



Network Architecture & Access Technology Development

An Operator's View of Release 12 and Beyond RWS-120032

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Release 12 and Beyond Abstracts

Release 12 will represent the first release since LTE began widespread commercial deployments. Features that are needed in release 12 should reflect not only new requirements such as enhancements to capacity, data stream aggregation, additional MIMO enhancements, HetNet, and advanced antenna systems. But it should also focus on any bug fixes that have been discovered in the field. Release 12 should also take the time necessary to complete these features and fixes in order for operators to utilize and integrate them into existing systems in an appropriate time line

Going on beyond release 12 the most important issue facing the global ecosystem is the acquisition of suitable spectrum and ways to take advantage of an ever-increasing fragmentation of spectrum. Another issue that would need to be addressed is the ways in which the user community will need to interact with information in an environment where on-demand high speed mobile data has become a reality. That will mean some significant changes in the way that user interfaces to information are designed and higher layer features are developed. The Internet model as we know it today may not be what best serves the users of high-speed mobile data.



Vision

Release 12

Capacity
Coverage
Spectrum Utilization

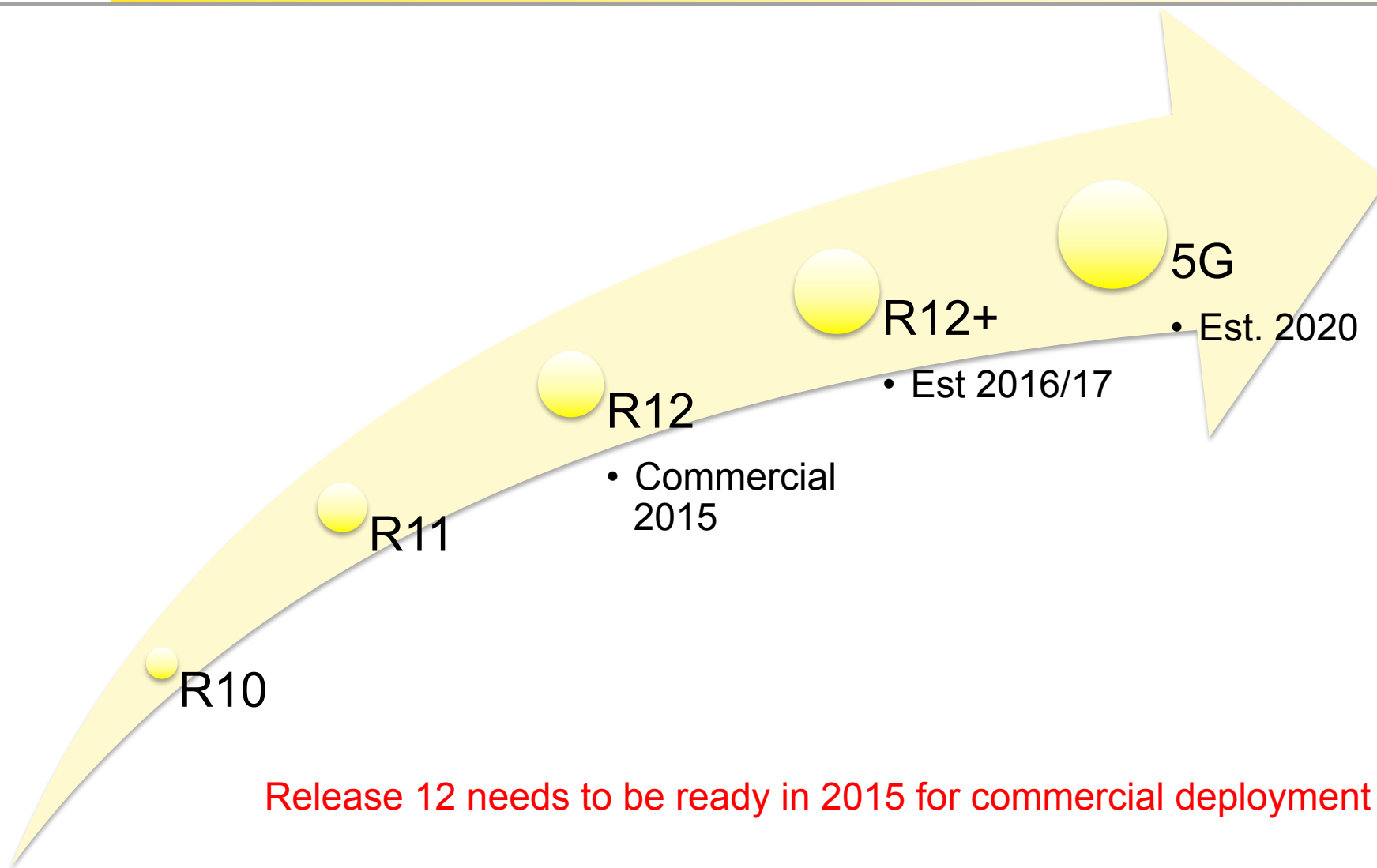
Release 12+

New Spectrum
Architecture
Improvements
Usability

5G

New Technology
New User
Experiences
New System
Architecture

Deployment Timelines



Release 12 needs to be ready in 2015 for commercial deployment

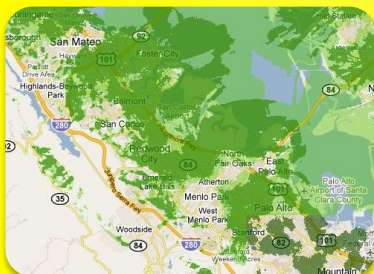
While CA: practical value is in Extension Carriers for scheduler pooling efficiencies and interRAT aggregation with WiFi.

Sprint traffic studies dramatic increase in data by 2017

Estimate: 2016-2020 4G networks will become saturated

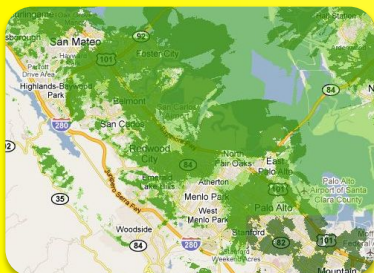
There is a need to maximize capacity in LTE systems with feature enhancements.

Multiple solutions may need to be used



Macro-cells:

- expensive due to rising real estate and equipment/capacity economics



Backhaul:

- As more cells carrying more data are deployed, the utilization and economics are very tight.
- Backhaul CANNOT be an afterthought



Need for Enhanced HetNet Solutions

Spectrum Utilization



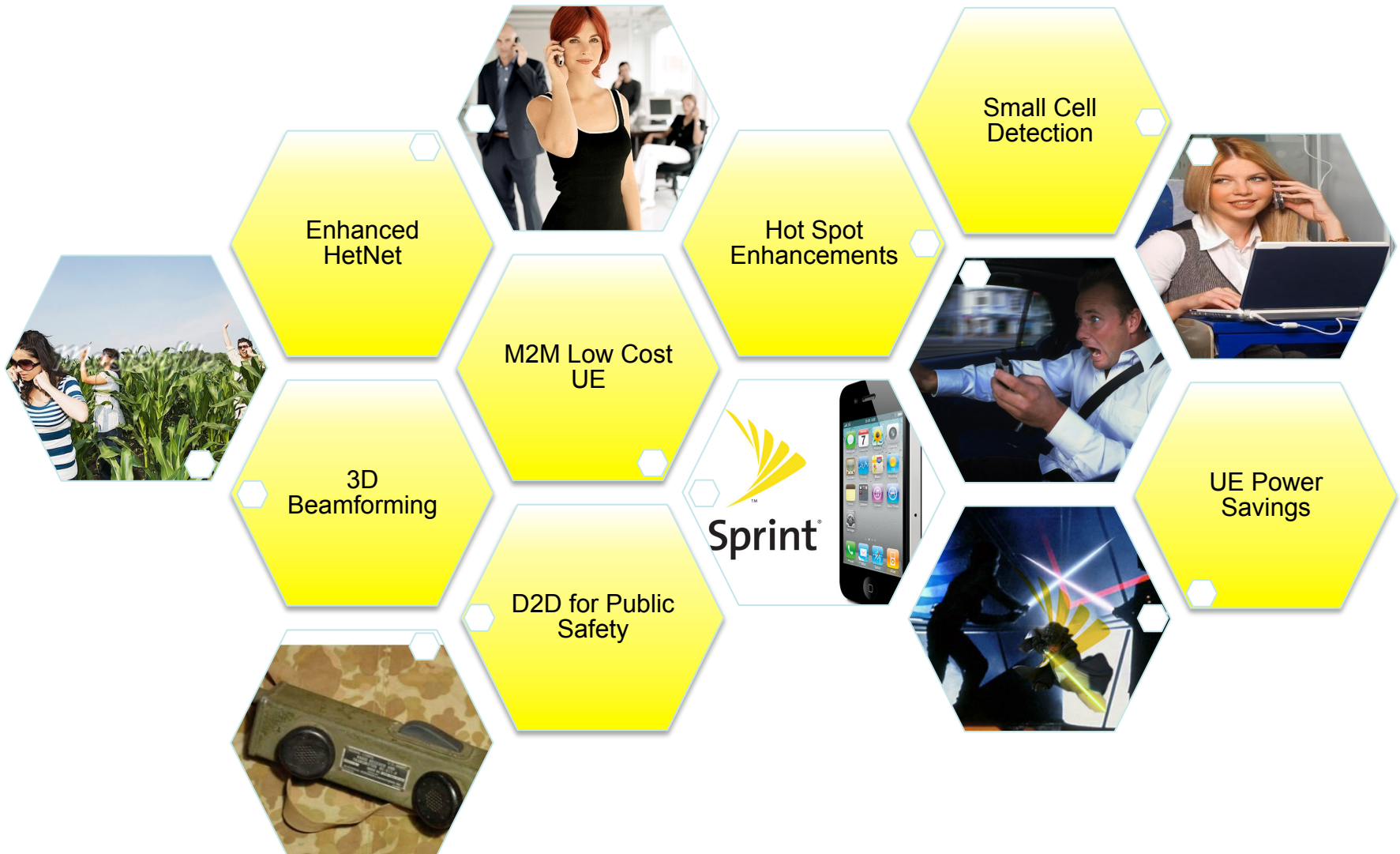
While CA can grab headlines for peak data rates, the practical value is in Extension Carriers for scheduler pooling efficiencies and interRAT aggregation with WiFi.



Small cells have the potential to improve spectrum utilization as not just a coverage but a capacity tool, increasing throughput per area.

However, small cell solutions have to be viewed in the context of the larger picture (macro, small cell, backhaul, core, etc.) and not sacrifice the other parts in order to improve small cells alone. Techniques that improve small cell performance as well as the system as a whole are valued

Features for R12 that Sprint Needs



Capacity:

- Find way to improve capacity on existing systems

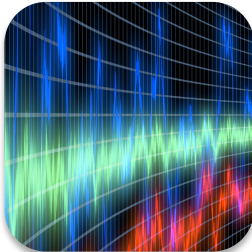
Coverage:

- Use of micro, pico, femto cells with efficient backhaul

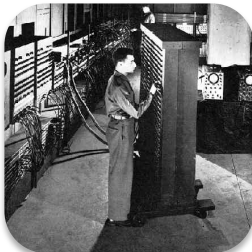
Spectrum Utilization:

- Better use of spectrum through aggregation techniques and other methods that do not adversely affect Capacity and Coverage

Macro trends:



More difficult spectrum challenges



More efficient network architectures



User experience affected by higher
mobile data rates

What we know



Things change and wireless will as well



Multiple technologies, diverse spectrum and multiple access devices mean that we need to link these together in an easy to use method for an average user



No single technology winner. In other words, no convergence of technologies



The time to start thinking about what's next is right now



Is it time to talk about 5G?

1G

- 1980's: all about voice

2G

- 1990's: all about capacity and text based services

3G

- 2000's: all about rudimentary data service

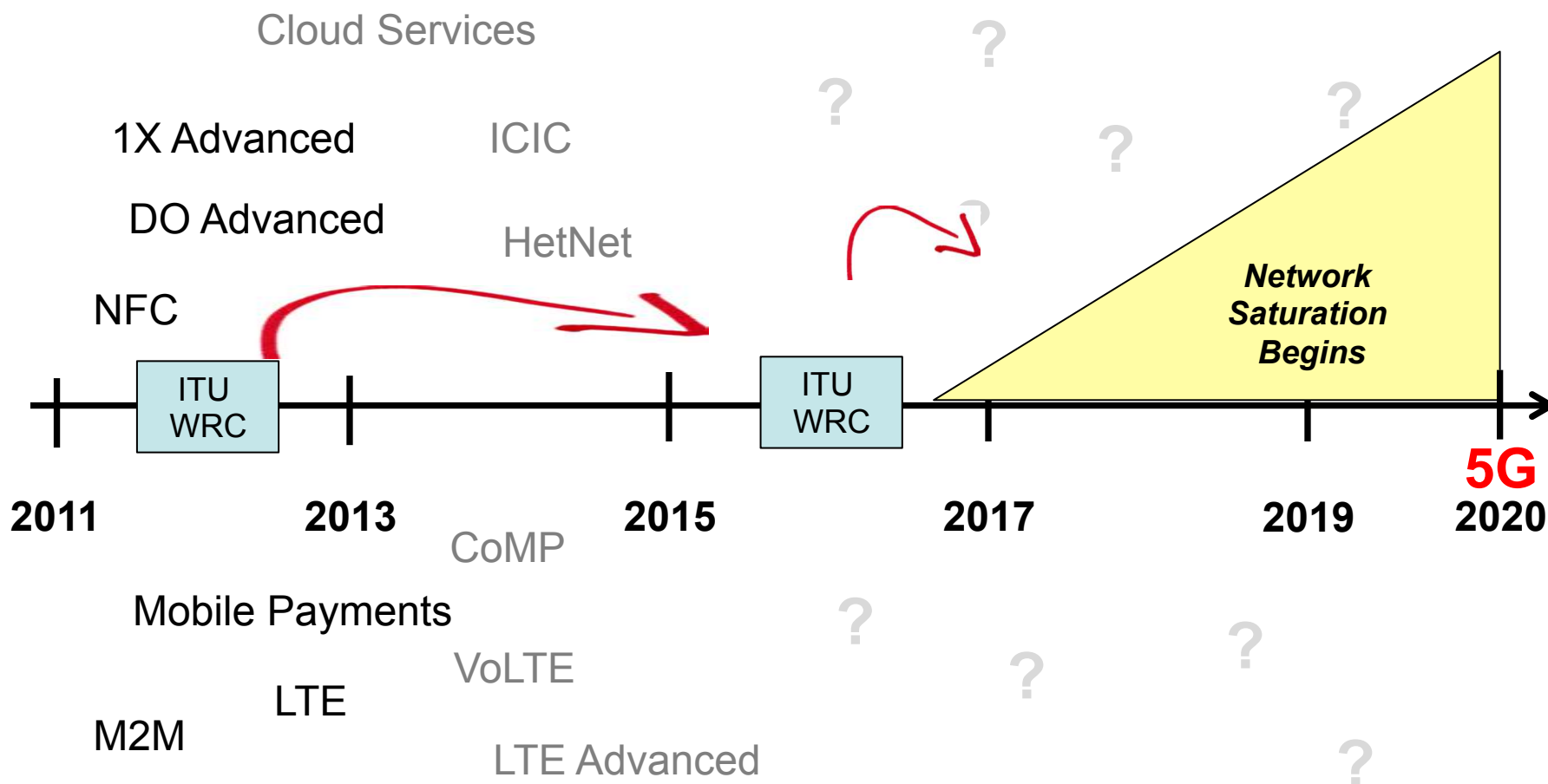
4G

- 2010's: It's the mobile Internet!

B4G or
5G

- 2020: Data, connectivity and user experience

Beyond Release 12: Spectrum



Beyond Release 12: Spectrum

- ***Non-Contiguous spectrum***
 - *Mobile operator spectrum holdings are increasingly spread far apart in the radio spectrum.*
- ***Non-Favorable Propagation***
 - *Some mobile operator bands exist in frequency ranges that are not favorable to propagation needed to substantiate desirable business cases*
- ***New Spectrum***
 - *Is there new spectrum that will become available or that regulator can be convinced to allocate?*
 - *Where would that spectrum be?*
 - *What characteristics will it to have?*

The big question is If TDD or FDD is the future?

Challenge:



With the ever increasing speed and bandwidth, Internet is struggling to meet the needs of the global consumers.



With 4G bandwidths, and broadband connections to the home, the Internet backbone is struggling to keep up with demand.



Is there is an opportunity to define new mechanisms for getting traffic across the Internet more effectively?

Beyond Release 12: User Challenges

- *Who is the typical user?*
 - 82% of American adults own a wireless device*
 - Adults send 10 text per day, teens send 50*
 - **Americans use media about 13 hours/day****
 - The latest census states the the average American makes
 - \$32k/year;
 - Has some college education;
 - Works in an office, service, or sales position;
 - Lives in a home that they are buying.



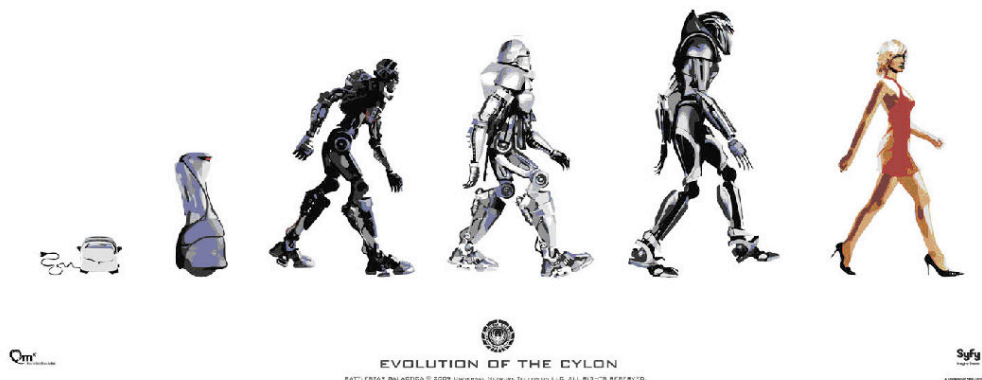
- Pew Internet <http://www.pewinternet.org/Reports/2010/Cell-Phones-and-American-Adults>
- ** Media Literacy ClearingHouse <http://www.frankwbaker.com/mediause.htm>

Beyond Release 12: User Challenges

Not All Users are Human

*“Increasingly for wireless carriers in the U.S., the best customers are no longer humans: **They're machines.** In the past 18 months, all the top wireless carriers have launched or greatly expanded their machine-to-machine (M2M) cellular data services. They're being driven to it, because voice revenues have hit a plateau; **there are only so many humans carrying phones.**”*

<http://computerworld.co.nz/news.nsf/telecommunications/new-gadgets-lte-upstarts-and-data-plans-on-tap-at-ctia->



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About Sprint-Nextel

Sprint Nextel offers a comprehensive range of wireless and wireline communications services bringing the freedom of mobility to consumers, businesses and government users. Sprint Nextel served more than 56 million customers at the end of the first quarter of 2012 and is widely recognized for developing, engineering and deploying innovative technologies, including the first wireless 4G service from a national carrier in the United States; offering industry-leading mobile data services, leading prepaid brands including Virgin Mobile USA, Boost Mobile, and Assurance Wireless; instant national and international push-to-talk capabilities; and a global Tier 1 Internet backbone. Newsweek ranked Sprint No. 3 in its 2011 Green Rankings, listing it as one of the nation's greenest companies, the highest of any telecommunications company.

THANK YOU!
ANY QUESTIONS?