EXHIBIT 21

EXHIBIT F

SAMSUNG'S PATENT L.R. 3-1(A)-(D) DISCLOSURES FOR U.S. PATENT NO. 7,362,867

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
25. An apparatus for generating scrambling codes in mobile communication system having a scrambling code generator, comprising:	Apple's 3G Products[1] contain an apparatus for generating scrambling codes in a mobile communications system having a scrambling code generator. For example, Apple's 3G Products contain a baseband processor that generates scrambling codes used to transmit data in accordance with 3GPP Release 6 protocol. *See* iPhone 3 Technical Specifications, http://support.apple.com/kb/sp495 ("Figure 1" shows Apple's description that the iPhone 3 is a Universal Mobile Telecommunications System ("UMTS") compliant device); iPhone 3G Teardown, http://www.ifixit.com/Teardown/iPhone-3G-Teardown/600/3 (stating the iPhone 3 contains an Infineon BGA736 (Tri-Band HSDPA LNA) baseband processor); *see also* iPhone 3GS Technical Specifications, http://www.apple.com/iphone/iphone-3gs/specs.html ("Figure 2" shows Apple's description that the iPhone 3GS is a UMTS compliant device); Apple's iPhone 3GS Costs $178.96 to Manufacture, http://www.cellular-news.com/story/38186.php ("Infineon has held onto this critical [component of the iPhone 3GS] with its PMB8878 [X-GOLD 608] baseband chip . . . ."); *see also* iPad 3G Technical Specifications, http://support.apple.com/kb/SP580 ("Figure 3" shows Apple's description that the iPad 3G is a UMTS compliant device); iPad 3G Teardown, http://www.ifixit.com/Teardown/iPad-3G-Teardown/2374/2 (stating the iPad 3G contains an Infineon 337S3754 PMB 8878 X-Gold 608 baseband IC 5Y06115 processor); *see also* iPhone 4 Technical Specifications, http://www.apple.com/iphone/specs.html ("Figure 4" shows Apple's description that the iPhone 4 "GSM Model" is a UMTS compliant device); iPhone 4 Teardown, http://www.tgdaily.com/hardware-features/50344-the-real-iphone-4-teardown (stating the iPhone 4 contains an Infineon X-GOLD 61x Baseband Processor); *see also* iPad 2 Technical Specifications, http://www.apple.com/ipad/specs/ ("Figure 5" shows Apple's description that the iPad 2 3G "Wi-Fi +3G model" is a UMTS compliant device); iPad 2

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

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	Teardown, http://www.ifixit.com/Teardown/iPad-2-3G-GSM-CDMA-Teardown/5127/1 (stating the iPad 2 contains an Infineon 337S3833 (X-GOLD 61x) Baseband Processor); *see also* Definition of UMTS, http://www.3gpp.org/article/umts (describing UMTS as a third generation ("3G") wireless technology that uses a wideband CDMA ("WCDMA") radio interface, the standards of which are created and governed by the Third Generation Partnership Project ("3GPP"); *see also* 3GPP TS 25.213 v5.0.0 at 28 (noting the inclusion of HDSPA into the 3GPP standard); *see also* X-GOLD 608 Technical Specification, http://www.infineon.com/dgdl/X-GOLD608-PMB8878+PB.pdf?folderId=db3a304312fcb1bc0113000c158f0004&fileId=db3a30431be39b97011c09549f077a1a ("Figure 6" shows Infineon's assertion that the X-GOLD 608 Processor uses HSDPA); *see also* X-GOLD 616 Technical Specification, http://www.infineon.com/dgdl/X-GOLD+616.pdf?folderId=db3a304312fcb1bc0113000c158f0004&fileId=db3a30431ed1d7b2011f5bee88ef75eb ("Figure 7" shows Infineon's assertion that the X-GOLD 61x Baseband Processor is compatible with 3GPP Release 6 protocols). Figure 1 – iPhone 3 Technical Specifications **Cellular and wireless** ▪ UMTS/HSDPA (850, 1900, 2100 MHz) ▪ GSM/EDGE (850, 900, 1800, 1900 MHz) ▪ Wi-Fi (802.11b/g) ▪ Bluetooth 2.0 + EDR

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	Figure 2 – iPhone 3GS Technical Specifications

Cellular and wireless

- UMTS/HSDPA (850, 1900, 2100 MHz)
- GSM/EDGE (850, 900, 1800, 1900 MHz)
- 802.11b/g Wi-Fi
- Bluetooth 2.1 + EDR wireless technology

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	Figure 3 – iPad 3G Technical Specifications **Wi-Fi + 3G model** ▪ UMTS/HSDPA (850, 1900, 2100 MHz) ▪ GSM/EDGE (850, 900, 1800, 1900 MHz) ▪ Data only[2] ▪ Wi-Fi (802.11a/b/g/n) ▪ Bluetooth 2.1 + EDR technology Figure 4 – iPhone 4 Technical Specifications  **Cellular and wireless** ▪ GSM model: UMTS/HSDPA/HSUPA (850, 900, 1900, 2100 MHz); GSM/EDGE (850, 900, 1800, 1900 MHz) ▪ CDMA model: CDMA EV-DO Rev. A (800, 1900 MHz) ▪ 802.11b/g/n Wi-Fi (802.11n 2.4GHz only) ▪ Bluetooth 2.1 + EDR wireless technology

<table>
<tr><th>ASSERTED CLAIM
(PATENT L.R. 3-1(A))</th><th>ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY
(PATENT L.R. 3-1(B)-(D))</th></tr>
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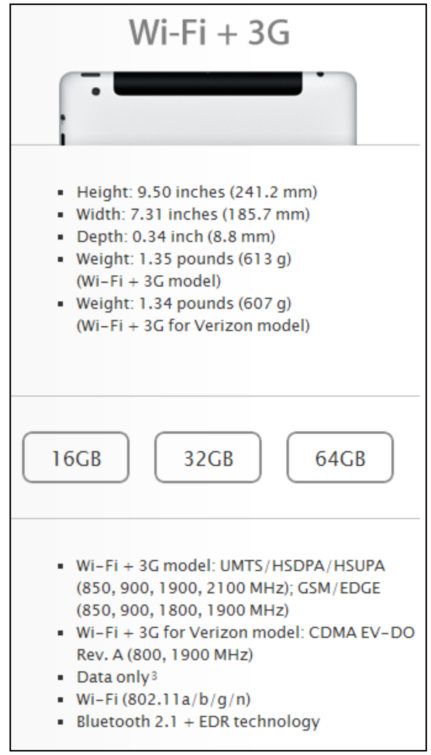
Figure 5 – iPad 2 Technical Specifications



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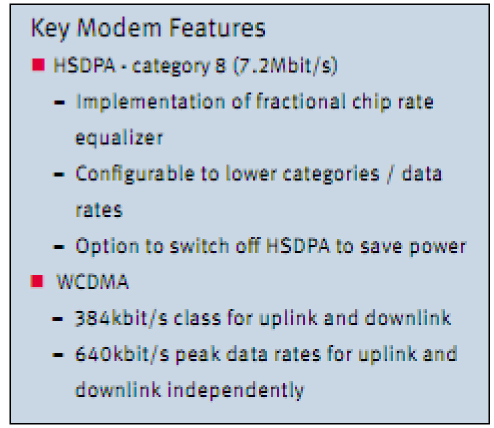
ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))

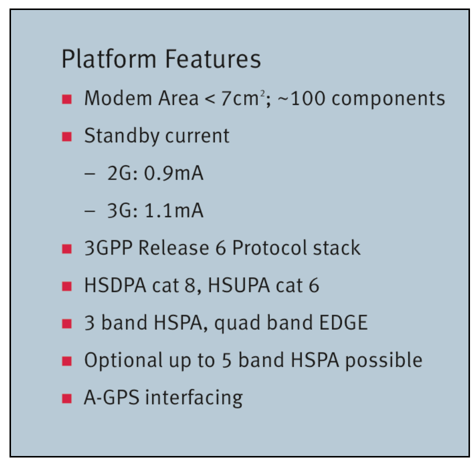
Figure 6 – Product Brief of Infineon X-GOLD 608 Processor



Key Modem Features

- HSDPA - category 8 (7.2Mbit/s)
  - Implementation of fractional chip rate equalizer
  - Configurable to lower categories / data rates
  - Option to switch off HSDPA to save power
- WCDMA
  - 384kbit/s class for uplink and downlink
  - 640kbit/s peak data rates for uplink and downlink independently

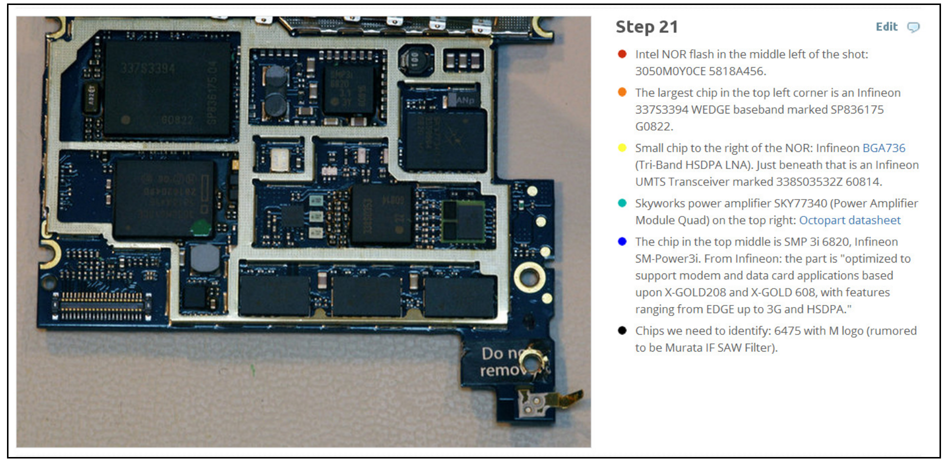
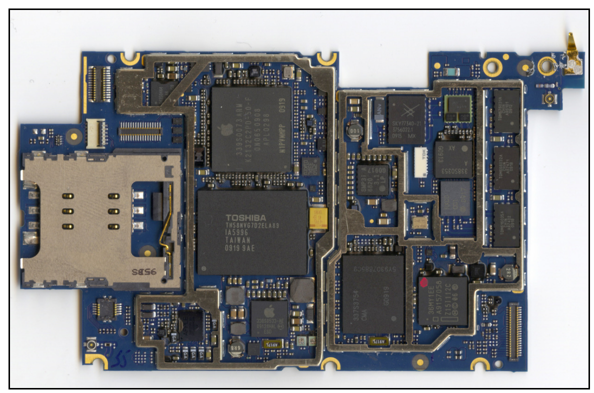
Figure 7 – Product Brief of Infineon X-GOLD 616 Processor



Platform Features

- Modem Area < $7cm^2$; ~100 components
- Standby current
  - 2G: 0.9mA
  - 3G: 1.1mA
- 3GPP Release 6 Protocol stack
- HSDPA cat 8, HSUPA cat 6
- 3 band HSPA, quad band EDGE
- Optional up to 5 band HSPA possible
- A-GPS interfacing

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
a first m-sequence generator to generate a first m-sequence;	Apple's 3G Products contain a first m-sequence generator to generate a first m-sequence. For example, Apple's 3G Products contain a UMTS/WCDMA compliant baseband processor for processing the UMTS ("3G") signals, compliant with 3GPP protocols that generates two binary *m*-sequences by means of two generator polynomials of degree 18. The first m-sequence, referred to as the "*x* sequence" is constructed using the primitive (over GF(2)) polynomial $1+ X^7+X^{18}$. *See* iPhone 3G Teardown ("Figure 8" shows a breakdown of the iPhone 3G components including an Infineon BGA736 (Tri-Band HSDPA LNA) Processor); *see also* iPhone 3GS Teardown ("Figure 9" shows a breakdown of the iPhone 3GS components including the Infineon PMB 8878 X-GOLD Baseband Processor); iPad 3G Teardown ("Figure 10" shows a breakdown of one set of components on the iPad 3 3G Model including the Infineon 337S3754 PMB 8878 X-GOLD Baseband Processor); *see also* iPhone 4 Teardown ("Figure 8" shows a breakdown of the components located on the rear of the iPhone 4 including the Infineon X-GOLD Baseband Processor); iPad 2 Teardown ("Figure 5" shows a breakdown of one set of components on the iPad 2 Wi-Fi +3G Model including the Infineon 337S3833 Baseband Processor); *see also* Figure 3 (describing the Infineon X-GOLD Baseband Processor as 3GPP Release 6 Protocol compliant); *see also* BGA736 Data Sheet; *see also* X-GOLD 608 Product Brief; *see also* X-GOLD 616 Technical Specification; *see also* 3GPP TS 25.213 v5.0.0 at 22, §5.2.2 "Scrambling code" ("Each of the two real sequences are constructed as the position wise modulo 2 sum of 38400 chip segments of two binary *m*-sequences generated by means of two generator polynomials of degree 18. The resulting sequences thus constitute segments of a set of Gold sequences . . . Let *x* and *y* be the two sequences respectively. The *x* sequence is constructed using the primitive (over GF(2)) polynomial $1+ X^7+X^{18}$."); *see also* 3GPP TS 25.213 v6.0.0 at 22.

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	Figure 8 – iPhone 3G Components  Figure 9 – iPhone 3GS Components 

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))

Figure 10 – iPad 3G Components

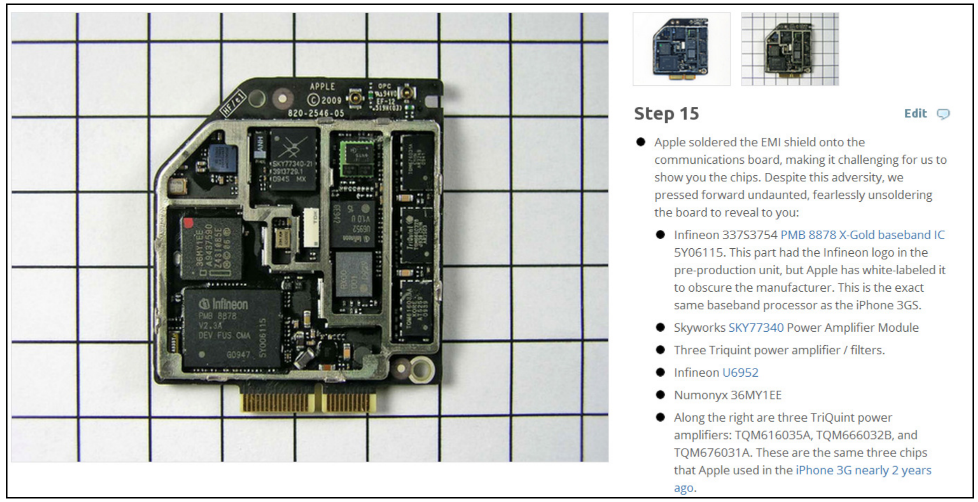
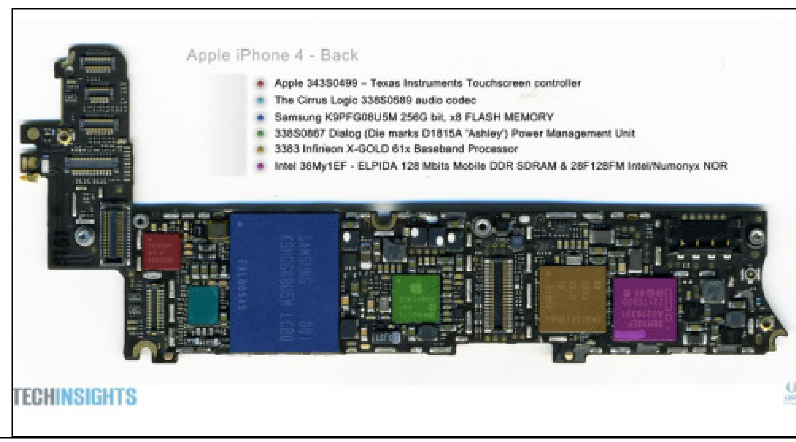
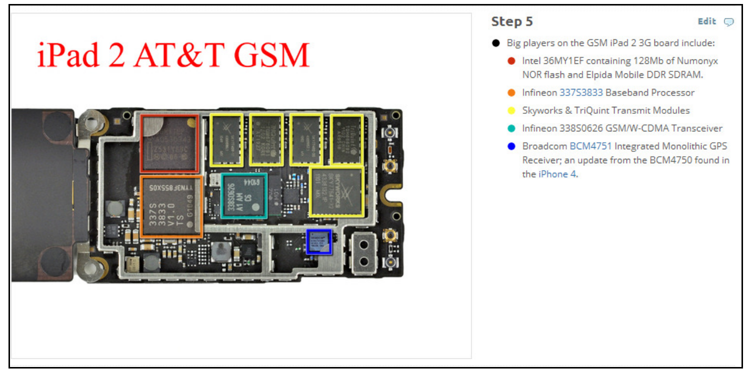


Figure 11 – iPhone 4 Components



ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	Figure 12 – iPad 2 Wi-Fi +3G Components 
a second m-sequence generator to generate a first m-sequence; and	Apple's 3G Products contain a second m-sequence generator to generate a first m-sequence. For example, Apple's 3G Products construct the second m-sequence, referred to as the "*y* sequence," using the primitive (over GF(2)) polynomial $1+X^5+X^7+X^{10}+X^{18}$. *See* 3GPP TS 25.213 v5.0.0 at 22, §5.2.2 "Scrambling code" ("Each of the two real sequences are constructed as the position wise modulo 2 sum of 38400 chip segments of two binary *m*-sequences generated by means of two generator polynomials of degree 18. The resulting sequences thus constitute segments of a set of Gold sequences . . . Let *x* and *y* be the two sequences respectively . . . The *y* sequence is constructed using the polynomial $1+X^5+X^7+X^{10}+X^{18}$."); *see also* 3GPP TS 25.213 v6.0.0 at 22.
at least one adder for generating a $((K-1)*M+K)^{th}$ Gold code as a K^{th} primary scrambling code by adding a $(((K-1)*M+K)-1)$-times shifted first m-	Apple's 3G Products contain at least one adder for generating a $((K-1)*M+K)^{th}$ Gold code as a K^{th} primary scrambling code by adding a $(((K-1)*M+K)-1)$-times shifted first m-sequence and the second m-sequence, wherein K is a natural number and M is a total number of secondary scrambling codes per one primary scrambling code.

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
sequence and the second m-sequence, wherein K is a natural number and M is a total number of secondary scrambling codes per one primary scrambling code.	For example, Apple's 3G Products divide scrambling codes into 512 sets, each having one primary scrambling code and 15 secondary scrambling codes. As a result, K = [1 through 512] and M = 15. Apple's 3G Products add an "n" shifted first m-sequence with a second m-sequence to produce an n:th Gold code $z_n(i)$. <u>Example No. 1:</u> The primary scrambling codes consists of the scrambling codes n=16*i, where i = 0, 1, 2…511. For K=1, the first primary code is the 1st Gold code. This is calculated by substituting K=1 and M=15 into the equation (K-1)*M+K. As a result, the first primary code is the (1-1)*15+1= 1st Gold code. For K=1, n=0 because i[1] = 0 and n=16*i. The first Gold code is composed of a ((K-1)*M+K)-1 shifted first m-sequence and second m-sequence. The value of the shift for K=1 is ((1-1)*15+1)-1 = 0. For Gold code $z_n(i)$ = x((i+n) modulo (2^{18} - 1)) + y(i) modulo 2, where i=0,…, 2^{18}-2, $z_0(i)$=x((i) modulo (2^{18} - 1)) + y(i) modulo 2. <u>Example No. 2:</u> For K=2, the second primary code is the 17th Gold code. This is calculated by substituting K=2 and M=15 into the equation (K-1)*M+K. As a result, the second primary code is the (2-1)*15+2= 17th Gold code. For K=2, n=16 because i[2] = 1 and n=16*i. The 17th Gold code is composed of a ((K-1)*M+K)-1 shifted first m-sequence and second m-sequence. The value of the shift for K=2 is ((2-1)*15+2)-1 = 16. For Gold code $z_n(i)$ =

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	x((i+n) modulo (2^{18} - 1)) + y(i) modulo 2, where i=0,…, 2^{18}-2, z_{16}(i)=x((i+16) modulo (2^{18} - 1)) + y(i) modulo 2. Example No. 3: For K=3, the third primary code is the 33[rd] Gold code. This is calculated by substituting K=3 and M=15 into the equation (K-1)*M+K. As a result, the third primary code is the (3-1)*15+3= 33rd Gold code. For K=3, n=32 because i[3] = 2 and n=16*i. The 33rd Gold code is composed of a ((K-1)*M+K)-1 shifted first m-sequence and second m-sequence. The value of the shift for K=3 is ((3-1)*15+3)-1 = 32. For Gold code z_n(i) = x((i+n) modulo (2^{18} - 1)) + y(i) modulo 2, where i=0,…, 2^{18}-2, z_{32}(i)=x((i+32) modulo (2^{18} - 1)) + y(i) modulo 2. *See* 3GPP TS 25.213 v5.0.0 at 22, § 5.2.2 "Scrambling code," (describing the n:th Gold code sequence "*z_n, n= 0,1,2,…,2^{18}-2*," as defined as "z_n(i) = x((i+n) modulo (2^{18} - 1)) + y(i) modulo 2, i=0,…, 2^{18}-2" where "n= 16*i where i=0…511."); *see also id*. at 22 ("A total of 2^{18}-1 = 262,143 scrambling codes, numbered 0 . . . 262,142 can be generated. However not all the scrambling codes are used. The scrambling codes are divided into 512 sets each of a primary scrambling code and 15 secondary scrambling codes."); *see also* 3GPP TS 25.213 v6.0.0.
26. The apparatus of claim 25, wherein the secondary scrambling codes of the K^{th} primary scrambling codes are the $((K-1)*M+K+1)^{th}$ through $(K*M+K)^{th}$ Gold codes.	Apple's 3G Products contain secondary scrambling codes of the K^{th} primary scrambling codes that are the $((K-1)*M+K+1)^{th}$ through $(K*M+K)^{th}$ Gold codes. For example, Apple's 3G Products divide scrambling codes into 512 sets, each having one primary scrambling code and 15 secondary scrambling codes. The primary scrambling codes consist of scrambling codes n=16*i where i=0…511. The i:th set of secondary

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	scrambling codes consists of scrambling codes 16*i+k, where k=1…15. As a result, for every 16 scrambling codes, the first code is a primary scrambling code whereas the 2nd through 16th codes are secondary codes. <u>Example No. 1:</u> For K=1, ((K-1)*M+K+1) = (1-1)*15+1+1) = (0+2) = 2 and (K*M+K) = (1*15+1) = (15+1) = 16. In Apple's 3G Products, the first primary scrambling code is n=16*0 = 0, while the secondary scrambling codes consists of 16*0+k (where k = 1…15) = [1…15]. As a result, for the first group of 16 scrambling codes (0 through 15), the first scrambling code is a primary scrambling code (code 0), whereas codes 2 through 16 are secondary scrambling codes. <u>Example No. 2:</u> For K=2, ((K-1)*M+K+1) = ((2-1)*15+2+1) = (15+3) = 18 and (K*M+K) = (2*15+2) = (30+2) = 32. In Apple's 3G Products, the second primary scrambling code is n=16*1 = 16, while the second group of secondary scrambling codes consists of 16*1+k (where k = 1…15) = [17…31]. As a result, for the second group of 16 scrambling codes (16 through 31), the first scrambling code (code 16) is a primary scrambling code whereas codes 2 through 16 (codes 17 through 31) are secondary scrambling codes. <u>Example No. 3:</u> For K=3, ((K-1)*M+K+1) = ((3-1)*15+3+1) = (30+4) = 34 and (K*M+K) = (3*15+3) =

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	(45+3) = 48. In Apple's 3G Products, the third primary scrambling code is n=16*2 = 32, while the third group of secondary scrambling codes consists of 16*2+k (where k = 1…15) = [33…47]. As a result, for the third group of 16 scrambling codes, the first scrambling code (code 32) is a primary scrambling code whereas codes 2 through 16 (codes 33 through 47) are secondary scrambling codes. *See* 3GPP TS 25.213 v5.0.0 at 21, §5.2.2 "Scrambling code" ("A total of $2^{18} - 1 = 262{,}143$ scrambling codes, numbered 0 . . . 262,142 can be generated. However not all the scrambling codes are used. The scrambling codes are divided into 512 sets each of a primary scrambling code and 15 secondary scrambling codes. The primary scrambling codes consist of scrambling codes n=16*i where i=0…511. The i:th set of secondary scrambling codes consists of scrambling codes 16*i+k, where k=1…15."); *see also* 3GPP TS 25.213 v6.0.0 at 22.
27. The apparatus as claimed in claim 26, wherein K is a primary scrambling code number and $1 \le K \le 512$.	Apple's 3G Products contain a primary scrambling code number, K, where $1 \le K \le 512$. For example, Apple's 3G Products divide scrambling codes into 512 sets, each having one primary scrambling code and 15 secondary scrambling codes. *See* 3GPP TS 25.213 v5.0.0 at 22, §5.2.2 "Scrambling code" ("A total of $2^{18} - 1 = 262{,}143$ scrambling codes, numbered 0 . . . 262,142 can be generated. However not all the scrambling codes are used. The scrambling codes are divided into 512 sets each of a primary scrambling code and 15 secondary scrambling codes."); *see also* 3GPP TS 25.213 v6.0.0 at 22.
30. The apparatus as claimed in claim 25, wherein the primary scrambling	Apple's 3G Products contain a primary scrambling code and secondary scrambling code that are I-channel components and a means for delaying at least one of the primary

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
code and secondary scrambling code are I-channel components and the apparatus further comprises a means for delaying at least one of the primary scrambling codes and secondary code to produce Q-channel components.	scrambling codes and secondary code to produce Q-channel components. For example, Apple's 3G Products transform the binary sequence generated by the n:th Gold code sequence z_n into a real valued sequence $Z_n(i)$, which in turn is used to generate a complex scrambling code sequence $S_{dl,n}$ having a real component I and an imaginary component Q. *See* 3GPP TS 25.213 v5.0.0 at 22, §5.2.2 "Scrambling code" ("Figure 13" shows the transformation from z_n to real valued sequence $Z_n(i)$, and the definition of $S_{dl,n}$); *see also id.* at 23 ("Figure 14" shows the output signals I and Q); *see also* 3GPP TS 25.213 v6.0.0 at 23. Figure 13 – Excerpt from 3GPP Standard Describing Definition of z_n and $S_{dl,n}$ The n:th Gold code sequence z_n, $n=0,1,2,\ldots,2^{18}-2$, is then defined as: - $z_n(i) = x((i+n) \text{ modulo } (2^{18}-1)) + y(i) \text{ modulo } 2$, $i=0,\ldots,2^{18}-2$. These binary sequences are converted to real valued sequences Z_n by the following transformation: $Z_n(i) = \begin{cases} +1 & \text{if } z_n(i)=0 \\ -1 & \text{if } z_n(i)=1 \end{cases} \quad \text{for} \quad i=0,1,\ldots,2^{18}-2.$ Finally, the n:th complex scrambling code sequence $S_{dl,n}$ is defined as: - $S_{dl,n}(i) = Z_n(i) + j\, Z_n((i+131072) \text{ modulo } (2^{18}-1))$, $i=0,1,\ldots,38399$. Note that the pattern from phase 0 up to the phase of 38399 is repeated.

ASSERTED CLAIM (PATENT L.R. 3-1(A))	ACCUSED INSTRUMENTALITY AND HOW EACH ELEMENT IS MET BY ACCUSED INSTRUMENTALITY (PATENT L.R. 3-1(B)-(D))
	Figure 14 – Configuration of downlink scrambling code generator