10 ms.	
29. The method of claim 23, wherein the TTI is one of 10, 20, 40 and 80 ms.	See claims 19 and 23.
30. The method of claim 23, wherein the coding rate is 1/3.	See claims 20 and 23.
31. A transmitting device in a mobile communication system, comprising:	Apple's 3G products comprise transmitting devices in a mobile communication system. See claims 1, 12, and 23.
[a] an encoder for receiving an information bit stream transmitted at a predetermined transmission time interval (TTI) and for outputting the	Apple's 3G products have an encoder for receiving an information bit stream transmitted at a predetermined transmission time interval (TTI) and for outputting the information bit stream and at least one kind of parity stream corresponding to the information bit stream in accordance with a coding rate of said encoder. See claims 1[a], 12[a], and 23[b].

information bit stream and at least one kind of parity stream corresponding to the information bit stream in accordance with a coding rate of said encoder;	
[b] an interleaver for receiving the information bit stream and the parity stream from the encoder, for interleaving the information bit stream and the parity stream, and for outputting an interleaved stream;	Apple's 3G products have an interleaver for receiving the information bit stream and the parity stream from the encoder, for interleaving the information bit stream and the parity stream, and for outputting an interleaved stream. See claims 1[b], 12[b], and 23[c].
[c] a demultiplexer for receiving the interleaved	See claim 12[d].

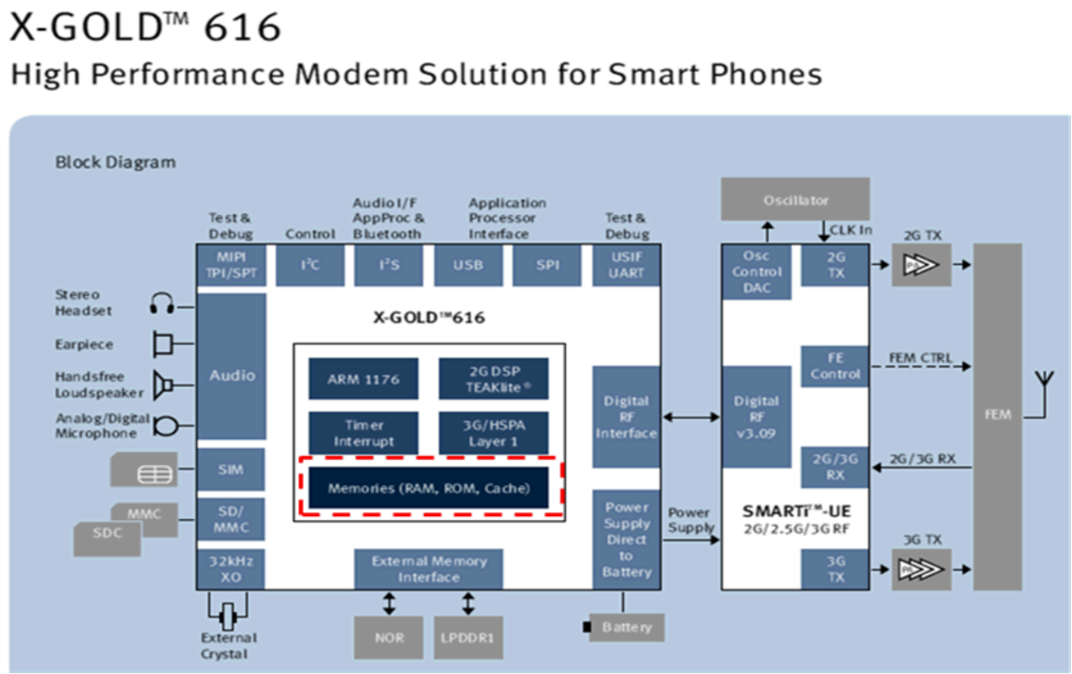
stream and for demultiplexing the received interleaved stream back into the information bit stream and the at least one kind of parity stream; and	
[d] a rate matcher for rate matching the information bit stream and the at least one kind of parity stream received from the demultiplexer, wherein said rate matcher includes at least one component rate matcher for rate matching a part of the at least one kind of parity stream, and a	Apple's 3G products have a rate matcher for rate-matching the information bit stream and the at least one kind of parity stream received from the demultiplexer, wherein said rate matcher includes at least one component rate matcher for rate matching a part of the at least one kind of parity stream, and a number of the component rate matcher is equal to a number of the at least one kind of parity stream. See claim 12[e].

number of the component rate matcher is equal to a number of the at least one kind of parity stream,	
[e] wherein the demultiplexer switches bits in the interleaved stream to the component rate matcher corresponding to each of the at least one kind of parity stream.	Apple's 3G products has the demultiplexer that switches bits in the interleaved stream to the at least one component rate matcher corresponding to each of the parity bits. *See, e.g.,* TS 25.212 v6.0.0: In the following figure, the bit separation in the rate matcher receives the stream e_{ik} from the radio frame segmentation and switches each of the parity bits (x_{2ik}, and x_{3ik},) in the radio frames to the component rate matchers corresponding to each of the at least one kind of parity bits.  **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.)
32. The	Apple's 3G products have the demultiplexer that switches each of the parity bits of the interleaved stream to the at

transmitter device of claim 31, wherein the demultiplexer switches each of the bits of the interleaved stream to the at least one component rate matcher in accordance with a regular pattern for arranging information bits and parity bits in the interleaved stream.	least one component rate matcher in accordance with a regular pattern for arranging information bits and parity bits in the interleaved stream. See claim 12[f]. *See, e.g.,* TS 25.212 v6.0.0: In the following figure, the bit separation in the rate matcher receives the stream e_{ik} from the radio frame segmentation and switches each of the parity bits (x_{2ik}, and x_{3ik},) in the radio frames to the component rate matchers corresponding to each of the parity bits.  **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.) Before these bits from the channel encoder are put into a radio frame, they are interleaved at the interleaver according to a specified permutation pattern. After the permutation is done at the interleaver, the resulting bit patterns have a newly permuted regularity. Thus, the arrangement of information bits and parity bits in the radio frames has a regular pattern. The demultiplexer utilizes the regular pattern in switching the information bits and parity bits.
33. The transmitter	See claims 14 and 25.

device of claim 32, wherein the regular pattern is determined by the TTI.	
34. The transmitter device of claim 32, further comprising: a multiplexer for synchronously multiplexing output bits of the at least one component rate matcher by synchronizing with the demultiplexer.	Apple's 3G products have a multiplexer for synchronously multiplexing output bits of the at least one component rate matcher by synchronizing with the demultiplexer. See claim 27.
35. The transmitter device of claim 34, further comprising: a controller for controlling the demultiplexer and the multiplexer based on the regular pattern.	Apple's 3G products have a baseband signal processor that implements uplink transmission, which includes a controller for controlling the demultiplexer and multiplexer. The received information bits e_{ik} are organized according to the regular pattern which is based on at least one of the TTI and the length of each of the radio frames. For example, X-GOLDTM 616 from Infineon is a baseband processor used in some of Apple's 3G products. Before these bits from the channel encoder are put into a radio frame, they are interleaved at the interleaver according to a specified permutation pattern. After the permutation is done at the interleaver, the resulting bit patterns have a newly permuted regularity. Thus, the arrangement of information bits and parity bits in the radio frames has a regular pattern. The demultiplexer and multiplexer utilizes this regular pattern in their respective functions.
36. The	Apple's 3G products have radio frames of 10 ms for each of the radio frames by segmenting and mapping input bit

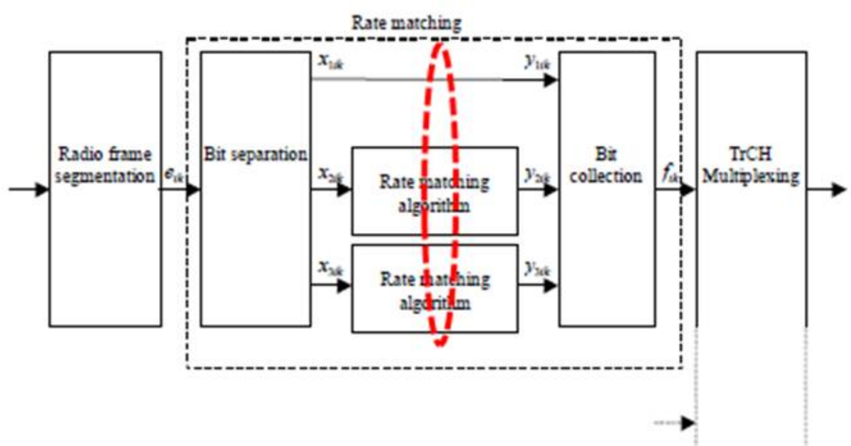
transmitter device of claim 31, wherein a length of at least one of the information bit stream and the interleaved stream is 10 ms.	sequence when the TTI is longer than 10 ms. Each of the radio frames contains information bit stream. An interleaved stream is made by interleaving bits in a radio frame and thus also has a length of 10 ms. See claims 18 and 28.
37. The transmitter device of claim 31, wherein the TTI is one of 10, 20, 40 and 80 ms.	See claims 19 and 29.
38. The transmitter device of claim 31, wherein the coding rate is 1/3.	See claims 20 and 30.
39. The transmitter device of claim 33, further comprising: a memory for storing the regular pattern including an initial symbol	Apple's 3G products have a baseband signal processor that implements uplink transmission, which includes a memory for storing the regular pattern including an initial symbol corresponding to each of the radio frames. For example, X-GOLDTM 616 from Infineon is a baseband processor used in some of Apple's 3G products. The following figure from the 616 Datasheet shows a memory for storing an initial symbol corresponding to the interleaved stream.

<table>
<tr>
<td>corresponding to the interleaved stream.</td>
<td>


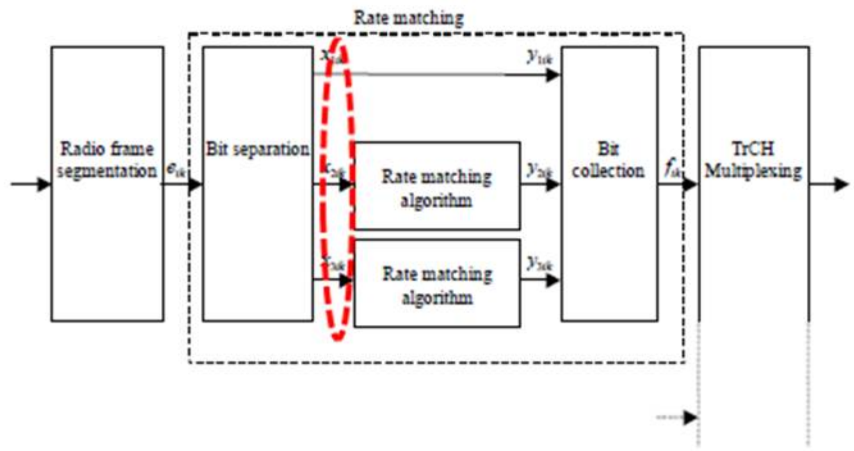
(616 Datasheet, page 2. Annotation added.)
</td>
</tr>
<tr>
<td>40. The transmitter device of claim 31, wherein the encoder is a turbo encoder.</td>
<td>See claim 22.</td>
</tr>
<tr>
<td>41. A method of transmitting in a mobile communication system, the method comprising the steps of:</td>
<td>Apple 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.

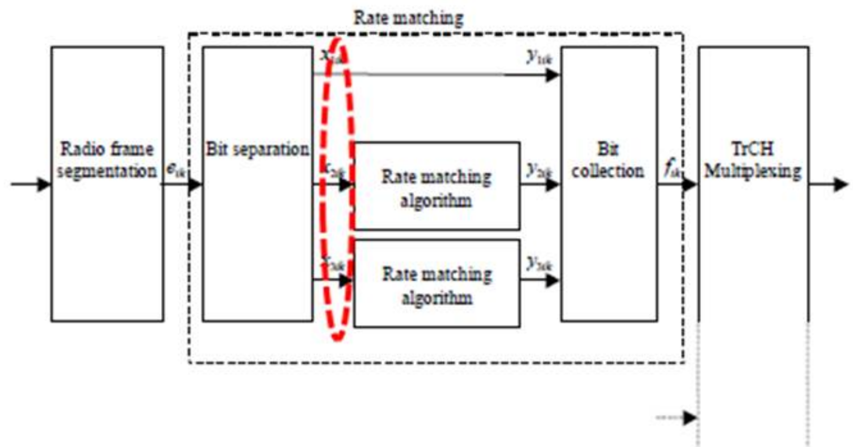
See claim 23.</td>
</tr>
</table>

[a] receiving an information bit stream at a predetermined transmission time interval (TTI);	See claim 23[a]
[b] encoding the information bit stream and outputting the encoded information bit stream and at least one kind of parity stream corresponding to the information bit stream in accordance with a coding rate of a encoder;	See claim 23[b].
[c] interleaving the information bit stream and the parity stream and outputting an interleaved stream;	See claim 23[c].

[d] demultiplexing the interleaved stream back into the information bit stream and the at least one kind of parity stream; and	See claim 23[e].
[e] rate matching the demultiplexed streams by a rate matcher, said rate matcher including at least one component rate matcher for rate matching a part of said at least one kind of parity stream;	Apple's 3G products have a rate matcher that rate-matches the demultiplexed streams. See claims 1[e] and 12[e]. *See, e.g.,* TS 25.212 v6.0.0: As the following figure from V6.0.0 illustrates, the rate matcher has at least one component rate matcher for rate matching a part of at least one kind of parity stream (x_{2ik}, *i.e.,* first parity bits and x_{3ik}, *i.e.,* second parity).  **Figure 5: Puncturing of turbo encoded TrCHs in uplink**

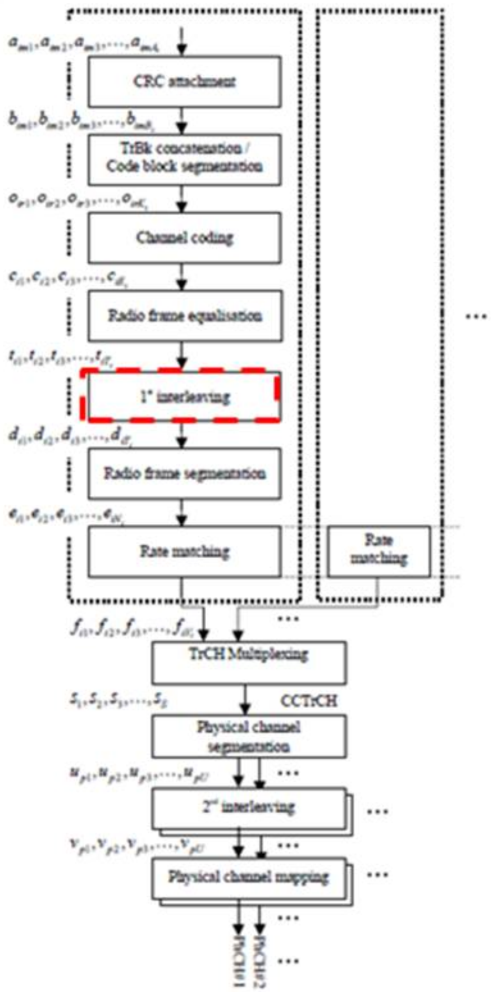
	(V6.0.0, paragraph 4.7.3, page 35. Annotation added.) "The first sequence contains: - All of the systematic bits that are from turbo encoded TrCHs. - From 0 to 2 first and/or second parity bits that are from turbo encoded TrCHs. These bits come into the first sequence when the total number of bits in a block after radio frame segmentation is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The second sequence contains: - All of the first parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The third sequence contains: - All of the second parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three. - Some of the systematic, first parity and second parity bits that are for trellis termination. The second and third sequences shall be of equal length, whereas the first sequence can contain from 0 to 2 more bits. Puncturing is applied only to the second and third sequences." (V6.0.0, paragraph 4.2.7.3, pages 34-35.) "For turbo encoded TrCHs with puncturing ($Y_i=X_i$): $z_{i,3(k-1)+1+(\alpha_1+\beta_{n_i}) \bmod 3} = y_{1,i,k}$ $k = 1, 2, 3, \ldots, Y_i$ $z_{i,3\lfloor N_i/3 \rfloor+k} = y_{1,i,\lfloor N_i/3 \rfloor+k}$ $k = 1, \ldots, N_i \bmod 3$ Note: When (N_i mod 3) = 0 this row is not needed. $z_{i,3(k-1)+1+(\alpha_2+\beta_{n_i}) \bmod 3} = y_{2,i,k}$ $k = 1, 2, 3, \ldots, Y_i$ $z_{i,3(k-1)+1+(\alpha_3+\beta_{n_i}) \bmod 3} = y_{3,i,k}$ $k = 1, 2, 3, \ldots, Y_i$ After the bit collection, bits $z_{i,k}$ with value δ, where $\delta \notin \{0, 1\}$, are removed from the bit sequence." (V6.0.0, paragraph 4.2.7.3.2, page 37.)
[f] wherein bits in the interleaved stream are switched to at	Apple's 3G products have the demultiplexer that switches bits in the interleaved stream to the at least one component rate matcher corresponding to each of the at least one kind of parity stream, a number of the at least one parity component rate matcher being equal to a number of the at least one parity stream. *See, e.g.,* TS 25.212 v6.0.0: In the following figure, the bit separation in the rate matcher receives the stream e_{ik} from the radio frame

least one parity component rate matcher corresponding to each of the at least one kind of parity stream, a number of the at least one parity component rate matcher being equal to a number of the at least one parity stream.	segmentation and switches each of the parity bits (*x_{2ik},* and *x_{3ik},)* in the radio frames to the component rate matchers corresponding to each of the at least one kind of parity bits.  Figure 5: Puncturing of turbo encoded TrCHs in uplink (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.) The rate matcher has at least one component rate matcher for rate matching a part of the parity stream, and the number of the component rate matcher (i.e., two rate matching algorithms in the figure above) is equal to a number of the parity streams (i.e., two parity streams *x_{2ik},* and *x_{3ik}* in the figure above).
42. The method of claim 41, wherein the bits of the interleaved stream are separated in accordance with a regular pattern for	See claim 41. Apple's 3G products have a rate matcher that separates the bits of the interleaved stream. *See, e.g.,* TS 25.212 v6.0.0: In the following figure, the bit separation in the rate matcher receives the stream e_{ik} from the radio frame segmentation and switches each of the parity bits (*x_{2ik},* and *x_{3ik},)* in the radio frames to the component rate matchers corresponding to each of the parity bits.

arranging information bits and parity bits in the interleaved stream.	 **Figure 5: Puncturing of turbo encoded TrCHs in uplink** (V6.0.0, paragraph 4.2.7.3, page 36. Annotation added.) Before these bits from the channel encoder are put into a radio frame, they are interleaved at the interleaver according to a specified permutation pattern. After the permutation is done at the interleaver, the resulting bit patterns have a newly permuted regularity. Thus, the arrangement of information bits and parity bits in the radio frames has a regular pattern. The rate matcher utilizes the regular pattern in separating the information bits and parity bits.
43. The method of claim 42, wherein the regular pattern is determined by the TTI.	See claims 14, 25, 33, and 41.
44. The method of claim 41, further comprising the step of:	Apple's 3G products have a multiplexer for multiplexing the output bits of the rate matching step by synchronizing the multiplexing with the demultiplexing by switching in the rate matcher. See claims 27 and 41.

multiplexing the output bits of the rate matching step by synchronizing the multiplexing with the demultiplexing by switching in the rate matcher.	
45. The method of claim 41, wherein a length of at least one of the information bit stream and the interleaved stream is 10 ms.	See claims 36 and 41.
46. The method of claim 41, wherein the TTI is one of 10, 20, 40 and 80 ms.	See claims 37 and 41.
47. The method of	See claims 38 and 41.

claim 41, wherein the coding rate is 1/3.	
48. A mobile communication system, comprising:	Apple's 3G products comprise a mobile communication system. See claims 1, 12, 23, and 31.
[a] an encoder for receiving an information bit stream and for outputting three encoder output streams, an information bit stream, a first parity stream, and a second parity stream, by encoding the information bit stream;	See claims 1[a] and 12[a].
[b] an interleaver coupled to the encoder for performing an interleaving operation according to a	Apple's 3G products have an interleaver that is coupled to the encoder for performing an interleaving operation. *See, e.g.,* TS 25.212 v6.0.0:

predetermined interleaving rule;	 **Figure 1: Transport channel multiplexing structure for uplink** (V6.0.0, paragraph 4.2, page 11. Annotation added) The interleaver in Apple's 3G products interleaves the information bit stream and the at least one type of parity stream and outputs the interleaved stream according to a predetermined interleaving rule.

	"(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}: $\begin{bmatrix} y_{i,1} & y_{i,(R1+1)} & y_{i,(2\times R1+1)} & \cdots & y_{i,((C1-1)\times R1+1)} \\ y_{i,2} & y_{i,(R1+2)} & y_{i,(2\times R1+2)} & \cdots & y_{i,((C1-1)\times R1+2)} \\ \vdots & \vdots & \vdots & \ldots & \vdots \\ y_{i,R1} & y_{i,(2\times R1)} & y_{i,(3\times R1)} & \cdots & y_{i,(C1\times R1)} \end{bmatrix}$" (V6.0.0, paragraph 4.2.5.2, page 23) "The bits input to the 1st interleaving are denoted by $t_{i,1}, t_{i,2}, t_{i,3}, \ldots, t_{i,T_i}$, 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 $d_{i,1}, d_{i,2}, d_{i,3}, \ldots, d_{i,T_i}$, and $d_{i,k} = y_{i,k}$." (V6.0.0, paragraph, 4.2.5.3, page 23.)
[c] a radio frame segmenter for receiving an interleaved stream from the interleaver and mapping the interleaved stream onto at	Apple's 3G products have a radio frame segmenter for receiving the interleaved stream from the interleaver and mapping the interleaved stream onto at least one radio frame. See claim 12[c].

least one radio frame;	
[d] a demultiplexer for separating the at least one radio frame received from the radio frame segmenter into three demultiplexer output streams; and	See claim 1[d]. The demultiplexer in Apple's 3G products separates each of the radio frames received from the radio frame segmenter into three demultiplexed output streams: the information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs), and two parity streams (x_{2ik}, *i.e.,* first parity bits and x_{3ik}, *i.e.,* second parity).
[e] a rate matcher for bypassing an information bit stream from the demultiplexer and for puncturing a part of a first and second parity streams from the demultiplexer according to a given rate matching rule.	See claim 1[e].
49. The system of claim 48,	See claim 2.

wherein the interleaved stream is mapped onto consecutive radio frames when a transmission time interval (TTI) is longer than 10 ms.	
50. The system of claim 48, wherein the interleaver performs the interleaving operation at a TTI (Transmission Time Interval), after inserting filler bits into an output of the encoder, in order to equalize a size of the at least one radio frames.	See claim 10.
51. The system of claim 48, wherein the	See claim 11.

rate matcher comprises: a first component rate matcher for rate-matching the information bit stream from the demultiplexer;	
[a] a second component rate matcher for rate-matching the first parity stream from the demultiplexer; and	See claim 11[a].
[b] a third component rate matcher for rate-matching the second parity stream from the demultiplexer.	See claim 11[b]. Apple's 3G products have the rate matcher with a second component rate matcher which rate-matches the second parity stream from the demultiplexer.
52. A method for transmitting data in a mobile	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 claims 1, 12, 23, and 41.

communication system, the method comprising:	
[a] encoding an information bit stream corresponding to a coding rate of an encoder and outputting the information bit stream, a first parity stream, and a second parity stream;	See claim 41[b].
[b] performing an interleaving operation with an interleaver coupled to the encoder;	Apple's 3G products perform an interleaving operation with an interleaver coupled to the encoder. See claim 48[b].
[c] mapping an interleaved stream from the interleaver onto at least one radio frame and outputting the at least one radio frame;	Apple's 3G products have a radio segmenter for mapping an interleaved stream from the interleaver onto at least one radio frame and outputting the at least one radio frame. See claim 48[c]. *See, e.g.,* TS 25.212 v6.0.0:

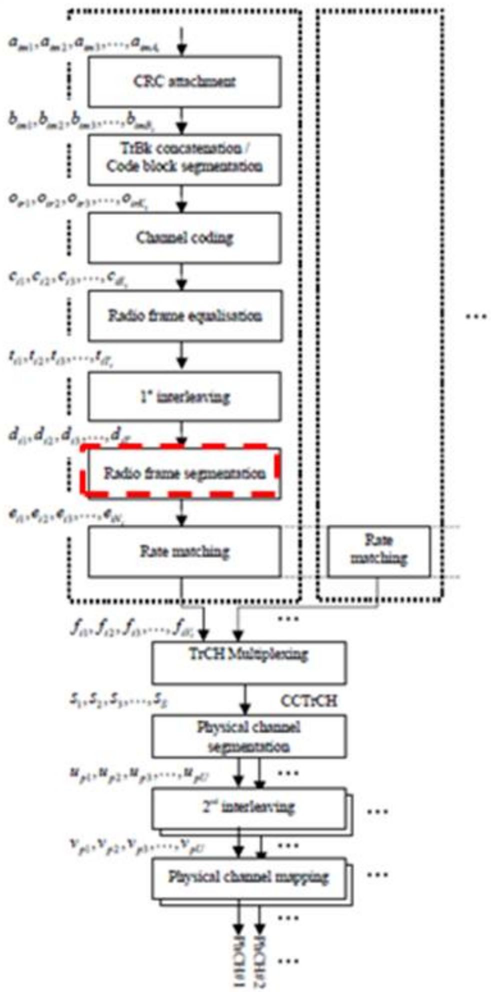


Figure 1: Transport channel multiplexing structure for uplink

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

The radio frame segmentation maps the received interleaved stream onto at least one radio frame and outputting the at least one 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: $y_{i,n_ik} = x_{i,((n_i-1)\cdot Y_i)+k}$, $n_i = 1 \ldots F_i$, $k = 1 \ldots Y_i$ 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 23.)
[d] performing an demultiplexing operation with a demultiplexer and outputting an information bit stream of the demultiplexer, and a first parity stream of the demultiplexer, and a second parity stream of the demultiplexer; and	See claim 23[e].
[e] bypassing the information	See claim 1[e].

bit stream of the demultiplexer and puncturing a part of the first and second parity stream from the demultiplexer according to a given rate matching rule.	
53. The method of claim 52, wherein the interleaved stream is mapped onto consecutive radio frames when a transmission time interval (TTI) is longer than 10 ms.	See claims 2, 49, and 52.
54. The method of claim 52, wherein the interleaving operation is	See claims 10, 50, and 52.

performed at a TTI (Transmission Time Interval), after inserting filler bits into an output of the encoder, in order to equalize a size of the at least one radio frame.	
55. A mobile communication system, comprising:	See claims 1, 12, 23, 31, 48, and 52.
[a] means for receiving an information bit stream and for outputting an output stream including an information bit stream, a first parity stream, and a second parity stream, by encoding the information bit stream;	Apple's 3G products have a means for receiving a information bit stream transmitted at a predetermined transmission time interval (TTI). See claim 12[a].
[b] means for	Apple's 3G products have a means for performing an interleaving operation in response to the output stream and

performing an interleaving operation in response to the output stream and outputting an interleaved stream;	outputting an interleaved stream. See claim 12[b].
[c] means for creating at least one radio frame in response to the interleaved stream;	Apple's 3G products have a means for creating at least one radio frame in response to the interleaved stream. See claim 12[c]. Radio frames are created by the radio frame segmentation shown in the figure below.

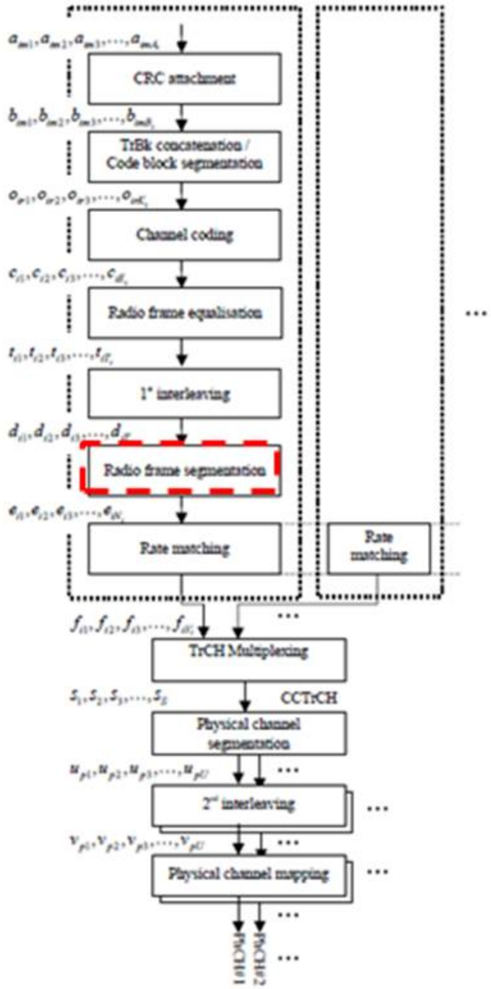
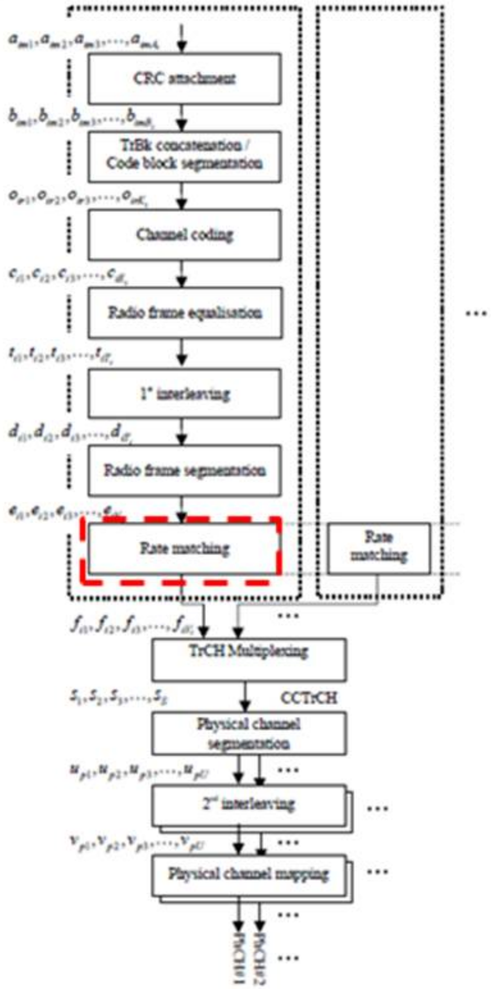


Figure 1: Transport channel multiplexing structure for uplink

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

The radio frame segmentation maps the received interleaved stream onto at least one radio frame and outputting the at least one 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: $y_{i,n_ik} = x_{i,((n_i-1)\cdot Y_i)+k}$, $n_i = 1\ldots F_i$, $k = 1\ldots Y_i$ 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.)
[d] means for separating the at least one radio frame into a separate information bit stream, a first separate parity stream, and a second separate parity stream; and	As part of the rate matching function (shown in the figure below), Apple's 3G products have a means for separating the at least one radio frame into a separate information bit stream, a first separate parity stream, and a second separate parity stream. See claim 12[d]. *See, e.g.,* TS 25.212 v6.0.0: The bit separation in Apple's 3G products separates each of the radio frames received from the radio frame segmenter into the information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs), and the first and second separate parity streams (x_{2ik}, *i.e.,* first parity bits and x_{3ik}, *i.e.,* second parity).

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

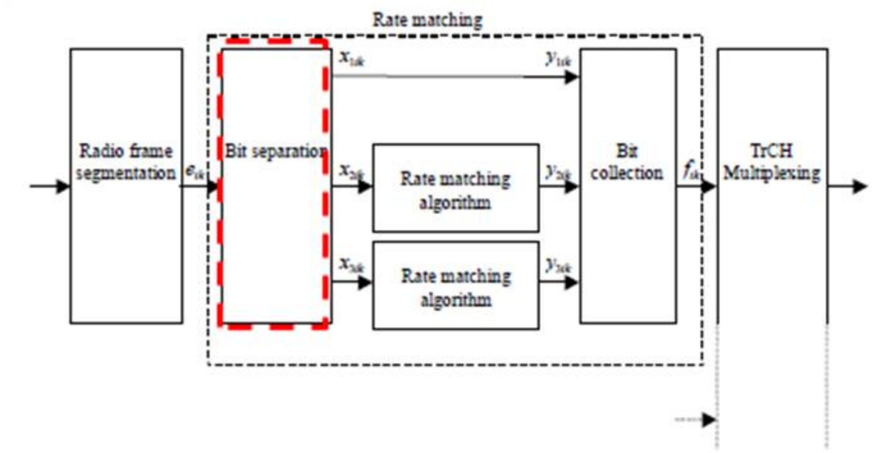


Figure 5: Puncturing of turbo encoded TrCHs in uplink

(V6.0.0, paragraph 4.7.3, page 36. Annotation added.)

"The first sequence contains:

- All of the systematic bits that are from turbo encoded TrCHs.
- From 0 to 2 first and/or second parity bits that are from turbo encoded TrCHs. These bits come into the first sequence when the total number of bits in a block after radio frame segmentation is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The second sequence contains:

- All of the first parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The third sequence contains:

- All of the second parity bits that are from turbo encoded TrCHs, except those that go into the first sequence when the total number of bits is not a multiple of three.
- Some of the systematic, first parity and second parity bits that are for trellis termination.

The second and third sequences shall be of equal length, whereas the first sequence can contain from 0 to 2 more bits. Puncturing is applied only to the second and third sequences."
(V6.0.0, paragraph 4.2.7.3, pages 35-36.)

	"For turbo encoded TrCHs with puncturing (Y_i=X_i): $z_{i,3(k-1)+1+(\alpha_1+\beta_{n_i}) \bmod 3} = y_{1,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3\lfloor N_i/3 \rfloor + k} = y_{1,i,\lfloor N_i/3 \rfloor + k}$ k = 1, …, N_i mod 3 Note: When (N_i mod 3) = 0 this row is not needed. $z_{i,3(k-1)+1+(\alpha_2+\beta_{n_i}) \bmod 3} = y_{2,i,k}$ k = 1, 2, 3, …, Y_i $z_{i,3(k-1)+1+(\alpha_3+\beta_{n_i}) \bmod 3} = y_{3,i,k}$ k = 1, 2, 3, …, Y_i After the bit collection, bits $z_{i,k}$ with value δ, where $\delta \notin \{0, 1\}$, are removed from the bit sequence." (V6.0.0, paragraph 4.2.7.3.2, page 38.)
[e] means for bypassing the separate information bit stream and for puncturing a part of the first and second separate parity streams according to a given rate matching rule.	Apple's 3G products have a means for bypassing the separate information bit stream (x_{1ik}, *i.e.,* the systematic bits of turbo encoded TrCHs) and for puncturing a part of the first (x_{2ik}) and second (x_{3ik}) parity streams from the demultiplexer according to a given rate matching rule. The rate matcher corresponds to the means for bypassing the separate information bit stream and for puncturing a part of the first and second separate parity streams according to a given rate matching rule. See claims 1[e] and 48[e].
56. The system of claim 55, wherein the interleaved stream is mapped onto consecutive radio frames when a transmission	See claims 2, 49, and 53.

time interval (TTI) is longer than 10 ms.	
57. The system of claim 55, wherein the interleaving operation is performed at a TTI (Transmission Time Interval), after inserting filler bits into the output stream, in order to equalize a size of the at least one radio frame.	See claims 10, 50, and 54.