

LTE Market Update

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..... Alcatel-Lucent 

AGENDA

1. Why the LTE Need?
2. Who is Driving the LTE Ecosystem?
3. What Are the LTE Expectation?

Why the LTE Need?

Trends Affecting LTE Adoption

Video Goes Mobile

- More video is uploaded to YouTube in **2 months** than the ABC, NBC, and CBS created in **six decades**
- **48 hours** of YouTube videos are uploaded every minute
- **100 million** mobile YouTube views **per day**
- **172 million** U.S. Internet users watched online video content in December for an average of **14.6 hours per viewer**



- **20M Netflix subscribers** and growing at 6M subscribers in 2H10 with **68% annual growth in subscribers**
 - Number of video subscribers will exceed Comcast in 2011
 - 22% of primetime US internet traffic with 1.8% of the active internet users

Trends Affecting LTE Adoption

Social Media

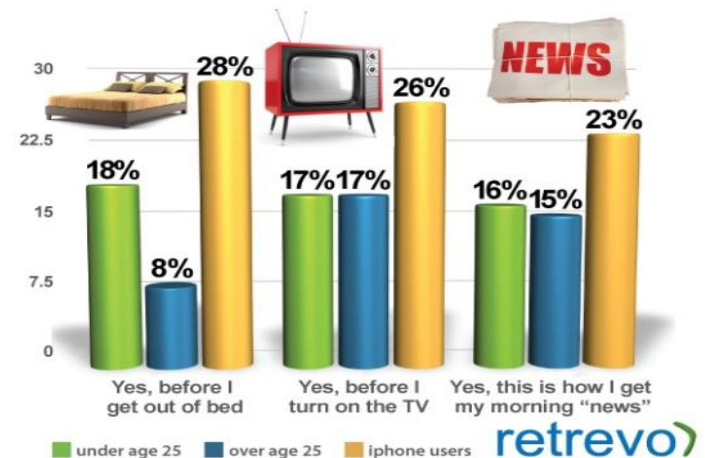
- 347 % Growth in Twitter mobile usage
 - 54% of twitter users access from mobile device
 - 100,000 tweets per minute
- 200 Million mobile Facebook Users
 - 112% increase in one year
- 100 M YouTube videos on mobile devices daily

Do you check/update Facebook or Twitter after you go to bed?



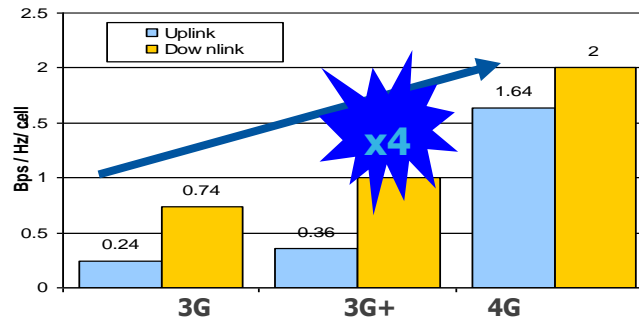
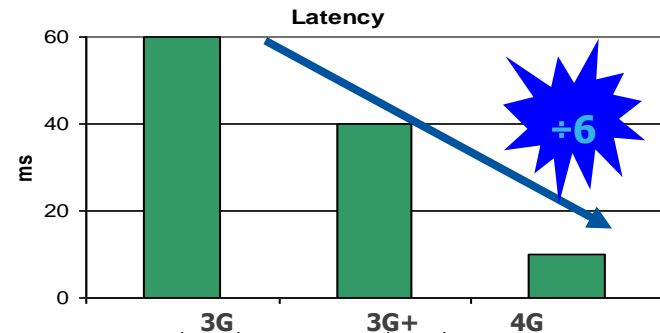
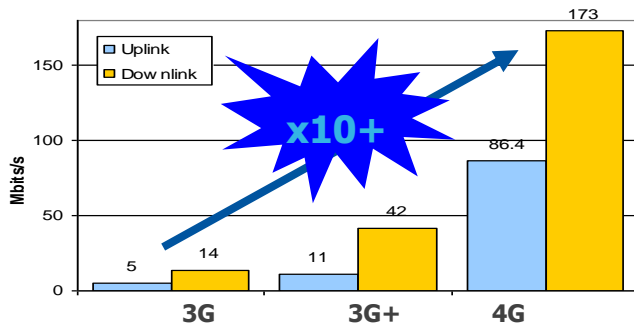
Do you check/update Facebook or Twitter after you go to bed ?

Do you check/update Twitter or Facebook first thing in the morning ?



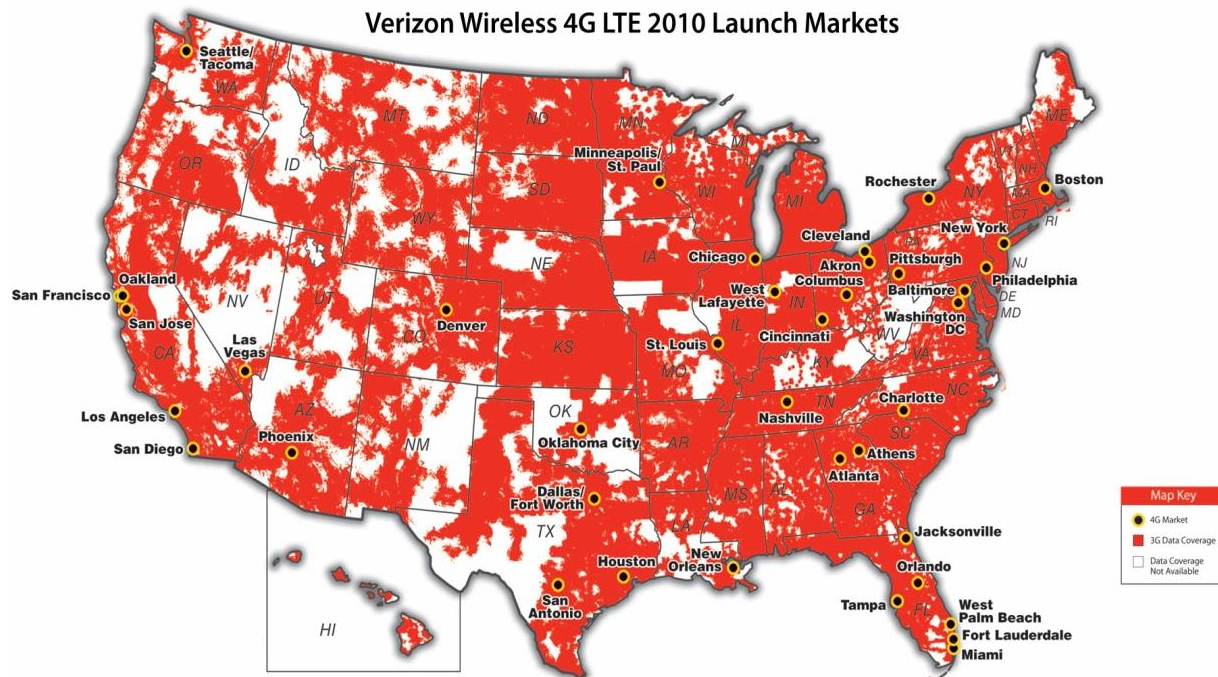
Can LTE Help?

- Improved spectrum efficiency provides broadband to the mobile at a much lower cost per bit
- Higher throughput to provide a better end-user experience
- Lower latency enables delay-sensitive applications such as gaming, virtualized computing



Who is Driving the LTE Ecosystem?

Verizon LTE Rollout



- Launched in 38 cities and 60 airports on 12/5/2010
- 140 markets by the end of 2011
- Average of 5-12 Mbps Downlink speeds
- Average of 2-5 Mbps Uplink speeds
- Full nationwide coverage in 2013

Verizon LTE Device Announcements

Verizon announced 2 USB
dongles with the
December 5, 2010
Launch.



LG VL600



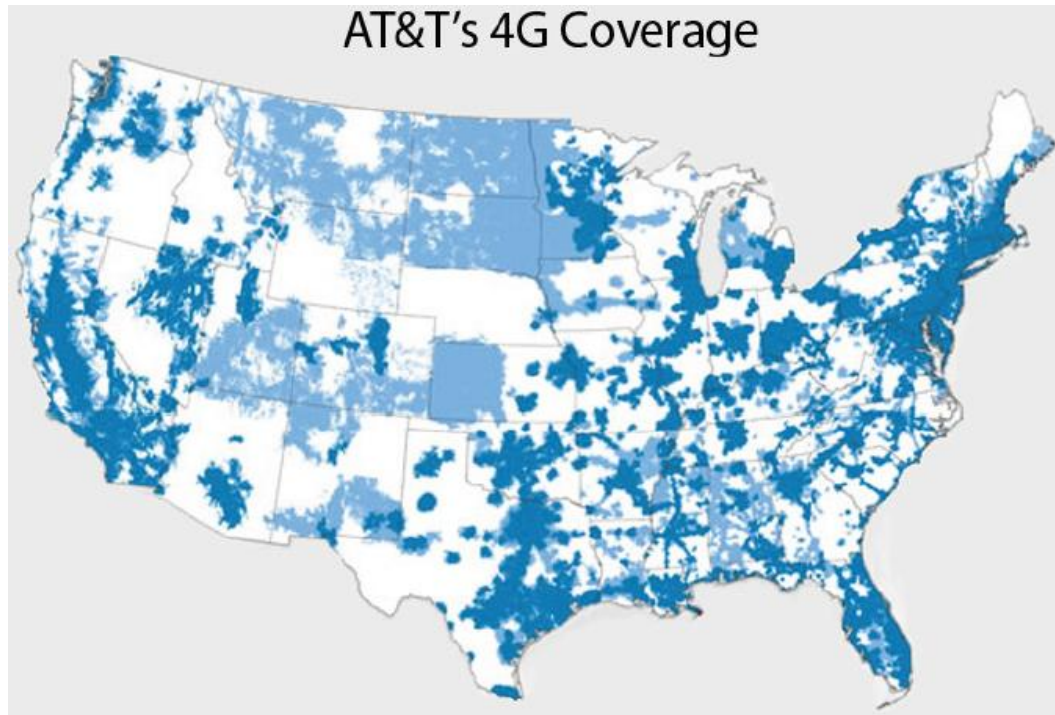
Pantech
UML290

Verizon announced 10 LTE devices at the Consumer Electronic Show (CES)
on January 6, 2011: 4 smartphones, 2 tablets, 2 hot spots, 2 netbooks.
These will be available 2Q2011



Motorola Xoom, Motorola Droid Bionic, HTC Thunderbolt, LGE Revolution, Novatel MiFi, Samsung Galaxy and HP Fusion
NOTE: Verizon devices will support LTE at Upper 700 MHz and CDMA/EVDO at 850/1900

AT&T LTE Rollout



- Five cities supported by end of summer 2011:
 - Atlanta, Chicago, Dallas, Houston and San Antonio
- 15 markets by the end of 2011
 - 70 million potential customers
- Devices include 20 new HSPA+ devices, some of which will support LTE.



Metro PCS LTE Rollout

- First to rollout out LTE in 2010.
- Available in 13 markets:
 - Atlanta, Jacksonville, Miami, Orlando, Boston, Dallas-Fort Worth, Detroit, Las Vegas, Los Angeles, New York, Philadelphia, Sacramento and San Francisco.
- Aims to have LTE covering all 11,000 of its towers by year end 2011
- Devices supported:
 - Samsung Craft
 - Samsung Galaxy Indulge
 - No LTE dongles supported
- AWS spectrum



Samsung Craft



Samsung Galaxy Indulge

US Cellular LTE Rollout

- Originally planned 2012 rollout
- Plans to cover 25% of its CDMA base by year end 2011
- 1250 cell sites
- Initial launch to include twenty-four markets in 6 states:
 - Iowa, Wisconsin, Maine, North Carolina, Texas, Oklahoma
- Markets include:
 - Milwaukee, Madison, and Racine, Wis.
 - Des Moines, Cedar Rapids, and Davenport, Iowa
 - Portland and Bangor, Maine
 - Greenville, N.C
- Owns 152 A and B block 700 MHz licenses

Other LTE Activities

Clearwire COO sees LTE switch on horizon, but details cloudy

May 20, 2011

Clearwire COO Erik Prusch said the company will eventually switch to LTE network technology, but declined to say when the switch will happen--and warned the plans are not definite.

LightSquared admits GPS interference but disagrees on solution

June 15, 2011

A final report that LightSquared and a GPS industry group will deliver today to the FCC will show that LightSquared's proposed terrestrial network for wholesale LTE will cause interference with GPS receivers.

Sprint signs network-sharing deal with LightSquared

June 20, 2011

Sprint Nextel has signed a 15-year network-sharing accord with LightSquared in a deal that could relieve both companies of considerable costs in maintaining and building a high-speed wireless service. Under the agreement, LightSquared -- which is controlled by Philip Falcone's Harbinger Capital Fund -- would share costs and provide services to Sprint.

Rogers will launch LTE in Q3

June 9, 2011

As well as Canada's capital city, the telco said it aims to roll out its high-speed mobile network in Montreal, Toronto and Vancouver this year, and then extend coverage to a further 25 markets during 2012.

Other LTE Activities

Verizon activates 500,000 LTE devices

June 9, 2011

In the first quarter of 2011, Verizon Wireless activated half a million LTE-enabled devices, according to a new Market Data report from ABI Research.

Verizon adding VoLTE capability in 2012

February 8, 2011

Verizon Wireless will likely add Voice over LTE functionality to its LTE smartphones sometime in 2012, the carrier said.

LightSquared inks wholesale LTE deal with Leap Wireless

March 22, 2011

The two companies said the deal will allow Leap to supplement LTE coverage it plans to deploy with roaming on LightSquared's network.

LTE adoption to occur more rapidly than expected

June 9, 2011

In North America, ABI Research states that mobile subscriptions will reach 387 million by 2016, with LTE users accounting for up to 85 million of that total.

AT&T Targeting VoLTE Capabilities by 2013

February 16, 2011

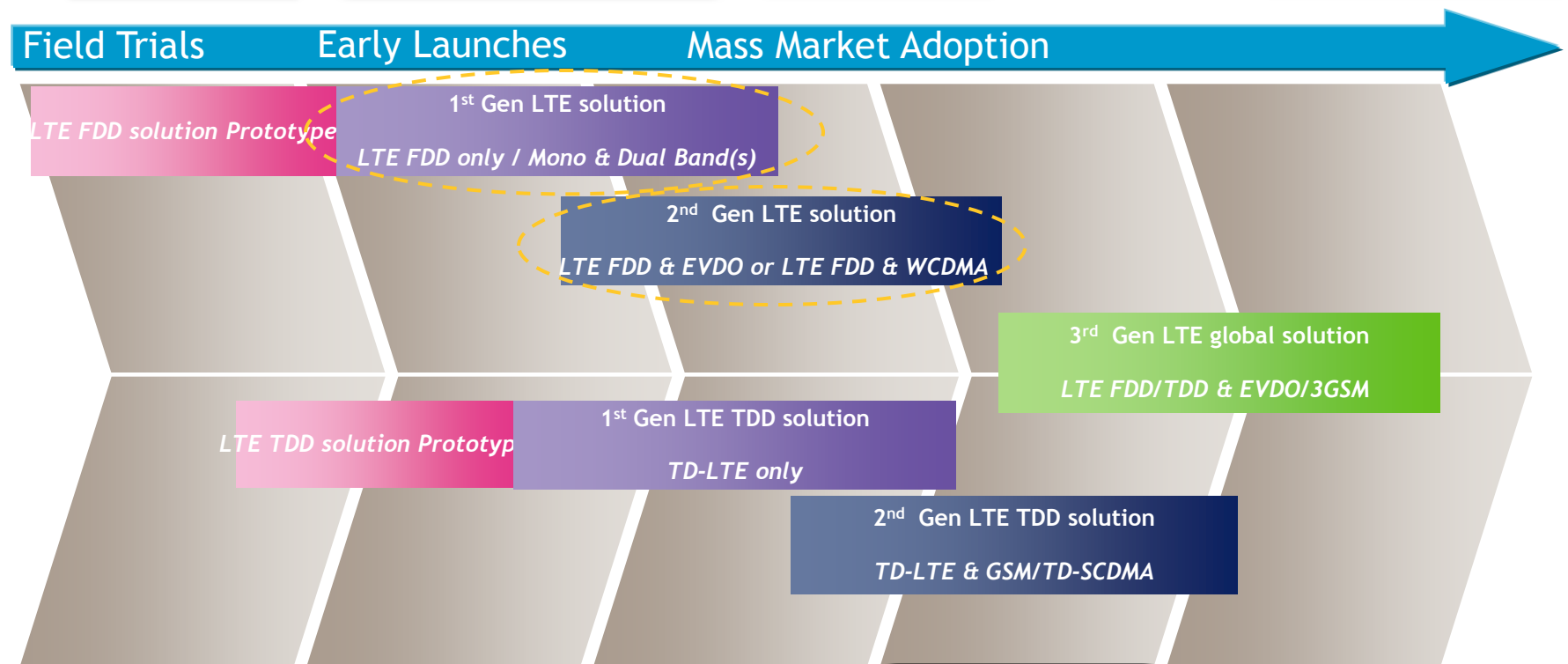
Speaking in an interview with Forbes, AT&T's CTO John Donovan said that the company plans to deploy Voice over LTE (VoLTE) on its forthcoming LTE network by the year 2013.

US Spectrum Deployment Options – Radio Access Network (Base Stations)

Frequency Band	CDMA 2G	CDMA REVA 3G	GSM 2G	W-CDMA (UMTS/HSPA) 3G	LTE 4G	WiMax 4G
Upper 700MHz					2Q10(Tier 1)	
Lower 700MHz					2Q10(Tier 1) 1Q11(Tier 2/3)	"Closed" Solutions Available
850MHz Cellular	X	X	X	X	?	
1900MHz PCS	X	X	X	X	2011	
1700MHz/2100MHz AWS		X	X	X	2Q10 (Tier 1/2) 1Q11 (Tier 3)	
MSS L Band					2012?	
2500 MHz BRS/EBS						X

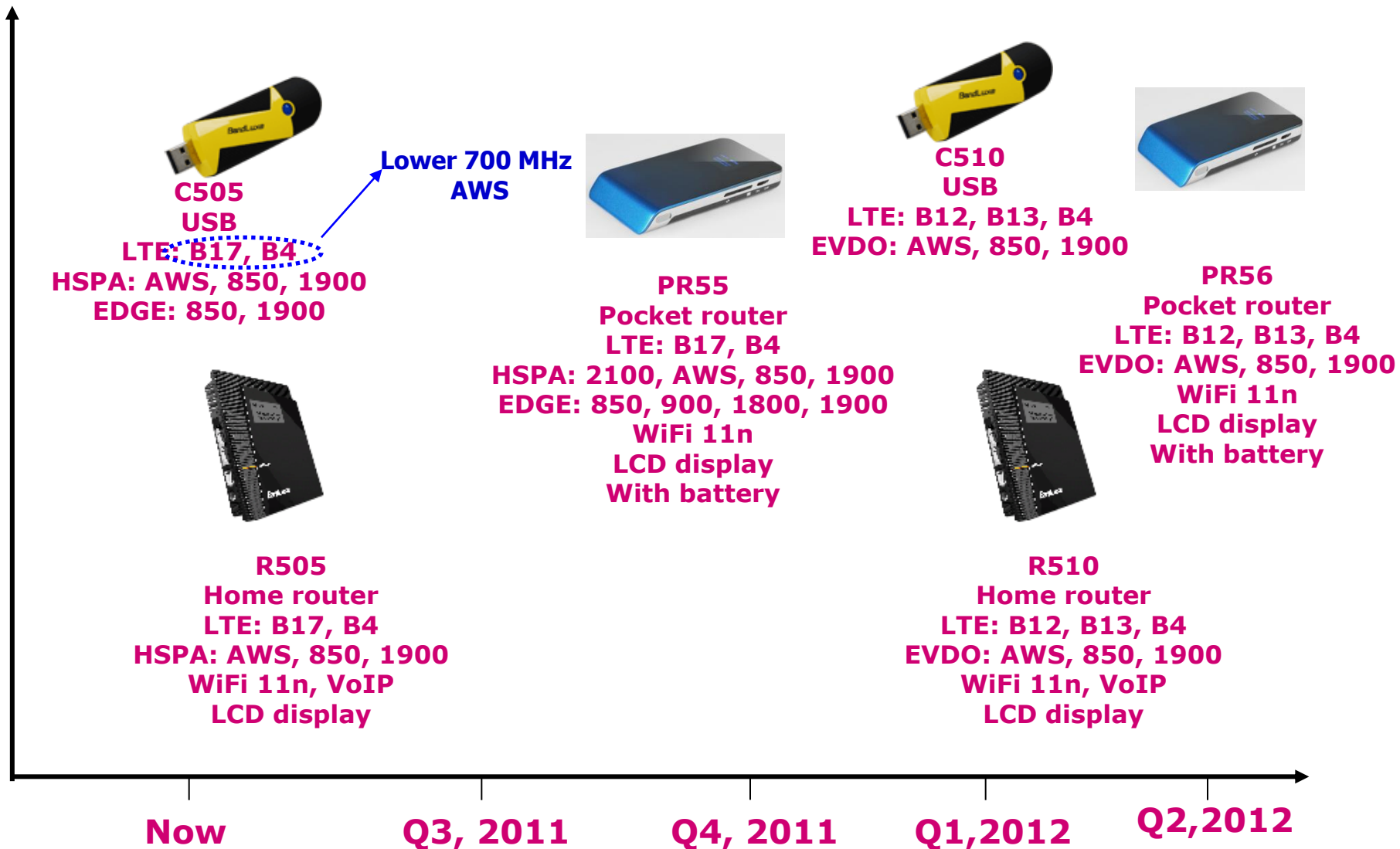
LTE FDD and TDD Device Availability And Expected Market Roll-Out (Tier 1)

North America LTE



BandRich LTE Product Roadmap for America Region

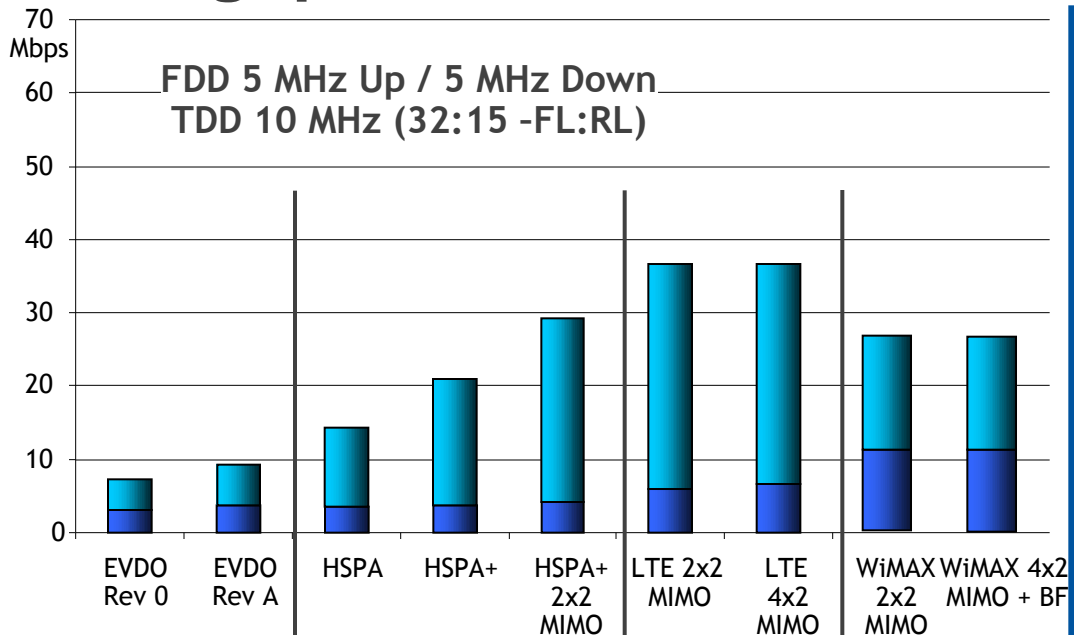
Fixed Example (Tier 3 Low Volume Availability Today)



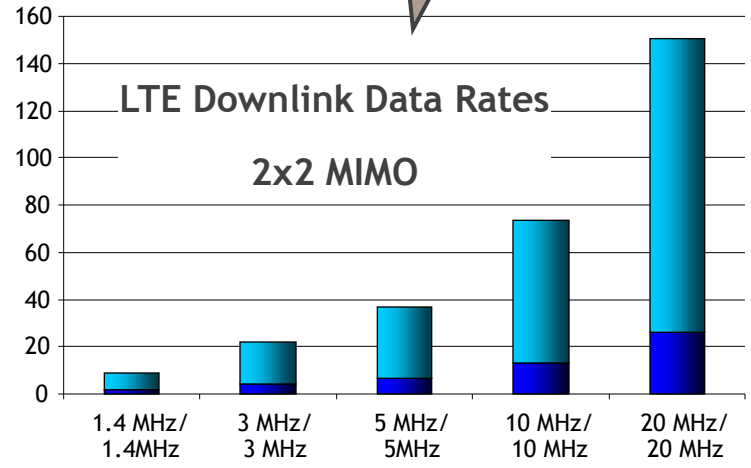
What Are the LTE Expectations?



LTE Expectations - Peak Rates vs. Average Sector Throughput in DL



Peak ≠ Typical
 Average macrocell spectral efficiency ≈ 1.2 bps/Hz, or ≈ 12 Mbps in 10 MHz

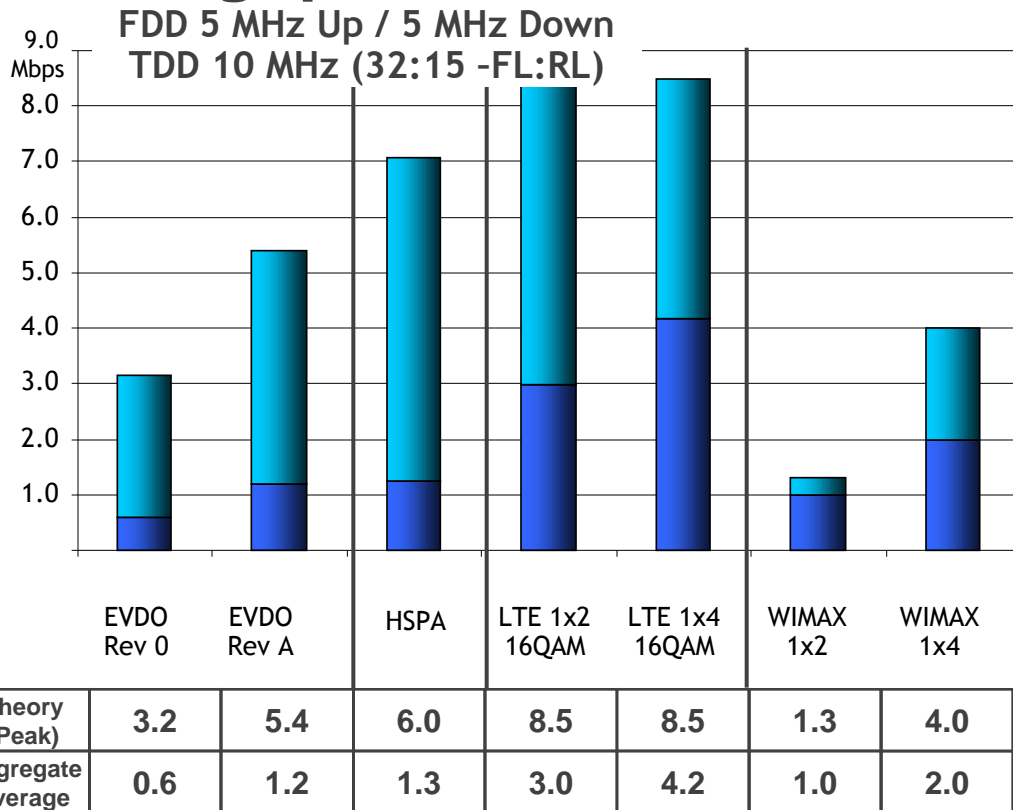


Theory (Peak)	8.8	22.1	36.7	73.4	150.8
Aggregate Average	1.4	3.6	6.0	12.0	24.0

Rural Carriers Typically Have 5 MHz up and 5 MHz down

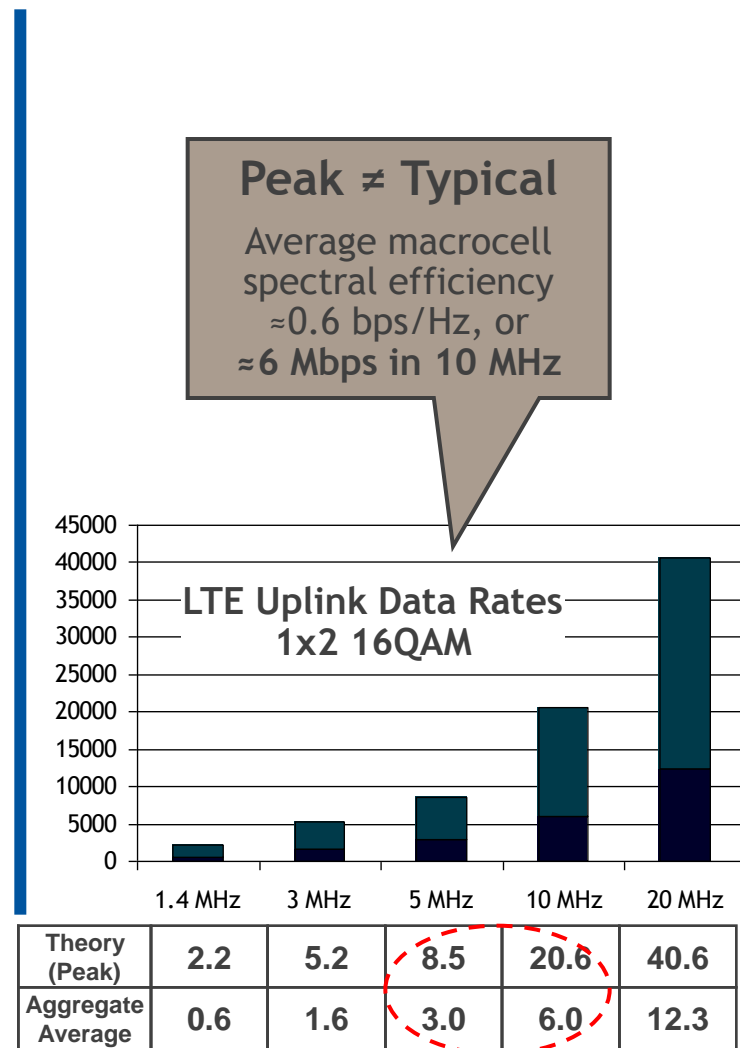
- 100 Mbps is NOT possible with this much spectrum
- OFDMA (LTE/WiMAX) benefit is reduced at lower bandwidths

LTE Expectations - Peak Rates vs. Average Sector Throughput in UL



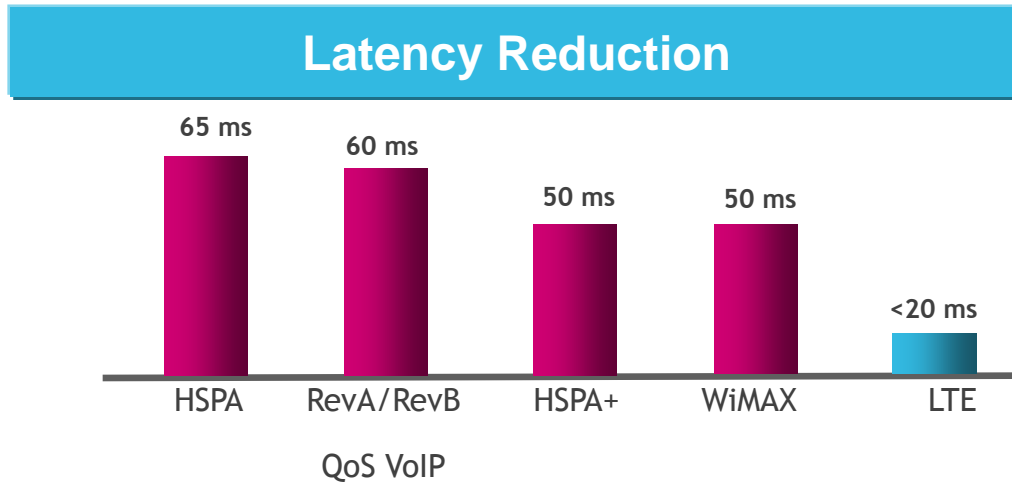
Rural Carriers Typically Have 5 MHz up and 5 MHz down

- 100 Mbps is NOT possible with this much spectrum and most systems are asymmetrically engineered to favor higher bandwidth on the downlink



3G vs. 4G – Latency

Low latency enables fast channel adaptation therefore allowing high speed applications



- HD TV
- User created
- Multi-screen
- Gaming
- More...



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