## Mueller Exhibit 61

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## **EXHIBIT G**

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

ASSERTED CLAIM	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMEN	TALITY
(PATENT L.R. 3-1(A))	(PATENT L.R. 3-1(B)-(D))	
1. A channel coding and multiplexing apparatus for	Apple's 3G Products' comprise a channel coding and multiplexing apparatus for a CDMA comm system, in which data frames that have different transmission time intervals (TTIs) are received a	nunication in parallel
a CDMA communication system, in which data	via a plurality of transport channels and multiplexed to a serial data frame.	
frames that have different transmission time intervals	s See, e.g.,	
(TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame, the apparatus comprising:	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):	

<sup>&</sup>lt;sup>1</sup> "Apple's 3G Products" include iPhone 3G, iPhone 3GS, iPhone4, iPad 3G, iPad2 3G and any other products compliant with 3GPP UMTS standard.



change your account lock the micro-SIM ca	tings (on iPad Wi-Fi <mark>+ 3G only)</mark> to turn Da t information, or add a Personal Identifica ard.	ata Roaming on or off, ation Number (PIN) to
Turn the cellular dat	a network on or off: Choose Cellular Da	ta, then turn Cellular Data
Turn data roaming o	on or off: Choose Data Roaming, then tu	rn data roaming on or off.
View your account in Account.	nformation: To see or change your acco	unt information, tap View
Chapter 17 Settings		
http://www.appie.c	<u>om/ipad/specs/</u> (iPad 2).	
Wireless and		
Wireless and Cellular	<ul> <li>Wi-Fi (802.11 a/b/g/n)</li> <li>Bluetooth 2.1 + EDR technology</li> </ul>	<ul> <li>Wi-Fi + 3G model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz)</li> <li>Wi-Fi + 3G for Verizon model: CDMA EV-DO Rev. A (800, 1900 MHz)</li> <li>Data only*</li> <li>Wi-Fi (802.11a/b/g/n)</li> <li>Bluetooth 2.1 + EDR technology</li> </ul>
Wireless and Cellular	<ul> <li>Wi-Fi (802.11a/b/g/n)</li> <li>Bluetooth 2.1 + EDR technology</li> </ul>	<ul> <li>Wi-Fi + 3G model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz)</li> <li>Wi-Fi + 3G for Verizon model: CDMA EV-DO Rev. A (800, 1900 MHz)</li> <li>Data only*</li> <li>Wi-Fi (802.11 a/b/g/n)</li> <li>Bluetooth 2.1 + EDR technology</li> <li>Learn more about Wi-Fi + 3G &gt;</li> </ul>

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



concatenation of the transport blocks. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.) As it can be seen from the following figure, data frames that have different transmission time intervals (TTIs) are received in parallel via a plurality of transport channels and multiplexed to a serial data frame. CRC attachmen data frames that have TrBk cos Code block se different transmission time intervals (TTIs) are received in Channel coding 🖌 parallel via a plurality of I transport channels. Radio frame ectual 1" interleaving d \_ d Radio frame received data frames are multiplexed to a serial data frame Physical channel mapping 22 (V6.0.0, paragraph 4.2, page 11. Annotations added.) "When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive  $F_i$  radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of  $F_i$ . The input bit sequence is denoted by  $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$  where *i* is the TrCH number and  $X_i$  is the number bits. The  $F_i$  output bit sequences per TTI are denoted by  $y_{i,n,1}, y_{i,n,2}, y_{i,n,3}, \dots, y_{i,n,Y_i}$  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:

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





	"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 $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the number bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \dots, y_{i,n_iY_i}$ 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>i</i> . The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}, n_i = 1F_i, k = 1Y_i$
	where
	$Y_i = (X_i / F_i)$ is the number of bits per segment.
	The $n_i$ -th segment is mapped to the $n_i$ -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.)
	"The input bit sequence to the radio frame segmentation is denoted by $d_{i1}, d_{i2}, d_{i3}, \dots, d_{iT_i}$ , where <i>i</i> is the TrCH number and <i>T</i> , the number of bits. Hence, $x_i = d_i$ and $Y_i = T_i$ .
	The output bit sequence corresponding to radio frame $n_i$ is denoted by $e_{i1}, e_{i2}, e_{i3}, \dots, e_{iN_i}$ , where <i>i</i> is the
	TrCH number and $N_i$ is the number of bits. Hence, $e_{i,k} = y_{i,n,k}$ and $N_i = Y_i$ ." (V6.0.0, paragraph 4.2.6.1,
	page 24.)
[b] a multiplexer for	Apple's 3G products have a multiplexer for multiplexing the radio frames to the serial data frame. <i>See, e.g.,</i>
frames to the serial data	15 25.212 VO.U.U.
frame	
nume,	



	"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 $f_{i1}, f_{i2}, f_{i3}, \dots, f_{iV_i}$ , where <i>i</i> is the TrCH number and $V_i$ is the number of bits in the radio frame of TrCH <i>i</i> . The number of TrCHs is denoted by <i>I</i> . The bits output from TrCH multiplexing are denoted by $s_1, s_2, s_3, \dots, s_s$ , where <i>S</i> is the number of bits, i.e. $S = \sum V_i$ .	
	The TrCH multiplexing is defined by the following relations: $s_k = f_{1k}$ $k = 1, 2,, V_1$	
	$s_k = f_{2,(k-V_1)}$ $k = V_1 + 1, V_1 + 2,, V_1 + V_2$	
	$s_k = f_{3,(k-(V_1+V_2))}$ $k = (V_1+V_2)+1, (V_1+V_2)+2,, (V_1+V_2)+V_3$	
	$s_{k} = f_{I,(k-(V_{1}+V_{2}++V_{I-1}))} \qquad k = (V_{1}+V_{2}++V_{I-1})+1, (V_{1}+V_{2}++V_{I-1})+2,, (V_{1}+V_{2}++V_{I-1})+V_{I}"$	
	(V6.0.0, paragraph 4.2.8, pages 41-42.)	
[c] wherein each radio frame segmenter determines the bit number of a radio frame according to the size of the data frames received by the corresponding frame	Each radio frame segmenter determines the bit number of a radio frame according to the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame and divides the data frames by the bit number of the radio frame. <i>See, e.g.,</i> TS 25.212 v6.0.0:	
	As the following passage explains, the $i^{th}$ transport channel receives $x_{il}$ , $x_{i2}$ , $x_{i3}$ $x_{iXi}$ where $X_i$ is the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame.	
matcher and the TTI of a radio frame and divides the data frames by the bit	"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 $F_i$ .	
number of the radio frame.	The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3},, x_{iX_i}$ where <i>i</i> is the IrCH number and $X_i$ is the number bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3},, y_{i,n_iY_i}$ where $n_i$ is the radio	

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



	of row 0 and ending with bit $x_{i,(R1\times C1)}$ in column C1 - 1 of row R1 - 1:
	<ul> <li>(4)Perform the inter-column permutation for the matrix based on the pattern ⟨P1<sub>C1</sub>(j)⟩<sub>j∈{0,1,,C1-1}</sub> shown in table 4, where P1<sub>C1</sub>(j) is the original column position of the <i>j</i>-th permuted column. After permutation of the columns, the bits are denot by y<sub>ik</sub>:</li> <li>"The bits input to the 1<sup>st</sup> i is the TrC and T<sub>i</sub> the number of bits. Hence, z<sub>i,k</sub> = t<sub>i,k</sub> and Z<sub>i</sub> = T<sub>i</sub>. The bis output from the 1<sup>st</sup> interleaving are denoted by d<sub>i,1</sub>, d<sub>i,2</sub>, d<sub>i,3</sub>,, d<sub>i,Ti</sub>, and d<sub>i,k</sub> = y<sub>i,k</sub>." (V6.0.0, paragraph, 4.2.5.3, page 23.)</li> </ul>
3. The channel coding and	Each radio frame matcher in Apple's 3G products further includes a rate matcher for adjusting the data rate
multiplexing apparatus of	of a radio frame received from a radio frame segmenter by one of puncturing and repeating parts of the
claim 1, wherein each	radio frame to match the data rate of the radio frame to that of a physical channel frame. See, e.g., 18
facto frame matcher	23.212 V0.0.0.
motohor for adjusting the	
data rata of a radio frama	
received from a radio	
frame segmenter by one of	
puncturing and repeating	
parts of the radio frame to	
match the data rate of the	
radio frame to that of a	
physical channel frame.	



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

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

transmitting device		
comprises:		
-	$b_{m1}, b_{m2}, b_{m3}, \dots, b_{md}$	
	TriBk concretenation / Code block segmentation	
	Channel coding	
	Radio frame equalisation	
	$t_{\alpha}, t_{\alpha}, t_{\alpha}, \cdots, t_{\sigma_{\alpha}}$	
	radio frame	
	matcher is Radio frame segmentation	
	connected e <sub>a</sub> , e <sub></sub>	
	between channel Rate matching matching	
	coder and finite for the second secon	
	TrCH Multiplexiag	
	<sup>2</sup> <sub>1</sub> , <sup>2</sup> <sub>2</sub> , <sup>2</sup> <sub>3</sub> ,, <sup>2</sup> <sub>3</sub> CCTrCH Physical channel	
	$u_{\mu_1}, u_{\mu_2}, u_{\mu_3}, \dots, u_{\mu_d} $	
	2" intelleving	
	Physical channel mapping	
	<u> </u>	
	081	
	Figure 1: Transport channel multiplexing structure for uplink	
	(V6.0.0, paragraph 4.2, page 11. Annotations added.)	
[a] an interleaver for	Each of the radio frame matchers of the uplink channel transmitting device in Apple's 3G products	
interleaving the data	includes an interleaver for interleaving the data frames received by the corresponding frame matcher. See,	
frames received by the	<i>e.g.</i> , TS 25.212 v6.0.0:	
corresponding frame		
matcher;	As the following figure shows, the interleaver interleaves the data frames received by the corresponding	
	Irame matcher.	



	"(3) Write the input bit sequence into the R1 $\times$ C1 matrix row by row starting with bit x in column 0		
	of row 0 and ending with bit $x_{i,(RI_{VC})}$ in column C1 - 1 of row R1 - 1:		
	$\begin{bmatrix} x_{i,1} & x_{i,2} & x_{i,3} & \dots & x_{i,C1} \end{bmatrix}$		
	$x_{i,(C1+1)}$ $x_{i,(C1+2)}$ $x_{i,(C1+3)}$ $\dots$ $x_{i,(2\times C1)}$		
	$x_{i,((R1-1)\times C1+1)}$ $x_{i,((R1-1)\times C1+2)}$ $x_{i,((R1-1)\times C1+3)}$ $x_{i,(R1\times C1)}$		
	(4)Perform the inter-column permutation for the matrix based on the pattern $\langle P1_{C1}(j) \rangle_{j \in \{0,1,,C1-1\}}$ shown		
	in table 4, where $P1_{C1}(j)$ is the original column position of the <i>j</i> -th permuted column. After		
	permutation of the columns, the bits are denoted by $y_{ik}$ :		
	$\mathcal{Y}_{i,1}$ $\mathcal{Y}_{i,(R1+1)}$ $\mathcal{Y}_{i,(2\times R1+1)}$ $\cdots$ $\mathcal{Y}_{i,((C1-1)\times R1+1)}$		
	$\mathcal{Y}_{i,2}$ $\mathcal{Y}_{i,(\mathrm{R1+2})}$ $\mathcal{Y}_{i,(2\times\mathrm{R1+2})}$ $\cdots$ $\mathcal{Y}_{i,((\mathrm{C1-1})\times\mathrm{R1+2})}$ ,		
	$\mathcal{Y}_{i,\mathrm{R1}}$ $\mathcal{Y}_{i,(2\times\mathrm{R1})}$ $\mathcal{Y}_{i,(3\times\mathrm{R1})}$ $\cdots$ $\mathcal{Y}_{i,(\mathrm{C1}\times\mathrm{R1})}$		
	(V6.0.0, paragraph 4.2.5.2, page 23.)		
	"The bits input to the 1 <sup>st</sup> interleaving are denoted by $t = t = t$ where i is the TrCH number and T		
	the number of bits. Hence, $z_{i} = t_{i}$ and $Z_{i} = T_{i}$ . The bits output from the 1 <sup>st</sup> interleaving are denoted by		
	$d = d = d$ and $d_{ij} = v_{ij}$ " (V6.0.0 paragraph 4.2.5.3 page 23.)		
[h] a radio frama	$u_{i,1}, u_{i,2}, u_{i,3}, \dots, u_{i,T_i}$ , and $u_{i,k}$ $y_{i,k}$ . (Volue, paragraph, 1.2.3.3, page 23.)		
segmenter for determining	includes a radio frame segmenter, for determining the bit number of a radio frame according to the size of		
the bit number of a radio	the data frames received by the corresponding frame matcher and a radio frame TTI and dividing the data		
frame according to the	frames by a variable, said variable being a function of the radio frame TTI. See, e.g., TS 25.212 v6.0.0:		
size of the data frames			
received by the	As the following passage explains, the $i^{th}$ transport channel receives $x_{i1}$ , $x_{i2}$ , $x_{i3}$ $x_{iXi}$ where $X_i$ is the size of		
corresponding frame	the data frames received by the corresponding frame matcher and the TTI of a radio frame.		
matcher and a radio frame	"When the transmission time interval is longer than 10 ms, the input hit sequence is segmented and		
i i i anu uiviunig inc uala	when the transmission time interval is longer than 10 ms, the input of sequence is segmented and		

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



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

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





	The interleaver in the downlink transmitting device interleaves data in the manner described below.
	"(3) Write the input bit sequence into the R1 $\times$ C1 matrix row by row starting with bit $x_{i,1}$ in column 0
	of row 0 and ending with bit $x_{i(R \times C1)}$ in column C1 - 1 of row R1 - 1:
	$\begin{bmatrix} x_{i1} & x_{i2} & x_{i3} & \dots & x_{iCI} \end{bmatrix}$
	$egin{array}{cccccccccccccccccccccccccccccccccccc$
	$\begin{array}{cccc} & & & & & & & & & & & & & & & & & $
	$x_{i,((R1-1)\times C1+1)}$ $x_{i,((R1-1)\times C1+2)}$ $x_{i,((R1-1)\times C1+3)}$ $x_{i,(R1\times C1)}$
	(4)Perform the inter-column permutation for the matrix based on the pattern $\langle P1_{C1}(j) \rangle_{i \in \{0,1,\dots,C1-1\}}$ shown
	in table 4, where $P1_{C1}(j)$ is the original column position of the <i>j</i> -th permuted column. After permutation of the columns, the bits are denoted by $y_{ik}$ :
	$\begin{bmatrix} \mathcal{Y}_{i,1} & \mathcal{Y}_{i,(R1+1)} & \mathcal{Y}_{i,(2\times R1+1)} & \cdots & \mathcal{Y}_{i,((C1-1)\times R1+1)} \end{bmatrix}$
	$\mathcal{Y}_{i,2}$ $\mathcal{Y}_{i,(\mathrm{R1+2})}$ $\mathcal{Y}_{i,(2\times\mathrm{R1+2})}$ $\cdots$ $\mathcal{Y}_{i,((\mathrm{C1-1})\times\mathrm{R1+2})}$
	$\begin{bmatrix} \mathcal{Y}_{i,\text{R1}} & \mathcal{Y}_{i,(2\times\text{R1})} & \mathcal{Y}_{i,(3\times\text{R1})} & \cdots & \mathcal{Y}_{i,(\text{C1}\times\text{R1})} \end{bmatrix}$
	(V6.0.0, paragraph 4.2.5.2, page 23.)
	"If fixed positions of the TrCHs in a radio frame is used then the bits input to the 1 <sup>st</sup> interleaving are denoted by $h_{i1}, h_{i2}, h_{i3}, \dots, h_{iD_i}$ , where <i>i</i> is the TrCH number. Hence, $z_{ik} = h_{ik}$ and $Z_i = D_i$ .
	If flexible positions of the TrCHs in a radio frame is used then the bits input to the 1 <sup>st</sup> interleaving are
	denoted by $g_{i1}, g_{i2}, g_{i3}, \dots, g_{iG_i}$ , where <i>i</i> is the TrCH number. Hence, $z_{ik} = g_{ik}$ and $Z_i = G_i$ .
	The bits output from the 1 <sup>st</sup> interleaving are denoted by $q_{i1}, q_{i2}, q_{i3}, \dots, q_{iQ_i}$ , where <i>i</i> is the TrCH number and
	$Q_i$ is the number of bits. Hence, $q_{ik} = y_{ik}$ , $Q_i = F_i H_i$ if fixed positions are used, and $Q_i = G_i$ if flexible positions are used." (V6.0.0, paragraph, 4.2.5.4, page 23.)
[b] a radio frame	Each of the radio frame matchers of the downlink channel transmitting device in Apple's 3G products
segmenter for determining	includes a radio frame segmenter for determining the bit number of a radio frame according to the size of
frame according to the	frame by a variable said variable being a function of the radio frame TTL Sec. e.g. TS 25 212 v6.0.0:

size of the data frames	
received by the	As the following passage explains, the <i>i</i> <sup>th</sup> transport channel receives $x_{i1}$ , $x_{i2}$ , $x_{i3}$ $x_{iXi}$ where $X_i$ is the size of
corresponding frame	the data frames received by the corresponding frame matcher and the TTI of a radio frame.
matcher and a radio frame	
TTI and dividing the data	"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and
frame by a variable, said	mapped onto consecutive $F_i$ radio frames. Following rate matching in the DL and radio frame size
variable being a function	equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of $F_i$ .
of the radio frame TTI.	The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the number
	bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i1}, y_{i,n_i2}, y_{i,n_i3}, \dots, y_{i,n_iY_i}$ 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>i</i> . The output sequences are defined as follows:
	$v = r_{\mu\nu} + 1$ $E \cdot k = 1$ $V$
	$y_{i,n,k} \sim x_{i,((n_i-1)Y_i)+k}, r_i = 1 \dots r_i, r_i = 1 \dots r_i$
	where $Y = (Y / F)$ is the number of hits non-segment
	$I_i - (X_i / F_i)$ is the number of oils per segment. The <i>n</i> -th compart is manual to the <i>n</i> -th radio frame of the transmission time interval "
	The $n_i$ -th segment is mapped to the $n_i$ -th radio frame of the transmission time interval. (V6.0.0, pergraph 4.2.6, page 24.)
	(v 0.0.0, paragraph 4.2.0, page 24.)
	As the above passage also shows, the bit number of a radio frame is $Y_i$ . The radio frame segmenter divides
	the data frames by the bit number of the radio frame and maps the received data frame into one or more
	radio frames. For example, the first radio frame of transport channel $i$ maps the first $Y_i$ bits of the received
	data frame ( <i>i.e.</i> , $y_{i,l,k} - x_{i,k}$ , $k=1,2,,Y_i$ ). The second radio frame of transport channel <i>i</i> maps the next $Y_i$
	bits of the received data frame ( <i>i.e.</i> , $y_{i,2,k} - x_{i,Y_i+k}$ , $k=1,2,,Y_i$ ), the third radio frame of transport channel <i>i</i>
	maps the next $Y_i$ bits of the received data frame ( <i>i.e.</i> , $y_{i,3,k} - x_{i,2Y_i+k}$ , $k=1,2,,Y_i$ ), and so on.
	The bit number of a radio frame is $Y_i$ is determined by $Y_i = (X_i / F_i)$ , where variable $F_i$ is the output bit
	sequences per TTI, which thus is a function of the radio frame TTI.
6. A channel coding and	See claim 1.
multiplexing apparatus for	
a CDMA communication	Apple's 3G products comprise a channel coding and multiplexing apparatus for a CDMA communication
system, in which data	system, in which data frames that have one or more transmission time intervals (TTIs) are received in
frames that have one or	parallel via a plurality of transport channels and converted to data frames of multi-code physical channels.
more transmission time	

intervals (TTIs) are	
received in parallel via a	<i>See, e.g.</i> , TS 25.212 v6.0.0:
plurality of transport	
channels and converted to	"Data stream from/to MAC and higher layers (Transport block / Transport block set) is encoded/decoded
data frames of multi-code	to offer transport services over the radio transmission link. Channel coding scheme is a combination of
physical channels, the	error detection, error correcting, rate matching, interleaving and transport channels mapping onto/splitting
apparatus comprising:	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. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)

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



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




	(V6.0.0, paragraph 4.2, page 11. Annotation added.)
	Each radio frame matcher in Apple's 3G products receives the data frames and segments the data frames into radio frames.
	"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive $F_i$ radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of $F_i$ . The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the number
	bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i,1}, y_{i,n_i,2}, y_{i,n_i,3}, \dots, y_{i,n_i,Y_i}$ 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>i</i> . The output sequences are defined as follows:
	$y_{i,n,k} = x_{i,((n_i-1)Y_i)+k}, n_i = 1F_i, k = 1Y_i$
	where
	$Y_i = (X_i / F_i)$ is the number of bits per segment.
	The $n_i$ -th segment is mapped to the $n_i$ -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.)
	"The input bit sequence to the radio frame segmentation is denoted by $d_{i1}, d_{i2}, d_{i3}, \dots, d_{iT_i}$ , where <i>i</i> is the
	TrCH number and $T_i$ the number of bits. Hence, $x_{ik} = d_{ik}$ and $X_i = T_i$ .
	The output bit sequence corresponding to radio frame $n_i$ is denoted by $e_{i1}, e_{i2}, e_{i3}, \dots, e_{iN_i}$ , where <i>i</i> is the
	TrCH number and $N_i$ is the number of bits. Hence, $e_{i,k} = y_{i,n,k}$ and $N_i = Y_i$ ." (V6.0.0, paragraph 4.2.6.1,
	page 24.)
[b] a multiplexer for	Apple's 3G products have a multiplexer for multiplexing the radio frames into a serial data frame.
frames into a serial data	See claim 1[b].
frame; and	

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



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

output as $e_{2,j}=d_{(j+P/M)}$ and the segmented physical channel frames for a physical channel #M are	"The bits input to the physical channe number of bits input to the physical ch The bits after physical channel segme	I segmentation are denoted by $x_1, x_2$ nannel segmentation block. The num ntation are denoted $u_{n1}, u_{n2}, u_{n3},,$	$x_2, x_3, \dots, x_X$ , where X is the mber of PhCHs is denoted by P. $u_{p U}$ , where p is PhCH number
output as $e_{M,j} = d_{(j+(M-1)P/M)}$ , and wherein the bits of the	and $U$ is the number of bits in one rad	io frame for each PhCH, i.e. $U = (X$	$X - N_{TGL} - (N_{data,*} - N'_{data,*})) / P$
serial data frame output	for compressed mode by puncturing, a	and $U = \frac{X}{R}$ otherwise." (V6.0.0, para	agraph 4.2.10, page 43.)
from the multiplexer are $d_1, d_2, \ldots, d_n$ , the number	"Bits on first PhCH after physical cha	nnel segmentation:	
of physical channels is M.	$u_{l,k} = x_{f(k)} \ k = 1, 2,, U$	-	
the size of the serial data	Bits on second PhCH after physical cl	hannel segmentation:	
frame output from the	$u_{2, k} = x_{f(k+U)}$ $k = 1, 2,, U$	· -	
multiplexer is P and $j=1$ ,			
2, , P/M.	Bits on the <i>P</i> <sup>th</sup> PhCH after physical ch	annel segmentation:	
	$u_{P,k} = x_{f(k+(P-1)\times U)}$ $k = 1, 2$	,, U	
	where $f$ is such that :		
	- for modes other than compressed mode by puncturing, $x_{f(k)} = x_k$ , i.e. $f(k) = k$ , for all k.		
	- for compressed mode by punctu	ring, bit $u_{1,1}$ corresponds to the bit.	$x_k$ with smallest index k when the
	bits p are not counted, bit $u_{1,2}$ co	prresponds to the bit $x_k$ with second	smallest index $k$ when the bits p
	are not counted, and so on for b	its $u_{1,3}, \ldots u_{I, U, U, u_{2, I, u_{2, 2, \dots}} u_{2, U, \dots} u_{P, I}$	$u_{P,2,} u_{P,U}$ ."
	(V6.0.0, paragraph 4.2.10, pages 43-4	4.)	
	Based on the above passages from V.	5.0.0, the following correspondence	e is made between the claim
	cleaner Elements and the above-cited notation	Netation for Claim Element	Notation from V(000
	Claim Element	Notation for Claim Element	Notation from V.6.0.0
	number of physical channels	M	P V
	size of the serial data frame	Р	λ
	output from the multiplexer (i.e.,		
	abannal sagmantar to be		
	channel segmented by physical channel		
	segmenter)		
	"serial data frame output from the	di da da	Y. Yo Yar
	serial data france output from the	$u_1, u_2, \dots u_p$	$\Lambda_1, \Lambda_2, \ldots \Lambda_X$

	multiplexer" (i.e., input bits to		
	position of a bit in a segmented physical channel frame	j	k
	"the segmented physical channel frames for a physical channel #1 are output"	e <sub>1,j</sub>	u <sub>1,k</sub>
	the segmented physical channel frames for a physical channel #2 are output"	e <sub>2,j</sub>	u <sub>2,k</sub>
	"the segmented physical channel frames for a physical channel #M are output"	e <sub>M,j</sub>	$u_{P,k}$ Note: The number of physical channels is "M" for the claim and "P" for V 6.0.0
	Based on the correspondence shown a shows the same "segmented physical " $u_{2, k} = x_{f(k+U)}$ $k = 1, 2,, U$ " shows #2" as the claimed " $e_{2,j}=d_{(j+P/M)}$ ," and physical channel frames for a physical	above, it is clear that " $u_{I, k} = x_{f(k)} k$ channel frames for a physical char the same "segmented physical char " $u_{P,k} = x_{f(k+(P-1)\times U)} k = 1, 2,, U$ l channel #M" as the claimed "as e	f = 1, 2,, U'' (where U=X/P) nel #1" as the claimed " $e_{1,j}=d_j$ ," annel frames for a physical channel " shows the same "segmented $e_{M,j}=d_{(j+(M-1)P/M.")}$
7. A channel coding and multiplexing apparatus for a CDMA communication system, in which data	Apple's 3G products comprise a chan system, in which data frames that hav parallel via a plurality of transport cha	nel coding and multiplexing appara e one or more transmission time in annels and multiplexed to a serial o	atus for a CDMA communication ntervals (TTIs) are received in data frame.
frames that have one or more transmission time intervals (TTIs) are	See, e.g.,		
received in parallel via a plurality of transport channels and multiplexed	Apple iPhone user guide re iOS 3.1: (	iPhone 3G or later, p. 21):	
to a serial data frame, the apparatus comprising:			



## 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	<ul> <li>WI-Fi (802.11 a/b/g/n)</li> <li>Bluetooth 2.1 + EDR technology</li> </ul>	<ul> <li>Wi-Fi + 3G model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz)</li> <li>Wi-Fi + 3G for Verizon model: CDMA EV-DO Rev. A (800, 1900 MHz)</li> <li>Data only*</li> <li>Wi-Fi (802.11 a/b/g/n)</li> <li>Bluetooth 2.1 + EDR technology</li> <li>Learn more about Wi-Fi + 3G &gt;</li> </ul>
Carriers Apple's 3G products the multiplexing and	contain a baseband processor for p	erizon
Specification 25.212	v6.0.0 ("TS 25.212 v6.0.0")).	ed in at least SOPP Release 6 (SOPP Technical
<i>See, e.g.</i> , TS 25.212 v	6.0.0:	
"Data stream from/to to offer transport serv error detection, error of from physical channel	MAC and higher layers (Transpor ices over the radio transmission li correcting, rate matching, interlear ls." (V6.0.0, paragraph 4.1, page 9	rt block / Transport block set) is encoded/decoded nk. Channel coding scheme is a combination of ving and transport channels mapping onto/splitting 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. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)

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



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



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



	(V6.0.0, paragraph 4.2, page 11. Annotation added.)
	The radio frame segmenter receives the data frames having the inserted number of filler bits into radio frames and segments the data frames.
	"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive $F_i$ radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of $F_i$ . The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the number
	bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n1}, y_{i,n2}, y_{i,n3}, \dots, y_{i,nV}$ 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>i</i> . The output sequences are defined as follows:
	$y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$ , $n_i = 1F_i$ , $k = 1Y_i$
	where
	$Y_i = (X_i / F_i)$ is the number of bits per segment.
	The $n_i$ -th segment is mapped to the $n_i$ -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.)
	"The input bit sequence to the radio frame segmentation is denoted by $d_{i1}, d_{i2}, d_{i3}, \dots, d_{iT_i}$ , where <i>i</i> is the
	TrCH number and $T_i$ the number of bits. Hence, $x_{ik} = d_{ik}$ and $X_i = T_i$ .
	The output bit sequence corresponding to radio frame $n_i$ is denoted by $e_{i1}, e_{i2}, e_{i3}, \dots, e_{iN_i}$ , where <i>i</i> is the
	TrCH number and $N_i$ is the number of bits. Hence, $e_{i,k} = y_{i,n,k}$ and $N_i = Y_i$ ." (V6.0.0, paragraph 4.2.6.1,
	page 24.)
[b] a multiplexer for	Apple's 3G products have a multiplexer for multiplexing the radio frames into the serial data frame. <i>See,</i>
multiplexing the radio	<i>e.g.</i> , TS 25.212 v6.0.0:
frames into the serial data	
frame.	



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

corresponding data frame	mapped onto consecutive $F_i$ radio frames. Following rate matching in the DL and radio frame size
by the bit number of the	equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of $F_i$ .
radio frames.	The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the number
	bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i,1}, y_{i,n_i,2}, y_{i,n_i,3}, \dots, y_{i,n_i,Y_i}$ 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>i</i> . The output sequences are defined as follows:
	$y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}, n_i = 1F_i, k = 1Y_i$
	where $Y = (Y   E)$ is the number of hits non-comment
	$I_i = (X_i / F_i)$ is the number of one per segment. The <i>n</i> -th segment is menned to the <i>n</i> -th radio frame of the transmission time interval "
	(V6.0.0, paragraph 4.2.6, page 24.)
	(v 0.0.0, paragraph 4.2.0, page 24.)
	As the above passage also shows, the bit number of a radio frame is $Y_i$ . The radio frame segmenter divides
	the data frames by the bit number of the radio frame and maps the received data frame into one or more
	radio frames. For example, the first radio frame of transport channel $i$ maps the first $Y_i$ bits of the received
	data frame ( <i>i.e.</i> , $y_{i,1,k} - x_{i,k}$ , $k=1,2,,Y_i$ ). The second radio frame of transport channel <i>i</i> maps the next $Y_i$
	bits of the received data frame ( <i>i.e.</i> , $y_{i,2,k} - x_{i,Y_i+k}$ , $k=1,2,,Y_i$ ), the third radio frame of transport channel <i>i</i>
	maps the next $Y_i$ bits of the received data frame ( <i>i.e.</i> , $y_{i,3,k} - x_{i,2Y_i+k}$ , $k=1,2,,Y_i$ ), and so on.
9. The channel coding and	Each radio frame matcher in Apple's 3G products further includes an interleaver for interleaving the data
multiplexing apparatus of	rames received by the corresponding frame matcher and applying the interleaved data frames to a
radio frama matahar	corresponding radio frame segmenter.
further includes an	$S_{aa} = a_{a} = TS 25 212 y_{b} 0.0$
interleaver for interleaving	See, e.g., 15 25.212 vo.0.0.
the data frames received	As the following figure shows the interleaver interleaves the data frames received by the corresponding
by the corresponding	frame matcher. The interleaved data from the interleaver are applied to a corresponding radio frame
frame matcher and	segmenter.
applying the interleaved	
data frames to a	
corresponding radio frame	
segmenter.	



	"(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 $x_{i,(RI\times CI)}$ in column C1 - 1 of row R1 - 1:
	<ul> <li>(4)Perform the inter-column permutation for the matrix based on the pattern ⟨P1<sub>C1</sub>(j)⟩<sub>j∈{0,1,,C1-1}</sub> shown in table 4, where P1<sub>C1</sub>(j) is the original column position of the <i>j</i>-th permuted column. After permutation of the columns, the bits are denot by y<sub>ik</sub>:</li> <li>"The bits input to the 1<sup>st</sup> i is the TrC and T<sub>i</sub> the number of bits. Hence, z<sub>i,k</sub> = t<sub>i,k</sub> and Z<sub>i</sub> = T<sub>i</sub>. The bis output from the 1<sup>st</sup> interleaving are denoted by d<sub>i,1</sub>, d<sub>i,2</sub>, d<sub>i,3</sub>,, d<sub>i,T<sub>i</sub></sub>, and d<sub>i,k</sub> = y<sub>i,k</sub>." (V6.0.0, paragraph, 4.2.5.3, page 23.)</li> </ul>
10. The channel coding and multiplexing apparatus of claim 7, wherein each radio frame	Each radio frame matcher in Apple's 3G products further includes a rate matcher for adjusting the data rate of a radio frame received from a radio frame segmenter by one of puncturing and repeating parts of the radio frame to match the data rate of the radio frame to that of a physical channel frame.
matcher further includes a rate matcher for adjusting	<i>See, e.g.</i> , TS 25.212 v6.0.0:
frame received from a	
one of puncturing and	
repeating parts of the radio frame to match the data	
rate of the radio frame to	
frame.	



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

	end do	
	else	
	$e = e_{ini}$	initial error between current and desired puncturing ratio
	m = 1	index of current bit
	do while m <= X <sub>i</sub>	
	$e = e - e_{minus}$	update error
	do while e <= 0	check if bit number m should be repeated
	repeat bit $x_{i,m}$	
	$e = e + e_{plus}$ $u$	pdate error
	end do	
	m = m + 1	next bit
	end do	
	end if	
	A repeated bit is placed directly a	fter the original one." (V6.0.0, paragraph 4.2.7.5, pages 40-41.)
11. A channel coding and	See claim 7.	
a CDMA communication	Apple's 3G products comprise a c	hannel coding and multiplexing apparatus for a CDMA communication
system, in which data	system, in which data frames that	have one or more transmission time intervals (TTIs) are received in
frames that have one or	parallel via a plurality of transpor	t channels and converted to data frames of multi-code physical channels.
more transmission time		
intervals (TTIs) are	See, e.g., TS 25.212 v6.0.0:	
received in parallel via a		
plurality of transport		
channels and converted to	"Data stream from/to MAC and h	igher layers (Transport block / Transport block set) is encoded/decoded
data frames of multi-code	to other transport services over th	e radio transmission link. Unannel coding scheme is a combination of



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



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

frames into a serial data	See claim 7[b].
frame; and	
F 7 1 1 1 1	
[c] a physical channel	Apple's 3G products have a physical channel segmenter for segmenting the multiplexed serial data frame
segmenter for segmenting	by the number of the physical channels and outputting the segmented physical channel frames to
the multiplexed serial data	corresponding physical channels.
frame by the number of	
the physical channels and	<i>See</i> , <i>e.g.</i> , TS 25.212 v6.0.0:
outputting the segmented	
physical channel frames to	
corresponding physical	
channels.	



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

received in parallel via a	parallel via a plurality of transport channels and multiplexed into a serial data frame.
plurality of transport	
channels and multiplexed	See claim 7.
into a serial data frame,	
the method comprising:	
[a] receiving data frames:	Apple's 3G products practice receiving data frames A data frame corresponds to data transmitted in a
[u] receiving data numes,	transmission time interval (TTI).
	<i>See, e.g.</i> , TS 25.212 v6.0.0:
	"All transport blocks in a TTI are serially concatenated. If the number of bits in a TTI is larger than Z, the
	maximum size of a code block in question, then code block segmentation is performed after the
	concatenation of the transport blocks. The maximum size of the code blocks depends on whether
[h] datarmining a number	Convolutional coding of turbo coding is used for the TrCH. (V6.0.0, paragraph 4.2.2, page 14.)
of filler hits.	Apple's 50 products practice determining a number of finer ofts.
or miler ons,	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 $c_{i1}, c_{i2}, c_{i3}, \dots, c_{iE_i}$ , where <i>i</i> is IrCH
	number and $E_i$ the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \dots, t_{iT_i}$ , where $T_i$ is the
	number of bits. The output bit sequence is derived as follows:
	- $t_{ik} = c_{ik}$ , for $k = 1 \dots E_i$ ; and
	$- t_{ik} = \{0, 1\} \text{ for } k = E_i + 1 \dots T_i, \text{ if } E_i < T_i;$
	where $T = F * M$ and
	- $I_i = \Gamma_i \cdot N_i$ , and - $N_i = \Gamma_i / \Gamma_i$ is the number of bits per segment after size equalisation "
	$N_i =  E_i/F_i $ is the number of one per segment after size equalisation.
[a] insorting the number of	(vo.u.u, paragraph 4.2.4, page 21.)
[c] inserting the number of	Apple's 50 products practice inserting the number of finer ons into the data frames.

filler bits into the data	
frames;	<i>See</i> , <i>e.g.</i> , 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 $c_{i1}, c_{i2}, c_{i3}, \dots, c_{iE_i}$ , where <i>i</i> is TrCH number and $E_i$ the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \dots, t_{iT_i}$ , where $T_i$ is the number of bits. The output bit sequence is derived as follows: - $t_{ik} = c_{ik}$ , for $k = 1 \dots E_i$ ; and - $t_{ik} = \{0, 1\}$ for $k = E_i + 1 \dots T_i$ , if $E_i < T_i$ ; where - $T_i = F_i * N_i$ ; and - $N_i = [E_i/F_i]$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
[d] segmenting the data frames including the filler bits into radio frames in a number of radio frame	Apple's 3G products practice segmenting the data frames including the filler bits into radio frames in a number of radio frame matchers. Each radio frame segmenter determines the bit number of a radio frame according to the size of the corresponding data frame, a radio frame TTI.
matchers; and	<i>See, e.g.</i> , TS 25.212 v6.0.0:
	As the following passage explains, the $i^{th}$ transport channel receives $x_{i1}$ , $x_{i2}$ , $x_{i3}$ $x_{iXi}$ where $X_i$ is the size of the data frames received by the corresponding frame matcher and the TTI of a radio frame. The received data frame by the radio frame segmenter contains the inserted filler bits.
	"When the transmission time interval is longer than 10 ms, the input bit sequence is segmented and mapped onto consecutive $F_i$ radio frames. Following rate matching in the DL and radio frame size equalisation in the UL the input bit sequence length is guaranteed to be an integer multiple of $F_i$ . The input bit sequence is denoted by $x_{i1}, x_{i2}, x_{i3},, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the number
	bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i,1}, y_{i,n_i,2}, y_{i,n_i,3}, \dots, y_{i,n_i,Y_i}$ 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>i</i> . The output sequences are defined as follows: $y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}$ , $n_i = 1F_i$ , $k = 1Y_i$ where $Y_i = (X_i / F_i)$ is the number of bits per segment. The $n_i$ -th segment is mapped to the $n_i$ -th radio frame of the transmission time interval." (V6.0.0, paragraph 4.2.6, page 24.) As the above passage also shows, the bit number of a radio frame is $Y_i$ . The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel <i>i</i> maps the first $Y_i$ bits of the received data frame ( <i>i.e.</i> , $y_{i,1,k} - x_{i,k}$ , $k=1,2,,Y_i$ ). The second radio frame of transport channel <i>i</i> maps the next $Y_i$
	bits of the received data frame ( <i>i.e.</i> , $y_{i,2,k} - x_{i,Y_i+k}$ , $k=1,2,,Y_i$ ), the third radio frame of transport channel <i>i</i> maps the next $Y_i$ bits of the received data frame ( <i>i.e.</i> , $y_{i,2,k} - x_{i,Y_i+k}$ , $k=1,2,,Y_i$ ) and so on
[e] multiplexing the radio frames into the serial data frame.	Apple's 3G products practice multiplexing the radio frames into the serial data frame. See, e.g., TS 25.212 v6.0.0:


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



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



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

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

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

frames that have one or	
more transmission time	Apple's 3G products practice a channel coding and multiplexing method for a CDMA communication
intervals (TTIs) are	system, in which data frames that have one or more transmission time intervals (TTIs) are received in
received in parallel via a	parallel via a plurality of transport channels and converted to data frames of multi-code physical channels.
plurality of transport	
channels and converted to	<i>See, e.g.</i> , TS 25.212 v6.0.0:
data frames of multi-code	
physical channels, the	
method comprising:	"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. The maximum size of the code blocks depends on whether convolutional coding or turbo coding is used for the TrCH." (V6.0.0, paragraph 4.2.2, page 14.)

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



	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 $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the number				
	bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i}, y_{i,n_i}, y_{i,n_i}, \dots, y_{i,n_i}$ 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>i</i> . The output sequences are defined as follows:				
	$y_{i,n_ik} = x_{i,((n_i-1)Y_i)+k}, n_i = 1F_i, k = 1Y_i$				
	where $V = (V / E)$ is the number of bits per segment				
	$I_i = (\Lambda_i / I'_i)$ is the number of one segment. The <i>n</i> -th segment is menored to the <i>n</i> -th radio frame of the transmission time interval."				
	The $n_i$ - in segment is mapped to the $n_i$ - in radio frame of the transmission time interval. (V6.0.0, paragraph 4.2.6, page 43.)				
	(v 0.0.0, paragraph 4.2.0, page 43.)				
	Apple's 3G products have multi-code physical channels that are used in CDMA communication systems.				
	"For all modes, some bits of the input flow are mapped to each code until the number of bits on the code				
	U." (V.6.0.0, paragraph 4.2.10, page 45.)				
	V.6.0.0 further states that "[t]he PhCH for both uplink and downlink is defined in [2]." (V.6.0.0,				
	paragraph 4.2.12, page 45.) [2] is a document entitled "3rd Generation Partnership Project; Technical				
	Specification Group Radio Access Network; Physical channels and mapping of transport channels onto physical channels (EDD) (Poloase 6) " which is deted December 2002. This decument states in nervor such				
	5.2.1 on page 10 that "It lhere are three types of unlink dedicated physical channels, the unlink Dedicated				
	5.2.1 on page 10 that "[t]here are three types of uplink dedicated physical channels, the uplink Dedicated Physical Control Channel (uplink DPCCI)				
	Physical Data Channel (uplink DPDCH), the uplink Dedicated Physical Control Channel (uplink DPCCH), and the uplink Dedicated Control Channel associated with HS DSCH transmission (uplink HS DPCCH)				
	The DPDCH the DPCCH and the HS DPCCH are I/O code multiplexed (see [4]) " which illustrates the				
	multi-code physical channels used in Apple's 3G products				
[a] segmenting the	Apple's 3G products practice segmenting the received data frames into radio frames in a number of radio				
received data frames into	frame matchers. Each radio frame segmenter determines the bit number of a radio frame according to the				
radio frames in a number	size of the corresponding data frame, a radio frame TTI.				
of radio frame matchers;					
	See, e.g., TS 25.212 v6.0.0:				
	As the following passage explains, the <i>i</i> <sup>th</sup> transport channel receives $x_{i1}$ , $x_{i2}$ , $x_{i3}$ $x_{iXi}$ where $X_i$ is the size of				

	the data frames received by the corresponding frame matcher and the TTI of a radio frame. The received data frame by the radio frame segmenter contains the inserted filler bits				
	data france by the radio frame segmenter contains the inserted finer ons.				
	"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 $x_{i1}, x_{i2}, x_{i3}, \dots, x_{iX_i}$ where <i>i</i> is the TrCH number and $X_i$ is the n					
	bits. The $F_i$ output bit sequences per TTI are denoted by $y_{i,n_i,1}, y_{i,n_i,2}, y_{i,n_i,3}, \dots, y_{i,n_i,Y_i}$ 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>i</i> . The output sequences are defined as follows:				
	$y_{i,n,k} = x_{i,((n_i-1)Y_i)+k}$ , $n_i = 1F_i$ , $k = 1Y_i$				
	where				
	$Y_i = (X_i / F_i)$ is the number of bits per segment. The <i>n</i> , th segment is manned to the <i>n</i> , th radio frame of the transmission time interval "				
	(V6.0.0, paragraph 4.2.6, page 24.)				
	As the above passage also shows, the bit number of a radio frame is $Y_i$ . The radio frame segmenter divides the data frames by the bit number of the radio frame and maps the received data frame into one or more radio frames. For example, the first radio frame of transport channel <i>i</i> maps the first $Y_i$ bits of the received data frame ( <i>i.e.</i> , $y_{i,1,k} - x_{i,k}$ , $k=1,2,,Y_i$ ). The second radio frame of transport channel <i>i</i> maps the next $Y_i$ bits of the received data frame ( <i>i.e.</i> , $y_{i,2,k} - x_{i,Y_i+k}$ , $k=1,2,,Y_i$ ), the third radio frame of transport channel <i>i</i> maps the next $Y_i$ bits of the received data frame ( <i>i.e.</i> , $y_{i,3,k} - x_{i,2Y_i+k}$ , $k=1,2,,Y_i$ ), and so on.				
[b] multiplexing the radio	Apple's 3G products practice multiplexing the radio frames into a serial data frame.				
frame; and	<i>See, e.g.</i> , TS 25.212 v6.0.0:				



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



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

output as $e_{2,j}=d_{(j+P/M)}$ and	"The bits input to the physical channel segmentation are denoted by $x_1, x_2, x_3, \dots, x_N$ , where X is the				
the segmented physical	number of bits input to the physical channel segmentation block. The number of PhCHs is denoted by <i>P</i> .				
channel frames for	The bits after physical channel segmentation are denoted $u_{n1}, u_{n2}, u_{n3}, \dots, u_{nU}$ , where p is PhCH number				
physical channel #M are	and U is the number of hits in one radio frame for each PhCH i.e. $U = (X - N - N' - V) / P$				
output as $e_{M,j}=d_{(j+(M-1)P/M)}$ ,	and U is the number of bits in one radio frame for each PhCH, i.e. $U = (X - N_{TGL} - (N_{data,*} - N_{data,*})) / P$				
and wherein the bits of the	for compressed mode by puncturing, and $U = \frac{X}{R}$ otherwise." (V6.0.0, paragraph 4.2.10, page 43.)				
serial data frame output	"Dite on first DhCII ofter physical channel commentation:				
from the multiplexer are	Bits on first PhCH after physical channel segmentation: $t_{1} = r_{1} + \frac{1}{2} = U$				
$a_1, a_2, \ldots, a_p$ , the number	$u_{l,k} = x_{f(k)}$ $\kappa = 1, 2,, U$ Dits on second DhCU after physical channel segmentation:				
o physical channels is M,	k = 1.2 U				
the size of the serial data	$u_{2, k} = x_{f(k+U)}$ $\kappa = 1, 2,, U$				
irame output from the	$P_{\mu}$ Dits on the $P^{th}$ DhCH after physical channel segmentation:				
multiplexing step is P and $\frac{1}{2}$	Bits on the P PhCH after physical channel segmentation:				
j=1,2,,P/M.	$u_{P,k} = x_{f(k+(P-I)\times U)} \qquad \qquad k = 1, 2,, U$				
	where $j$ is such that :				
	- for compressed mode by punctu	a mode by puncturning, $x_{f(k)} - x_k$ ,	1.6. $f(k) = k$ , for all k.		
	- for compressed mode by puncturing, bit $u_{l,l}$ corresponds to the bit $x_k$ with smallest index k when the				
	are not counted, and so on for bits $u_{1,2}$ when $u_{1,2}$ with second smallest matrix <i>k</i> when the only p				
	are not counted, and so on for bits $u_{1,3},, u_{1, U}, u_{2, 1}, u_{2, 2},, u_{2, U},, u_{P,I}, u_{P,2,}, u_{P,U}$ .				
	(V6.0.0, paragraph 4.2.10, pages 43-44.)				
	Based on the above passages from V.6.0.0, the following correspondence is made between the claim elements and the above-cited notation from V 6.0.0				
	Claim Element	Notation for Claim Element	Notation from V.6.0.0		
	""""""""""""""""""""""""""""""""""""""	М	Р		
	"size of the serial data frame	Р	Х		
	output from the multiplexer" ( i.e.,				
	number of input bits to physical				
	channel segmenter to be				
	segmented by physical channel				
	segmenter)				
	"serial data frame output from the	$d_1, d_2, \dots d_P$	X <sub>1</sub> , X <sub>2</sub> , X <sub>X</sub>		
	multiplexer" ( i.e., input bits to				

physical channel segmenter)		
position of a bit in a segmented	j	k
physical channel frame	_	
"the segmented physical channel	e <sub>1,i</sub>	u <sub>1,k</sub>
frames for a physical channel #1	~	
are output"		
the segmented physical channel	e <sub>2.i</sub>	u <sub>2.k</sub>
frames for a physical channel #2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	,
are output"		
"the segmented physical channel	e <sub>M,i</sub>	u <sub>P,k</sub>
frames for a physical channel #M		,
are output"		Note: The number of physical
		channels is "M" for the claim and "P"
		for V.6.0.0.
		1.2 $U'''$ (and any $U = V/P$ )
Based on the correspondence shown above, it is clear that $u_{l,k} = x_{f(k)}$ $k = 1, 2,, U^{(n)}$ (where $U=X/P$ )		
shows the same "segmented physical channel frames for a physical channel #1" as the claimed " $e_{1,j}=d_j$ ,"		
$u_{2,k} = x_{f(k+U)}$ $k = 1, 2,, U''$ shows the same "segmented physical channel frames for a physical channel		
#2" as the claimed " $e_{2,j}=d_{(j+P/M)}$ ," and " $u_{P,k}=x_{f(k+(P-1)\times U)}$ $k=1,2,,U$ " shows the same "segmented"		
physical channel frames for a physical channel #M" as the claimed "as $e_{M_i} = d_{(i+(M-1)P/M}$ ."		

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

	(V6.0.0, paragraph 4.2.4, page 21.)
19. The channel coding and multiplexing apparatus of claim 12, wherein one filler bit is added to the end of each radio frame having frame time index $t \ge T_i - r_i + 1$ where $r_i$ indicates the number of filler bits and $T_i$ indicates a TTI.	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index $t \ge Ti \cdot ri + 1$ where ri indicates the number of filler bits and Ti indicates a TTI. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in $F_i$ data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \dots, c_{iE_i}$ , where <i>i</i> is TrCH number and $E_i$ the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \dots, t_{iT_i}$ , where $T_i$ is the number of bits. The output bit sequence is derived as follows: $t_{ik} = c_{ik}$ , for $k = 1 \dots E_i$ ; and $t_{ik} = \{0, 1\}$ for $k = E_i + 1 \dots T_i$ , if $E_i < T_i$ ; where $T_i = F_i * N_i$ ; and $N_i = [E_i/F_i]$ is the number of bits per segment after size equalisation." (V6.0.0, paragraph 4.2.4, page 21.)
20. The channel coding and multiplexing apparatus of claim 14, wherein one filler bit is added to the end of each radio frame having frame time index t>= $T_i$ - $r_i$ +1 where $r_i$ indicates the number of filler bits and $T_i$ indicates a TTI.	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index t>=Ti-ri+1 where ri indicates the number of filler bits and Ti indicates a TTI. "Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in $F_i$ data segments of same size as described in subclause 4.2.7. Radio frame size equalisation is only performed in the UL. The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \dots, c_{iE_i}$ , where <i>i</i> is TrCH number and $E_i$ the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \dots, t_{iT_i}$ , 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
	- $N_i = [E_i/F_i]$ is the number of bits per segment after size equalisation."
	(V6.0.0, paragraph 4.2.4, page 21.)
21. The channel coding	In Apple's 3G products, one filler bit is added to the end of each radio frame having frame time index
apparatus of claim 15,	V = 11 - 11 + 1 where it indicates the number of thier bits and 11 indicates a 1 11.
wherein one filler bit is	
added to the end of each	"Radio frame size equalisation is padding the input bit sequence in order to ensure that the output can be segmented in $E$ data segments of same size as described in subclause 4.2.7. Radio frame size equalisation
radio frame having frame time index $t \ge T_{t} r_{t} + 1$	is only performed in the UL.
where $r_i$ indicates the	The input bit sequence to the radio frame size equalisation is denoted by $c_{i1}, c_{i2}, c_{i3}, \dots, c_{iE_i}$ , where <i>i</i> is TrCH
number of filler bits and T <sub>i</sub>	number and $E_i$ the number of bits. The output bit sequence is denoted by $t_{i1}, t_{i2}, t_{i3}, \dots, t_{iT_i}$ , where $T_i$ is the
indicates a 111.	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 $k = E_i + 1 \dots T_i$ , if $E_i < T_i$ ;
	where
	- $T_i = F_i * N_i$ ; and
	- $N_i = [E_i/F_i]$ is the number of bits per segment after size equalisation."
	(V6.0.0, paragraph 4.2.4, page 21.)