



## *Solving the Bandwidth Crunch*

*The Library of Congress has more than 22 million books in its catalog. If each book is equal to one MB, then wireless service providers are delivering **the entire Library of Congress' book catalog** for wireless consumers **every 30 minutes***

*Source: Dr Robert Roche of CTIA*

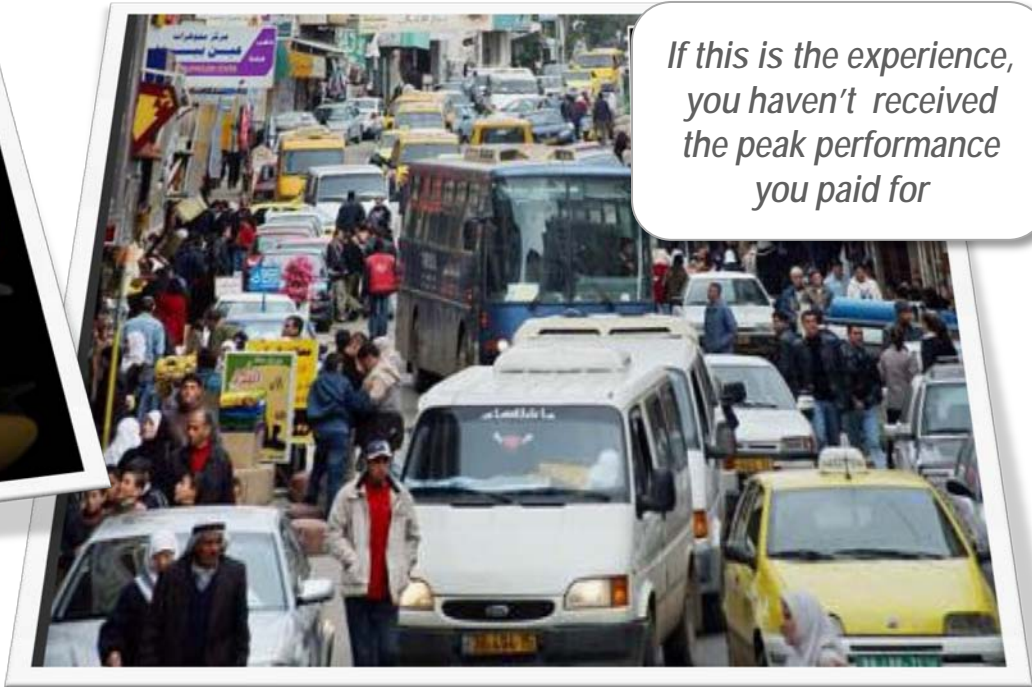
# Exploding Growth in Mobile Data Demand

## *Delivering the Advanced Mobile Internet*

### *The Expectation*



### *...The Reality?*



*If this is the experience, you haven't received the peak performance you paid for*

Source: Agilent Presentation

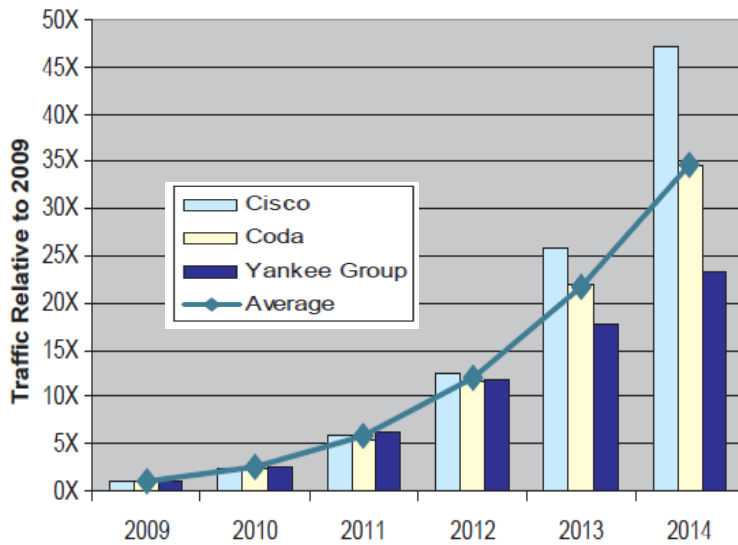
***Are 4G/LTE, Additional Spectrum enough?  
- What else is needed?***



# Mobile Data Demand - Driving the Bandwidth Crunch

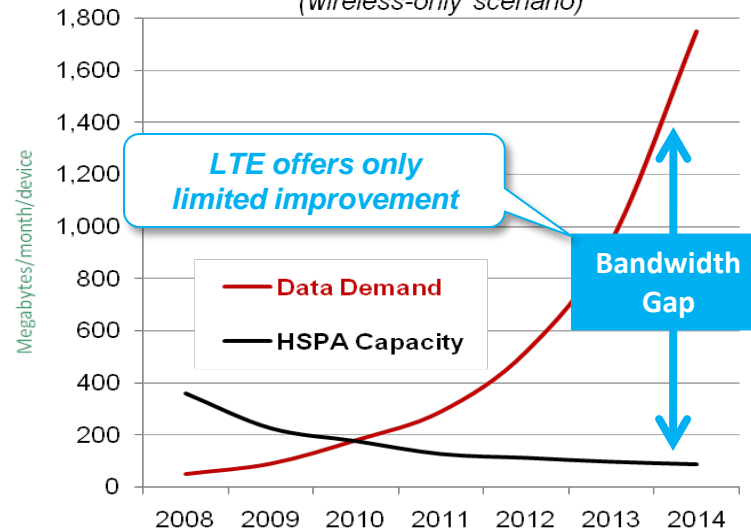
**Video Calling, HD Video Streaming, Mobile Cloud and other new services to the Smartphone & Tablet**

**Industry Forecasts of Mobile Data Traffic**



Source: Federal Communications Commission, Mobile Broadband: The Benefits of Additional Spectrum, www.fcc.gov, October 2010.

**HSPA network capacity and data demand forecast per device for an incumbent 3G operator (wireless-only scenario)**



Source: Cisco

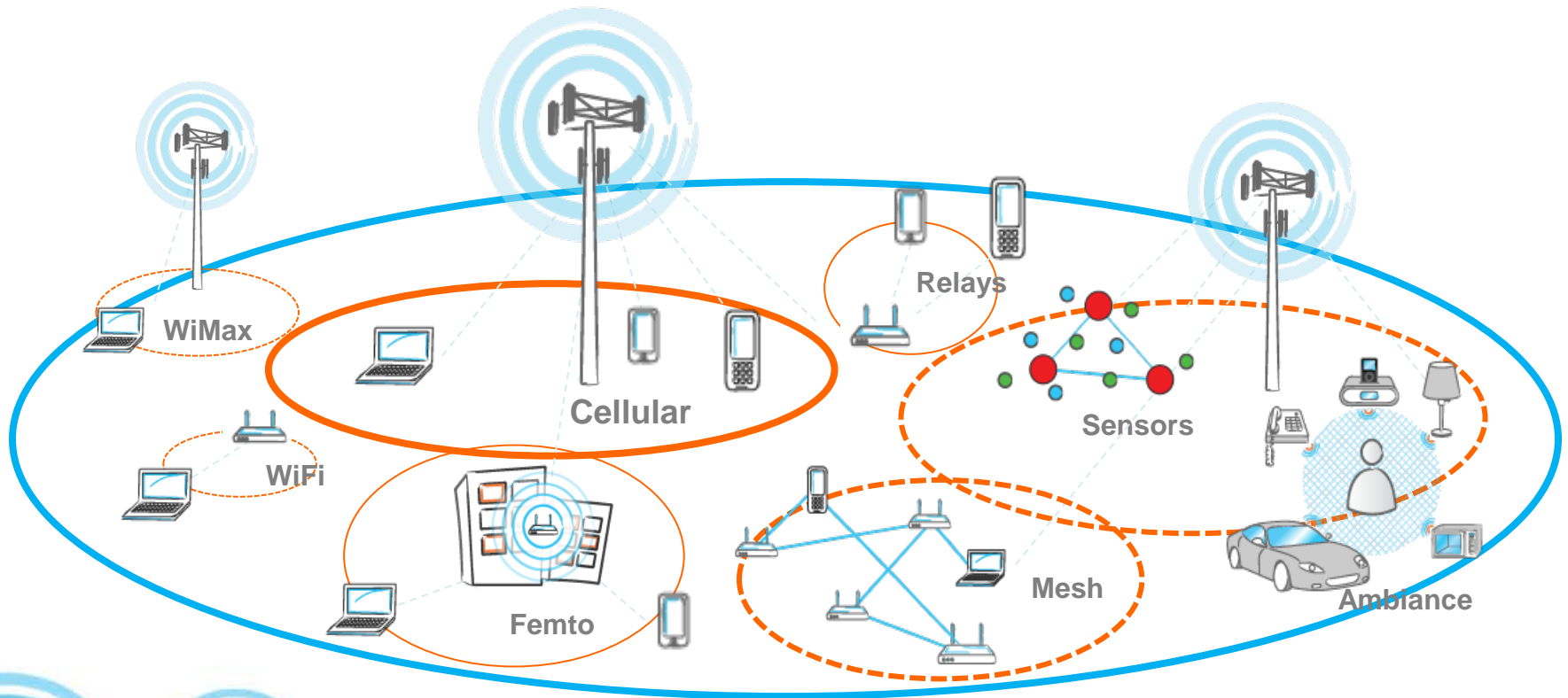
**Drives need for "Spectrum Multiplying" Technologies that Close the Bandwidth Gap**

# A Vision of Tomorrow's Network of Networks

*From today's complex and disconnected networks to....*

*Ubiquitous Connectivity:*

*Billions of subscribers, Trillions of connections, Seamlessly connected and fully integrated*



# Need for a Holistic Approach to Solving the Bandwidth Crunch

## *Innovations for increased data usage and a richer multimedia experience*

### *Build networks of heterogeneous networks*

- *Offloading, least-cost routing,  
load-balancing*
- *BW Segregation/Aggregation*
- *Dynamic Spectrum  
Management*
- *Seamless broadband  
Connectivity and Mobility*

**Connectivity  
& Mobility**  
*More Pipes*

**Spectrum  
Optimization**  
*Bigger Pipes*

**Intelligent  
Data Delivery**  
*Better Pipes*

### *Accelerate evolution of cellular throughput*

- *Cell-Edge performance  
improvements*
- *Direct Terminal-Terminal  
communications*

### *Create more efficient media distribution*

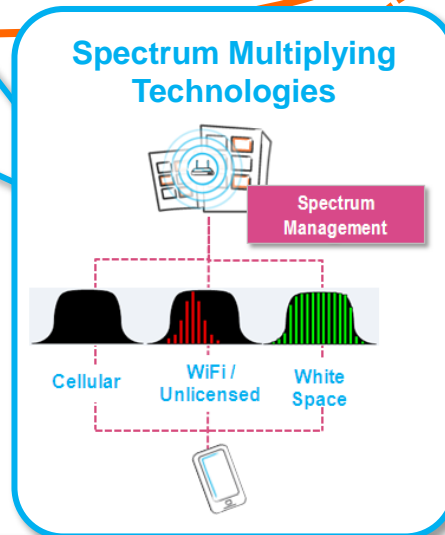
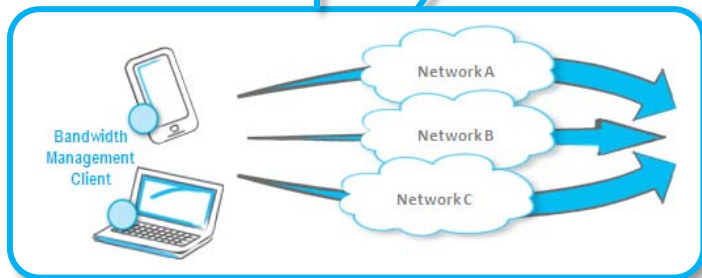
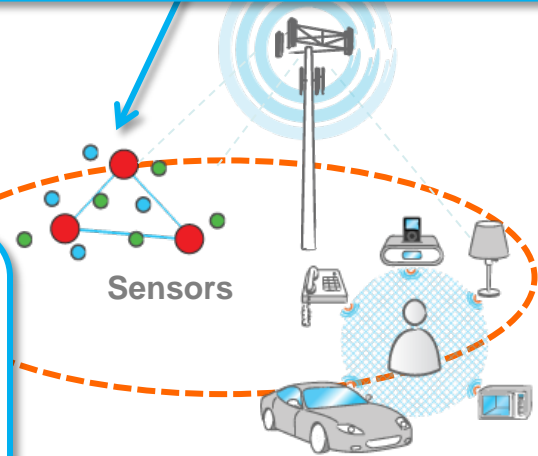
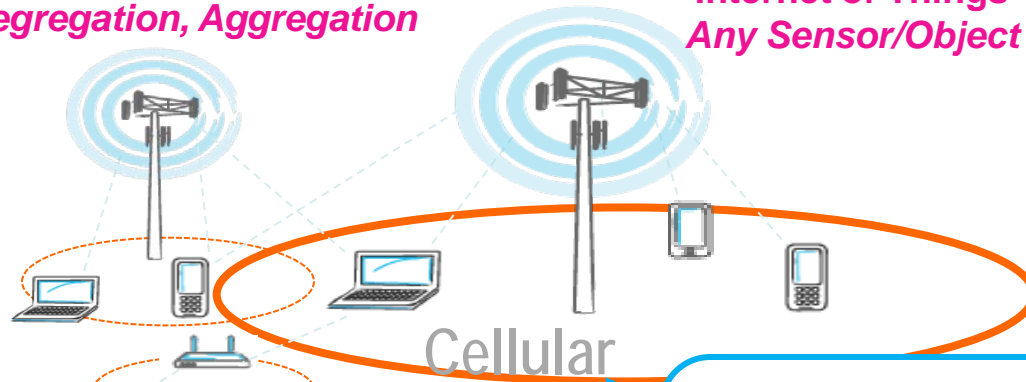
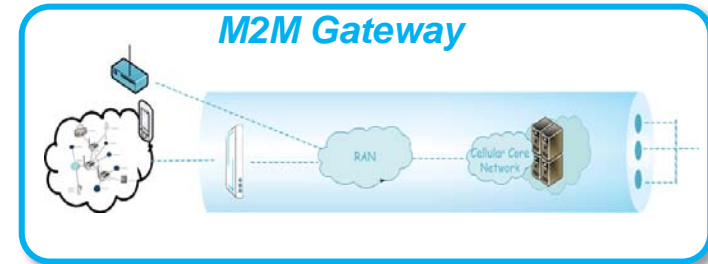
- *Video Compression &  
Optimization*
- *Local Routing, Local Content  
Caching*
- *Media Mobility*

# More Pipes - Connectivity and Mobility Solutions

## Bandwidth Management, M2M & Internet of Things, Dynamic Spectrum Management

**Anylink, Anytime**  
*Mobility across networks,  
Segregation, Aggregation*

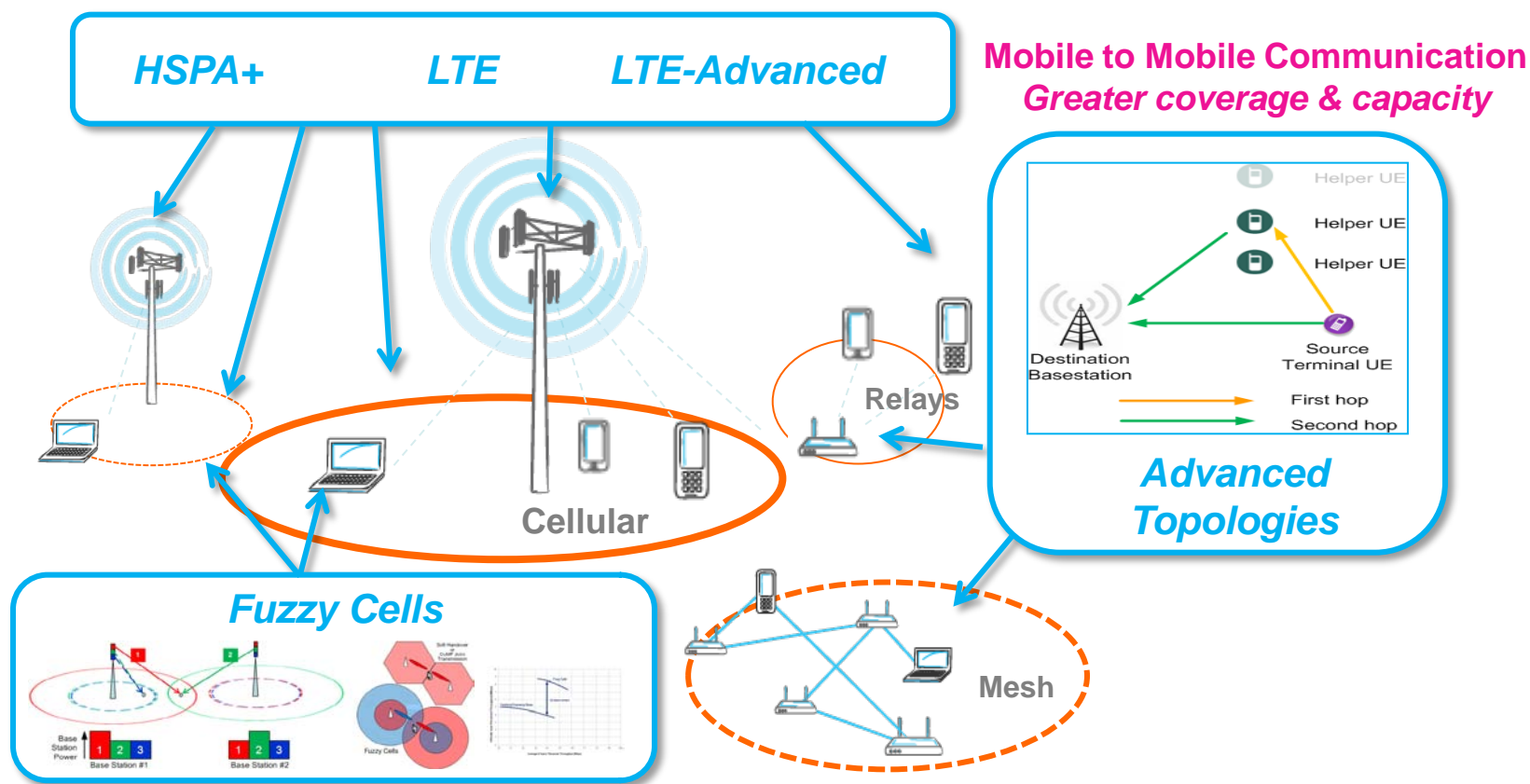
**Internet of Things**  
*Any Sensor/Object*



**Leverage unused spectrum**  
*Move the link*

# Bigger Pipes – Greater Coverage and Capacity

**Advanced Cellular Solutions provide greater coverage and throughput**



**Maximize throughput to Cell Edge  
Interference Mitigation, Multi-point Multi-flow**

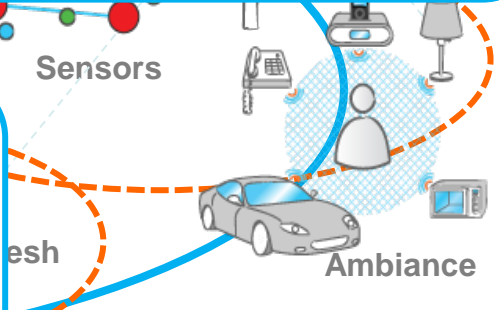
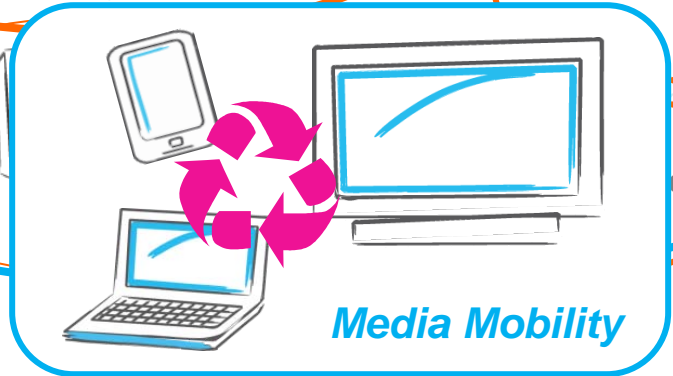
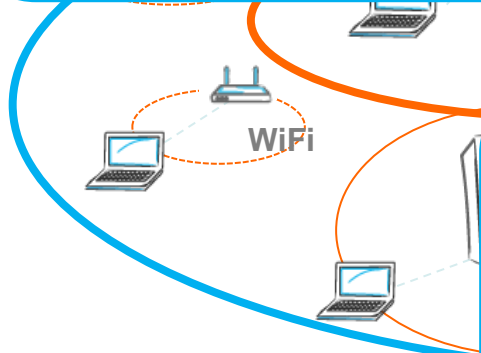
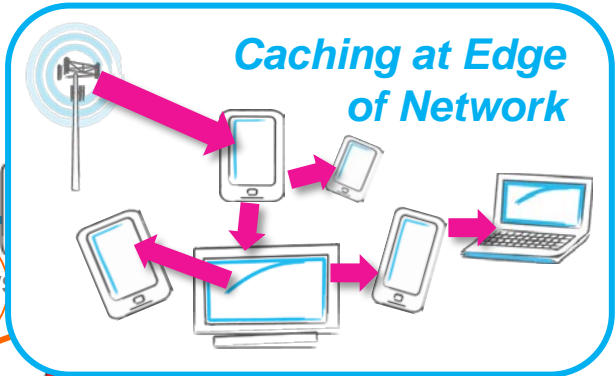
# Better Pipes – More Efficient Delivery and Distribution of Media

*Video is the single biggest contributor to the bandwidth crunch*

**Compress/Optimize Video**  
*Deliver what's needed to device*



**Intelligence/Control & Data**  
*Moves to the edge of the network*



**Unlock Content**  
*Content moves with user across devices*

***Holistic approach across radio, network, and distribution technologies can address the most aggressive projections of mobile bandwidth and capacity requirements***

- *More Pipes - Connectivity and Mobility Solutions*
- *Bigger Pipes – Greater Coverage and Capacity*
- *Better Pipes – More Efficient Delivery and Distribution of Media*

**InterDigital**<sup>®</sup>



*Thank You!*

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