



# *Motorola LTE*

Beyond Mobile Broadband



# Motorola – Accelerating the Delivery of the Personal Media Experience with LTE

The lines have blurred between the silos of voice, video, and data – and between fixed and mobile. Users are demanding all these services to work in harmony, helping them to get personalized content anywhere. Motorola's LTE solution, leveraging our leadership in OFDM, is uniquely positioned to enable service providers to transition to 4G and deliver high speed mobile data. Anytime. Anywhere.

and capacity planning have changed. At the same time, mobile operators that can navigate this new technology will be greatly rewarded with the benefits of far greater capacity, and the capability to profitably offer the full spectrum of service in a wireless and mobile environment.

## 3GPP and 3GPP2 Operators – 4G choice

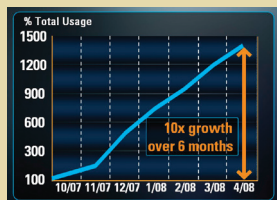
LTE is expected to be the technology of choice for most existing 3GPP and 3GPP2 mobile operators looking to migrate to a new next generation OFDM network. In effect, LTE can be deployed in the existing FDD spectrum bands and offers a smooth migration with the ability to keep global roaming agreements and hand over calls to existing 3GPP and 3GPP2 networks, offering the coverage benefit of existing 2G and 3G networks.

While mainly focused on FDD, LTE is also capable of using TDD spectrum and gives global operators the ability to standardize on one mobile broadband technology even if they have spectrum holding in both FDD and TDD in their various markets.

All successful technologies evolve as innovators develop new ideas and enhancements, building on what has gone before. Standards provide a platform for that evolution. The LTE standard clearly defines the migration from prior 3GPP and 3GPP2 standards. This provides operators with a clear path to LTE. Motorola, a leader in both OFDM and All-IP networks, can help operators move down this path to an all new 4G network.

### Data Capacity of 3G is Quickly Being Exhausted

Most operators reported 6-14X increase in data usage from 2H07 to 1H08



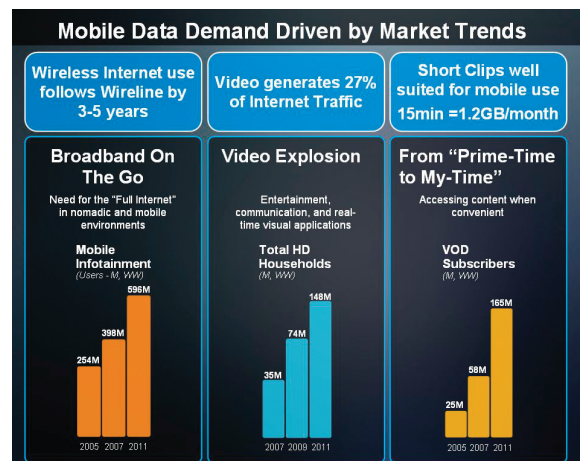
Source: H3UK, 04/08

LTE is a new wireless technology standard that can offer the data speeds on-the-go that are needed for true media mobility. By moving rapidly to LTE, service providers can capture the most valuable mobile broadband customer segments including millennials, road warriors and home users wanting to take their content on the go. Below are just a few examples of some exciting LTE use cases:

- Continuing to watch the latest Video TV series recorded on your DVR on your mobile phone, automatically transferred as you walk out the door
- Uploading Video content onto your social networking profile to let your friends know what you are up to
- The PowerPoint file you just saved on your laptop instantaneously becoming available on your smartphone
- Or even your LTE-enabled digital camera uploading your latest picture on your home server or social networking site for your family to see while automatically and instantaneously backing it up

## LTE – Next Generation OFDM Mobile Networks

LTE is based on Orthogonal Frequency Division Multiplexing (OFDM). Motorola is a leader in the new wave of wireless technologies based on OFDM, that are going to power wireless networks for at least the next 10 years. For mobile operators, getting to an OFDM system like LTE is a big step, but an important one. Previous rules for frequency



Source: Motorola Internal Research



# LTE technology is here today, and the market is moving quickly.

## LTE Sooner for Competitive Advantage

Operators will be faced with having to make a decision on their next generation network upgrade. While HSPA+ may seem a natural and easy upgrade to support the growing demand on data services, it will require a significant investment to replace the legacy equipment and upgrade ancillaries. What's more, HSPA+ will bring only limited benefits compared to next-generation LTE.

By bringing LTE to market early, Motorola is driving a more cost-effective option for mobile operators. Upgrade to LTE directly to reap the cost benefits of using an OFDM technology and target the mass market with the most compelling mobile broadband experience possible today.

## True Mobile Broadband at Lower Cost Per Bit

LTE will enable you to finally reach mass market penetration of mobile broadband, with data speeds that make mobile video a delight, at a lower cost per bit. LTE allows you to offer a differentiated service of true mobile video and broadband at a cost below that of current 3G data.

LTE not only helps realize a true mobile broadband experience nearly anywhere, it also allows you to introduce new exciting services, such as video blogging, video on demand, media mobility, online gaming, and others. LTE brings a significantly improved business proposition, offering 2.5 times capacity, lower cost per bit, spectrum flexibility, media mobility, flat IP architecture, end-to-end QoS.

LTE promises ...

### Improved User Experience:

- Reduced latency – ~15ms round trip latency
- Higher data rates – ~10Mbps per user

### Improved Business Proposition:

- Improve capacity – 2.5-4x compared to legacy 3.5G technologies
- Simple IP-based flat architecture and open interfaces
- Lower the cost per bit – 4-10x improvement compared to 3.5G technologies

- Allow for reasonable terminal power consumption and better edge of cell performance
- Media Mobility: Interconnect all access technologies to LTE Evolved Packet Core (EPC) to offer common services and applications across all access technologies

## Early to market with Motorola

Motorola will be among the first vendors to have an end-to-end LTE solution ready for commercial service, thanks to our years of expertise in OFDM with Expedience, IP Point to Point products and WiMAX, and mobile broadband innovation. With Motorola, service providers can be confident in a smooth LTE deployment. Our OFDM leadership position and the common technical features with LTE give Motorola the ability to bring to market an early and field-tested LTE end-to-end solution – like our third generation OFDM broadband platform that is common to WiMAX and LTE.

Our leadership in LTE is demonstrated by:

- Our number one position in LTE RAN standard contribution
- Our LTE trial activity with leading operators
- Our membership in the LTE/System Architecture Evolution (SAE) Trial Initiative (LSTI) and Next Generation Mobile Networks (NGMN)
- Our demonstrated industry-first LTE-CDMA hand-over.

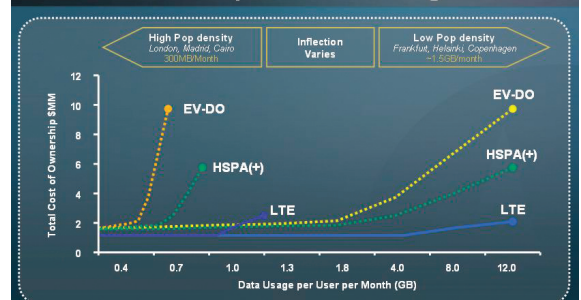
### Definition

LTE (Long Term Evolution) refers to the new air interface that is being developed by 3GPP in its Release 8 Specification set. LTE will provide users with an experience similar to that of fixed line broadband both in terms of bandwidth and latency, meaning applications that can be delivered today on fixed line will soon be available over the air and fully mobility with LTE. The LTE standards are planned for completion by end of 2008. By combining expertise from across Motorola including, chipsets, network, video head-end solutions, and professional services, the Motorola LTE ecosystem will enable true media mobility, delivering innovative applications that can help operators to increase revenues and gain a competitive advantage.

### Advanced Antenna Technologies and Flexible Deployment

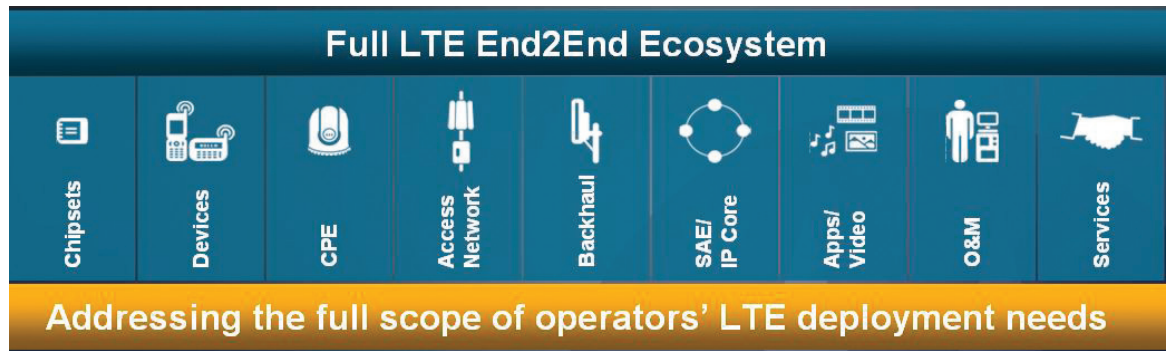
At the network edge, Motorola's LTE solution is comprised of a common wireless broadband platform and a selection of radio options that include MIMO and smart antennas. The portfolio includes frame-based mounted radios, remote radio heads and tower top radios to support a wide variety of LTE deployment scenarios across new and existing spectrum.

## LTE TCO = Competitive Advantage



Notes: 15k subscribers in 100 km<sup>2</sup>  
1 busy hour, 7 non-busy hours per day  
Edge of Cell : DL 1 Mbps, UL 256 kbps  
EV-DO : 2.5 GHz with 7 carriers

WiMAX : 2.5 GHz at 10 MHz channel  
BW  
Backhaul assumes operator owned  
wireless



## Why Motorola?

### Verizon Wireless Chooses LTE – and Motorola

Verizon Wireless plans to develop and deploy its 4<sup>th</sup> generation mobile broadband network using LTE – Long Term Evolution. The selection of LTE provides Verizon and Vodafone – joint owners of U.S.-based Verizon Wireless – with a unique opportunity to adopt a common access platform with true global scale and compatibility with existing technologies of both companies. Motorola is among the vendors selected by Verizon Wireless and Vodafone to participate in their joint LTE trials during 2008.

### Leading in 4G and Media Mobility

#### A wealth of expertise and innovation in OFDM technology

- Leader in 802.16 and 3GPP standards bodies for OFDM technology
- First in OFDM / MIMO: 300Mbps in 2004 OFDM Point-to-point solutions
- First with mobile WiMAX: 802.16e commercial solutions since 2006

#### Proven experience in deploying OFDM/ All-IP networks

- Over 20 signed WiMAX contracts, all utilizing Motorola's Integration Services (including design and deployment) and most utilizing Motorola's Managed Services
- Currently managing some of the largest WiMAX networks in the world at Wateen in Pakistan and Axtel in Mexico

#### Broad, market-leading portfolio of OFDM products

- Thousands of OFDM access points shipped worldwide
- Hundreds of thousands of OFDM CPE or user devices shipped worldwide

#### Video solutions and expertise to leverage for a personal media experience with LTE

- Lead vendor in set-top box shipments
- Leader in video head-end solutions, dynamic ad insertion, and content bundling and management solutions

### An end-to-end solution

LTE will be about personal media, with the ability to access all your content, share it and take it with you wherever you go. Motorola is bringing to market a true end-to-end solution that includes a leading OFDM access network, LTE chipsets, backhaul, consumer devices, an IP core, video solutions, applications and services. In addition, as an early driver of LTE, Motorola will be working with a wide group of third-party vendors for devices and other infrastructure components to drive an LTE ecosystem that delivers true media mobility and accelerates the delivery of the personal media experience.

### Designed for cost-effective migration

Motorola's LTE solution can be deployed in a wide selection of spectrum bands including the existing GSM and CDMA bands. Because of LTE spectrum bandwidth flexibility (ranging from 1.4MHz to 20MHz), it offers GSM operators a practical solution for progressively re-farming their existing spectrum. The migration of 3GPP2 CDMA service providers to LTE's EUTRAN/EPC configuration involves updates to the 1x/DO-A network, allowing for seamless interworking, and hand-over of services between the two technologies.

Leveraging the benefits of Motorola's mobile broadband experience in OFDM network deployments, Motorola's LTE solution will provide virtually any operator with a reliable and leading edge end-to-end solution for their next generation mobile broadband networks.



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