Wireless Forecast

Ray Hodges
Senior Consultant,
Technology Futures, Inc.

rhodges@tfi.com

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13740 Research Blvd., Bldg. C-1 • Austin, Texas 78750
(512) 258-8898 • www.tfi.com

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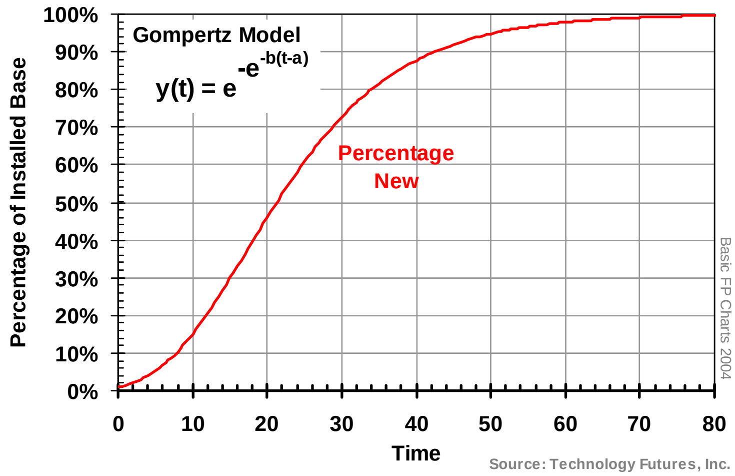
The Gompertz Model

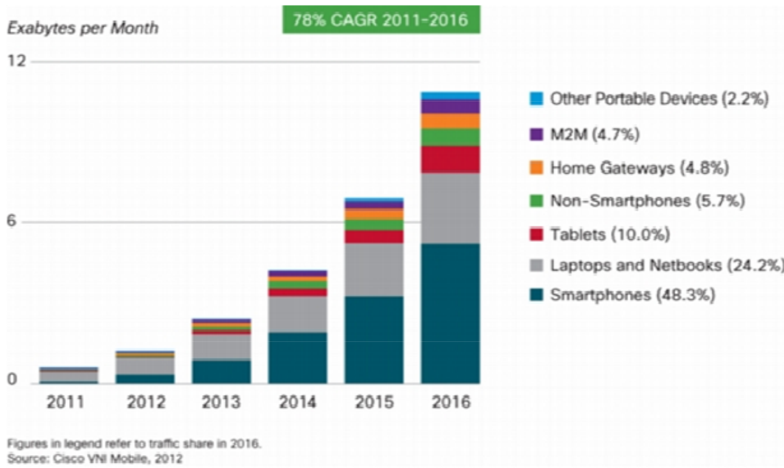


y(t) = Fraction of market taken over by new technology at time "t"
"a" is 37% time; "b" determines rate of substitution

Wireless Universe?

- Wireline – Places
- Wireless Voice – People
- Wireless Data – Devices
- Wireless Potential – All Things Fixed or Mobile, Man or Machine

Growth in Mobile Data



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Mobile Data Growth is Similar to Internet Growth in the Late 1990s

Global Internet Traffic Growth (Fixed)			Global Mobile Data Traffic Growth	
1997	178%		**2009**	140%
1998	124%		**2010**	159%
1999	128%		**2011**	133%
2000	195%		**2012 (estimate)**	110%
2001	133%		**2013 (estimate)**	90%
2002	103%		**2014 (estimate)**	78%

Source: Cisco

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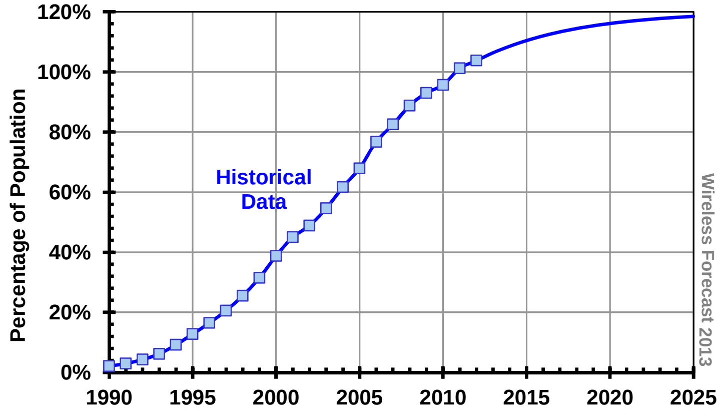
2013 US Wireless Forecast



Historical Data Source: CTIA

Source: Technology Futures, Inc.

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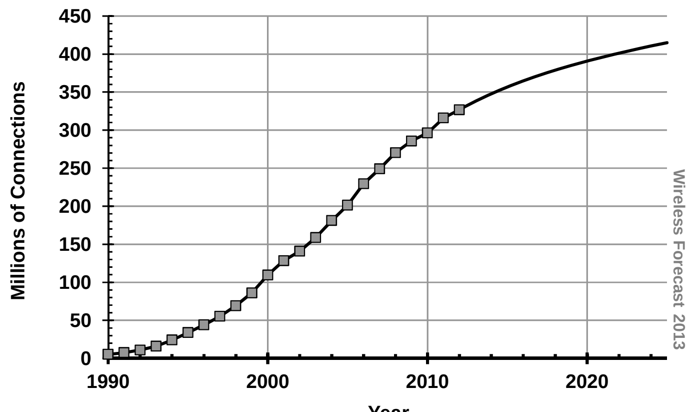
2013 Subscriber Forecast



Historical Data Source:CTIA

Source: Technology Futures, Inc.

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2013 Subscriber Forecast

U.S. Wireless Connections Tabulated

Year	Population millions	Percent Connections	Connections (millions)	
1990	250.8	2.1%	5.3	Historical
1991	253.6	3.0%	7.6	
1992	256.4	4.3%	11.0	
1993	259.1	6.2%	16.0	
1994	261.9	9.2%	24.1	
1995	264.7	12.8%	33.8	
1996	267.3	16.5%	44.0	
1997	269.0	20.6%	55.3	
1998	271.2	25.5%	69.2	
1999	273.4	31.5%	86.0	
2000	282.2	38.8%	109.5	
2001	285.1	45.0%	128.4	
2002	288.0	48.9%	140.8	
2003	290.9	54.6%	158.7	
2004	293.7	61.7%	181.1	
2005	296.4	67.9%	201.4	
2006	299.1	76.7%	229.5	
2007	301.7	82.6%	249.1	
2008	304.4	88.8%	270.3	
2009	307.0	93.0%	285.6	
2010	309.7	95.7%	296.3	
2011	312.3	101.2%	316.0	
2012	315.0	103.8%	326.8	
2013	317.6	106.4%	337.9	Forecast
2014	320.3	108.6%	347.8	
2015	323.0	110.4%	356.7	
2016	325.7	112.0%	364.8	
2017	328.4	113.3%	372.1	
2018	331.1	114.4%	378.8	
2019	333.8	115.4%	385.0	
2020	336.5	116.1%	390.8	
2021	339.2	116.8%	396.1	
2022	341.9	117.3%	401.2	
2023	344.7	117.8%	405.9	
2024	347.5	118.2%	410.5	
2025	350.3	118.5%	414.9	

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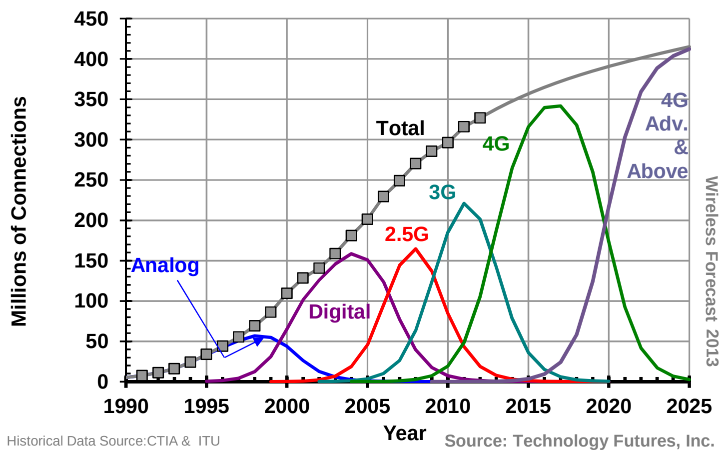
2013 US Wireless Forecast



Historical Data Source:CTIA & ITU

Source: Technology Futures, Inc.

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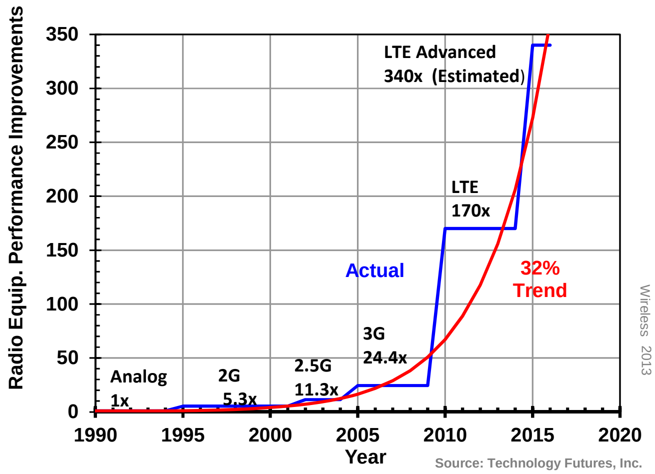
Wireless Generations Performance



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Technology Market Share

	TECHNOLOGY MARKET SHARES					
Year	*Analog*	*Digital*	*G2.5*	*G3*	*G4*	*G4 Adv*
Ending	T0	T1	T2	T3	T4	T5
1990	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1991	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1992	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%
1993	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%
1994	99.5%	0.5%	0.0%	0.0%	0.0%	0.0%
1995	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%
1996	96.9%	3.1%	0.0%	0.0%	0.0%	0.0%
1997	92.3%	7.7%	0.0%	0.0%	0.0%	0.0%
1998	82.1%	17.9%	0.0%	0.0%	0.0%	0.0%
1999	63.7%	36.2%	0.1%	0.0%	0.0%	0.0%
2000	40.1%	59.6%	0.2%	0.0%	0.0%	0.0%
2001	20.4%	78.9%	0.6%	0.0%	0.0%	0.0%
2002	8.9%	89.3%	1.7%	0.1%	0.0%	0.0%
2003	3.6%	91.9%	4.2%	0.3%	0.0%	0.0%
2004	1.4%	87.6%	10.3%	0.7%	0.0%	0.0%
2005	0.5%	75.0%	22.7%	1.7%	0.1%	0.0%
2006	0.2%	53.9%	41.4%	4.4%	0.1%	0.0%
2007	0.1%	31.0%	58.0%	10.6%	0.4%	0.0%
2008	0.0%	14.6%	60.9%	23.5%	1.0%	0.0%
2009	0.0%	6.1%	48.0%	43.3%	2.6%	0.0%
2010	0.0%	2.4%	28.6%	62.5%	6.5%	0.0%
2011	0.0%	0.9%	13.7%	70.0%	15.4%	0.0%
2012	0.0%	0.4%	5.8%	61.6%	32.2%	0.1%
2013	0.0%	0.1%	2.3%	42.1%	55.3%	0.1%
2014	0.0%	0.1%	0.9%	22.5%	76.2%	0.4%
2015	0.0%	0.0%	0.3%	10.1%	88.5%	1.0%
2016	0.0%	0.0%	0.1%	4.1%	93.2%	2.6%
2017	0.0%	0.0%	0.1%	1.6%	91.8%	6.5%
2018	0.0%	0.0%	0.0%	0.6%	84.0%	15.4%
2019	0.0%	0.0%	0.0%	0.2%	67.5%	32.2%
2020	0.0%	0.0%	0.0%	0.1%	44.4%	55.5%
2020	0.0%	0.0%	0.0%	0.0%	23.4%	76.6%
2020	0.0%	0.0%	0.0%	0.0%	10.4%	89.5%
2020	0.0%	0.0%	0.0%	0.0%	4.3%	95.7%
2020	0.0%	0.0%	0.0%	0.0%	1.7%	98.3%
2020	0.0%	0.0%	0.0%	0.0%	0.6%	99.4%

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Technology Market Connections

		UNITS (millions)					
		Analog	Digital	G2.5	G3	G4	*G4 Adv*
Year	Total	T0	T1	T2	T3	T4	T5
1990	5.3	5.3					
1991	7.6	7.6					
1992	11.0	11.0					
1993	16.0	16.0					
1994	24.1	24.0					
1995	33.8	33.4	0.4				
1996	44.0	42.7	1.4				
1997	55.3	51.1	4.3				
1998	69.2	56.8	12.4				
1999	86.0	54.8	31.2	0.1			
2000	109.5	43.9	65.3	0.3			
2001	128.4	26.2	101.3	0.8			
2002	140.8	12.5	125.7	2.3	0.1		
2003	158.7	5.7	145.8	6.7	0.4		
2004	181.1	2.6	158.6	18.7	1.2	0.0	
2005	201.4	1.1	151.0	45.7	3.4	0.1	
2006	229.5	0.5	123.7	95.0	10.0	0.3	
2007	249.1	0.2	77.1	144.4	26.4	1.0	
2008	270.3	0.1	39.5	164.6	63.4	2.7	
2009	285.6	0.0	17.5	137.0	123.7	7.4	
2010	296.3	0.0	7.2	84.7	185.1	19.2	
2011	316.0	0.0	3.0	43.3	221.1	48.5	0.1
2012	326.8	0.0	1.2	18.9	201.3	105.2	0.2
2013	337.9	0.0	0.5	7.8	142.1	187.0	0.5
2014	347.8	0.0	0.2	3.1	78.2	264.9	1.3
2015	356.7	0.0	0.1	1.2	36.0	315.8	3.6
2016	364.8	0.0	0.0	0.5	15.1	339.8	9.4
2017	372.1	0.0	0.0	0.2	6.0	341.8	24.1
2018	378.8	0.0	0.0	0.1	2.4	318.2	58.2
2019	385.0	0.0	0.0	0.0	0.9	259.9	124.2
2020	390.8	0.0	0.0	0.0	0.4	173.5	216.9
2020	396.1	0.0	0.0	0.0	0.1	92.7	303.3
2020	401.2	0.0	0.0	0.0	0.1	41.9	359.2
2020	405.9	0.0	0.0	0.0	0.0	17.3	388.6
2020	410.5	0.0	0.0	0.0	0.0	6.9	403.7
2020	414.9	0.0	0.0	0.0	0.0	2.7	412.3

Verizon Wireless 4G LTE Plans

- Verizon covered 419 markets at the end of 3Q 2012 markets with 250 million POPs.
- 35% of data traffic was over LTE at end of 2012. (Vz. Homepage).
- Verizon expects LTE to cover its entire 3G footprint by end of 2013.
- Will continue build out with AWS spectrum.
- Will use small cells to meet growing data demand through 2014.

AT&T Mobility 4G LTE

- AT&T LTE was available to approximately150 million POPs at the end of 2012.
- AT&T plans to extend LTE to 250M POPS by year-end 2013 and 300M POPs by year-end 2014.
- A number of deals provide spectrum for a nationwide WCS footprint.
- Will add 40,000 small cells for all technologies starting this year.

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