

WELCOME



# LTE – PREPARING NETWORKS FOR THE DATA STORM

Nuno Marques  
24/May/2012



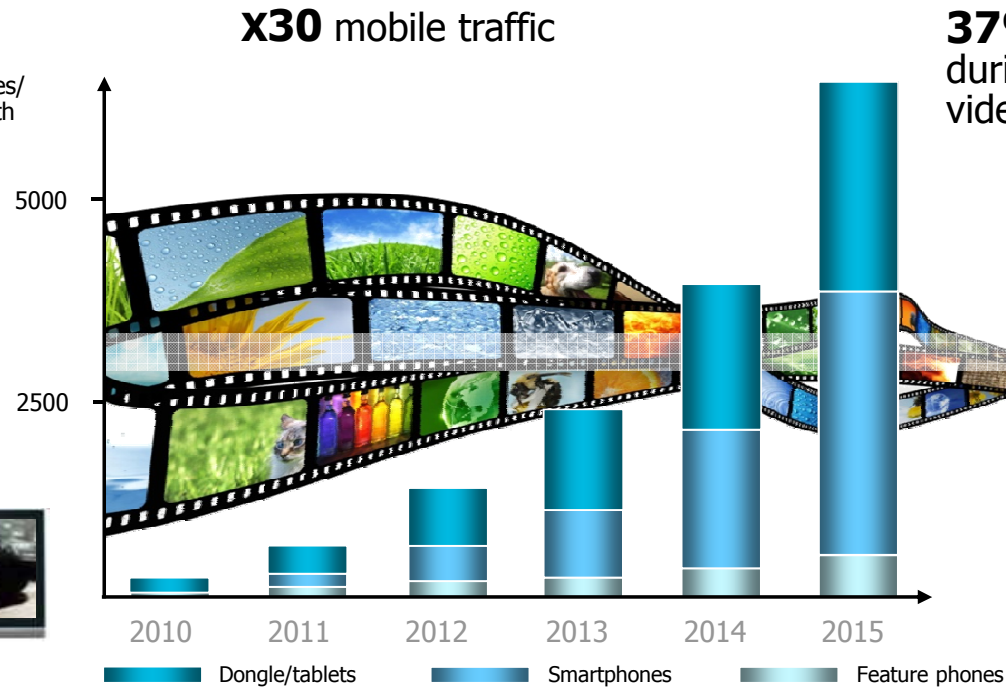
# THE GAME IS CHANGING

Market Dynamics

# SURGING DEMAND



Pbytes/  
month



**37%** of Internet traffic during prime time is online video



**Connected, IP-enabled Devices** 1.2 billion devices connected by 2014

**Video**  
~ 70% of internet traffic by 2014

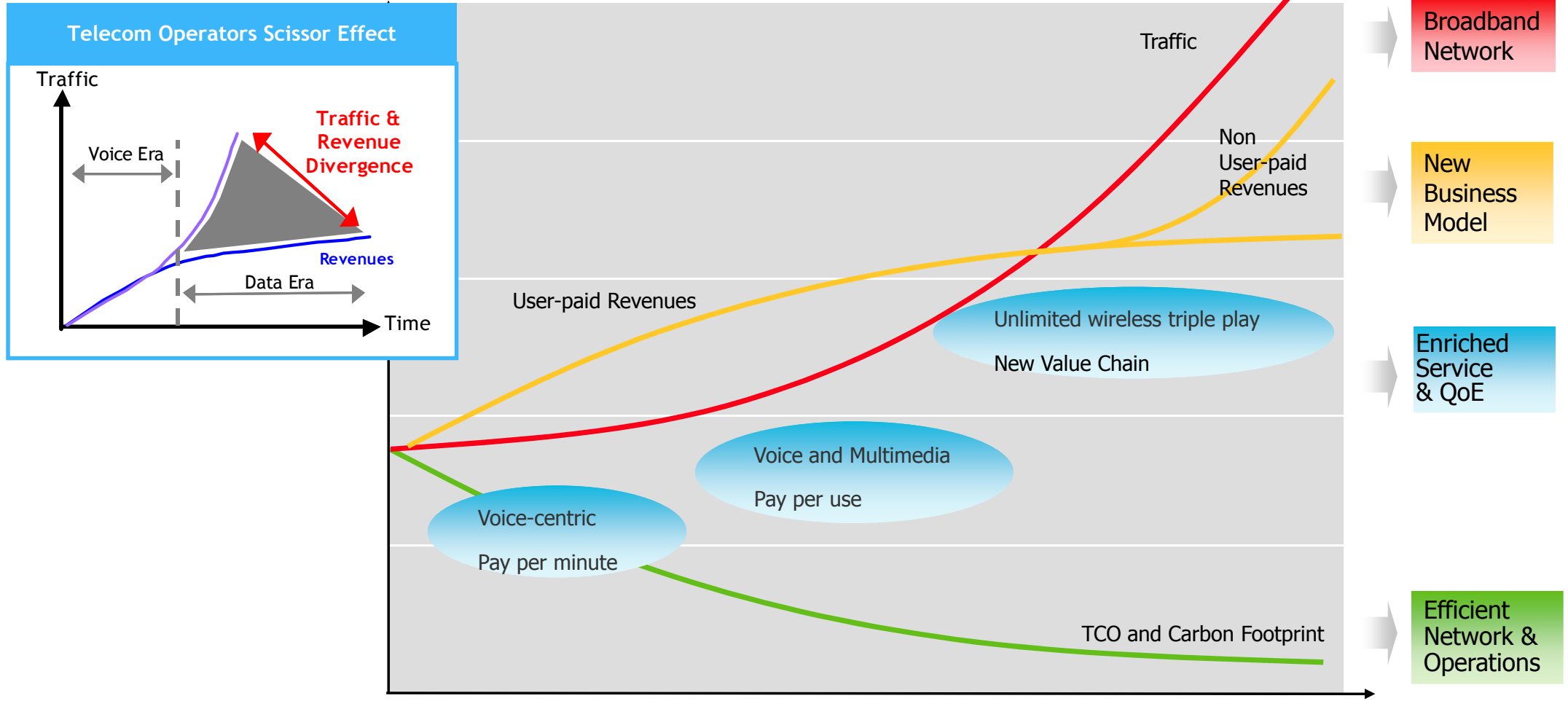
**Smartphones**  
2.5 billion connections by 2015

**Mobile Internet**  
70% of mobile traffic by 2014

Source: Bell Labs analysis

AT THE SPEED OF IDEAS™

# THE DATA ERA





LTE

**RISE ABOVE  
THE DATA  
STORM**

# MAIN LTE CHARACTERISTICS



Excellent performance for outstanding Quality of Experience



Wide spectrum and bandwidth range



cost effective IP architecture and transport

Smooth interaction with legacy

CDMA, GSM, W-CDMA



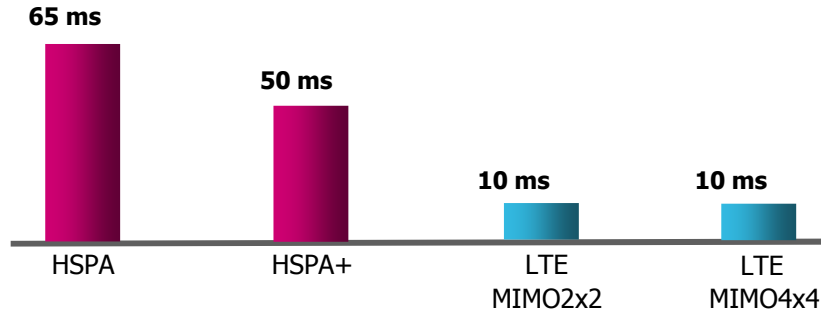
4G LTE is the fastest developing mobile system technology ever. As of early 2012:

- 285 operators in 93 countries investing in LTE
- 49 commercial LTE networks in 29 countries
- 119 commercial LTE networks in 53 countries forecast by the end of 2012

source: GSA in January 2012

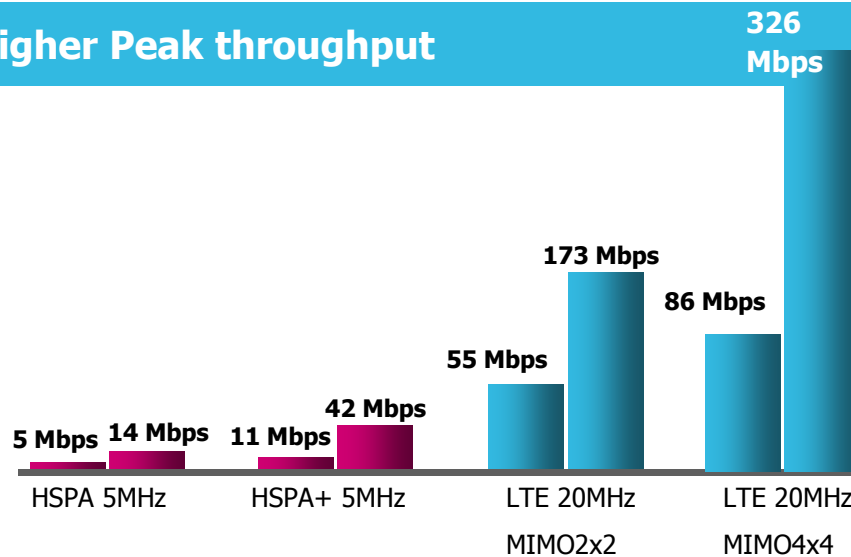
# MAIN LTE CHARACTERISTICS

## Latency Reduction



Low latency enables fast channel adaptation therefore allowing high speed applications

## Higher Peak throughput



High peak throughput enables rich content applications over LTE

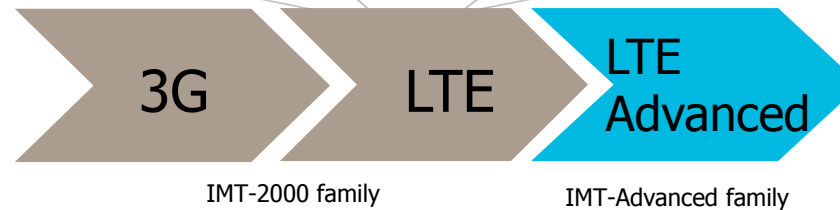
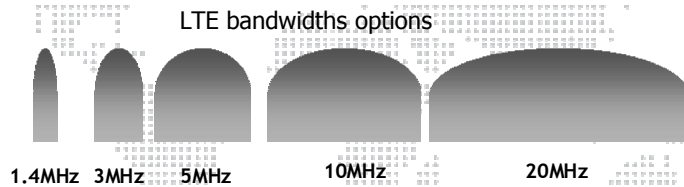
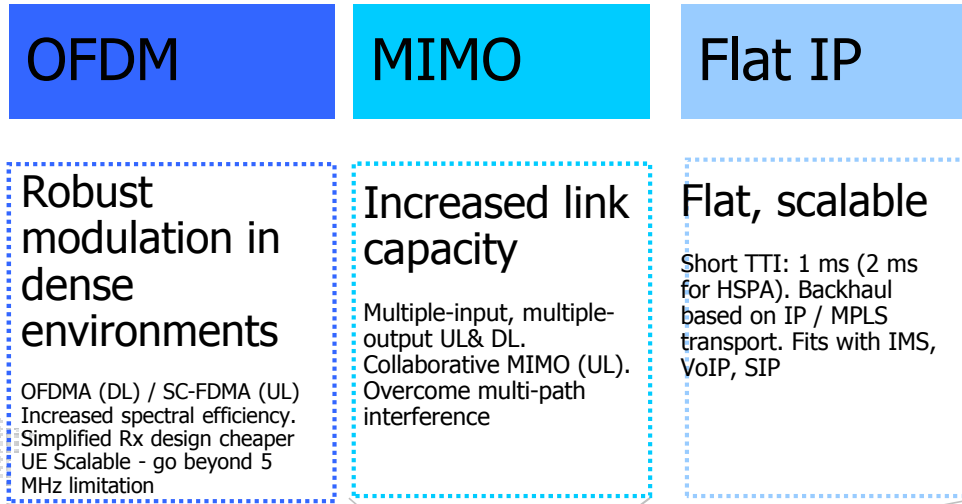
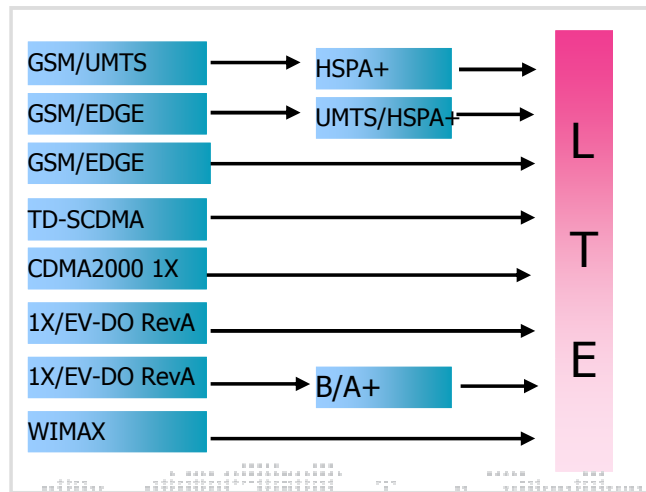
- HD TV 
- User created content 
- Multi-screen 
- Gaming 
- More...



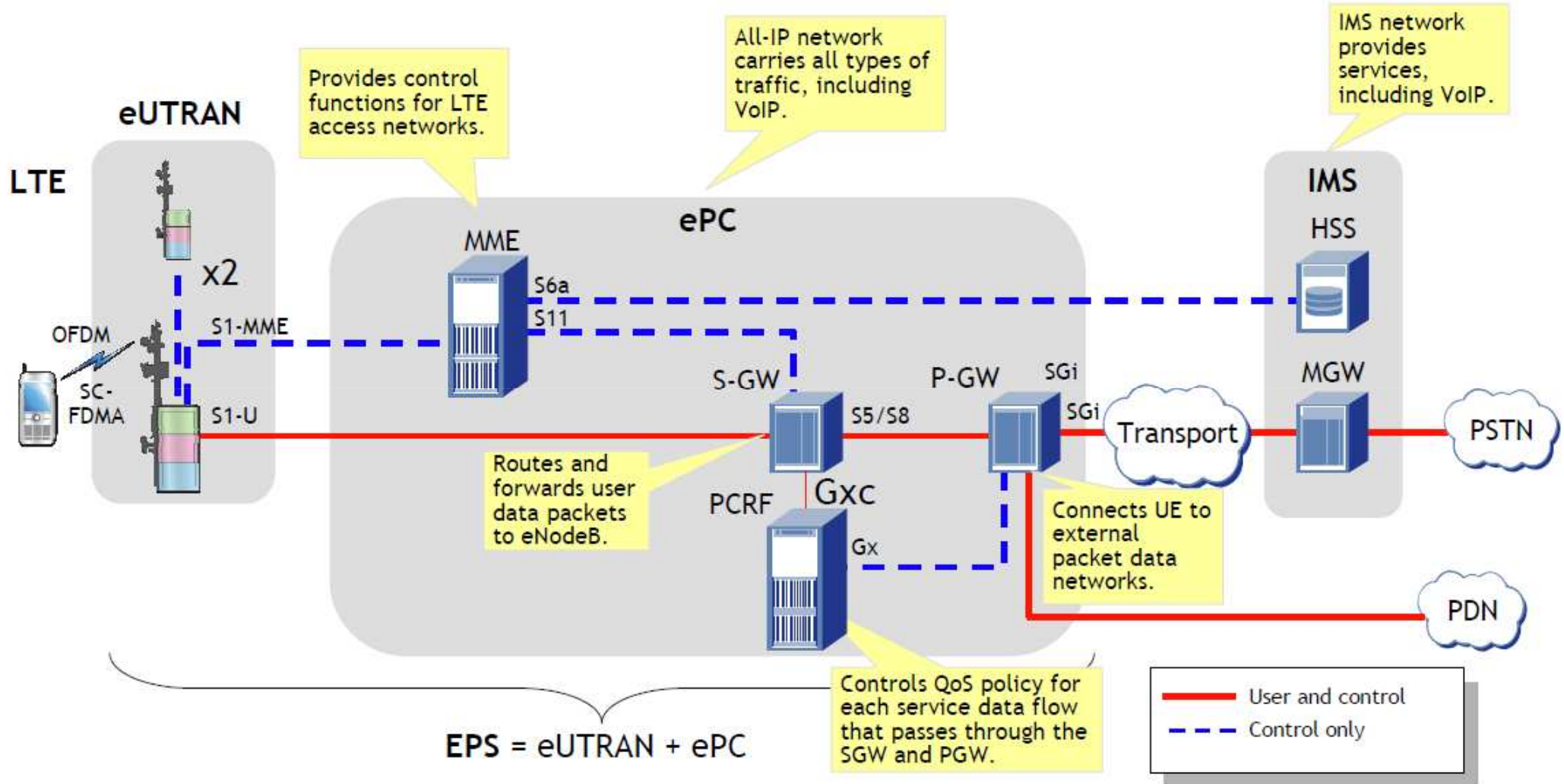
# GREATER RESOURCE EFFICIENCY

A common evolution ...

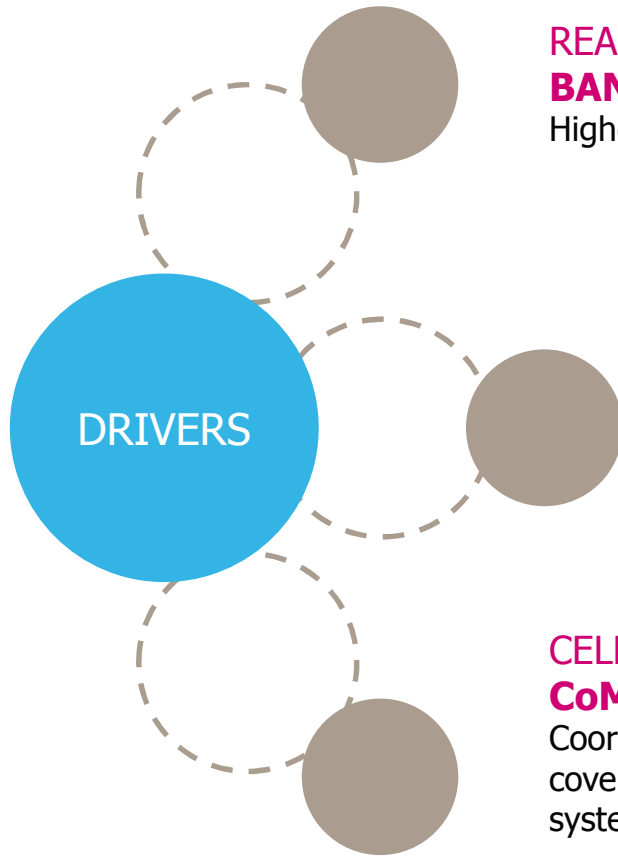
...introducing highly efficient technologies



# LTE ARCHITECTURE



# LTE ADVANCED



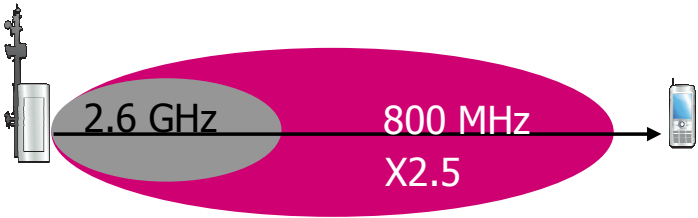
REACHING HIGHER DATA RATES  
**BAND AGGREGATION**  
Higher throughput aggregating multiple LTE carriers

IMPROVING PEAK DATA-RATES AND SPECTRAL EFFICIENCY  
**MIMO CAPABILITIES**  
LTE Advanced extends MIMO capabilities of LTE Release 8 to now supporting 8 downlink antennas and 4 uplink antennas

CELL-EDGE IMPROVEMENT  
**CoMP**  
Coordinated multiple point transmission and reception: improve coverage of high data-rates, the cell-edge throughput, and increase system throughput

# SPECTRUM IN PORTUGAL

<b>800 MHz</b>	<p><b>800 MHz split by 3 operators</b></p> <ul style="list-style-type: none"> <li>• 3 x 20MHz</li> </ul>
<b>2.6 GHz</b>	<p><b>2.6 GHz split by 3 operators</b></p> <ul style="list-style-type: none"> <li>• 3 x 40 MHz</li> </ul>



- Typical Cell Ranges for LTE show a significant advantage of using lower frequencies



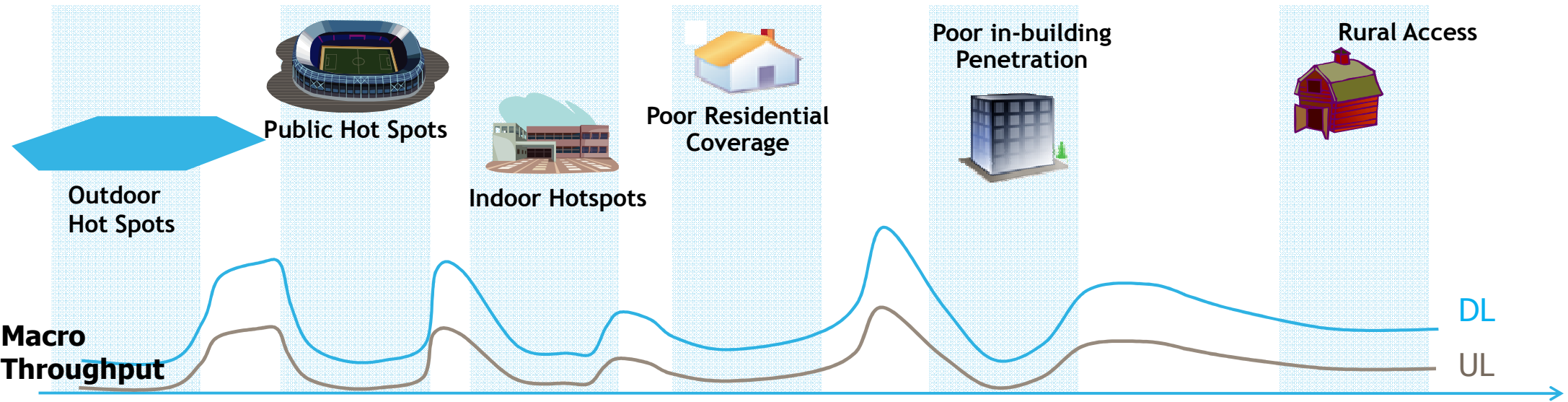
For rural environments, cell count can be cut by 6x (to 9x) for the same area covered

# ALWAYS ON REINVENTING THE NETWORK



# TODAY'S MACRO APPROACH IS INSUFFICIENT

Macro is part of the solution, not "the" solution



## THE OBJECTIVE IS QOE EVERYWHERE

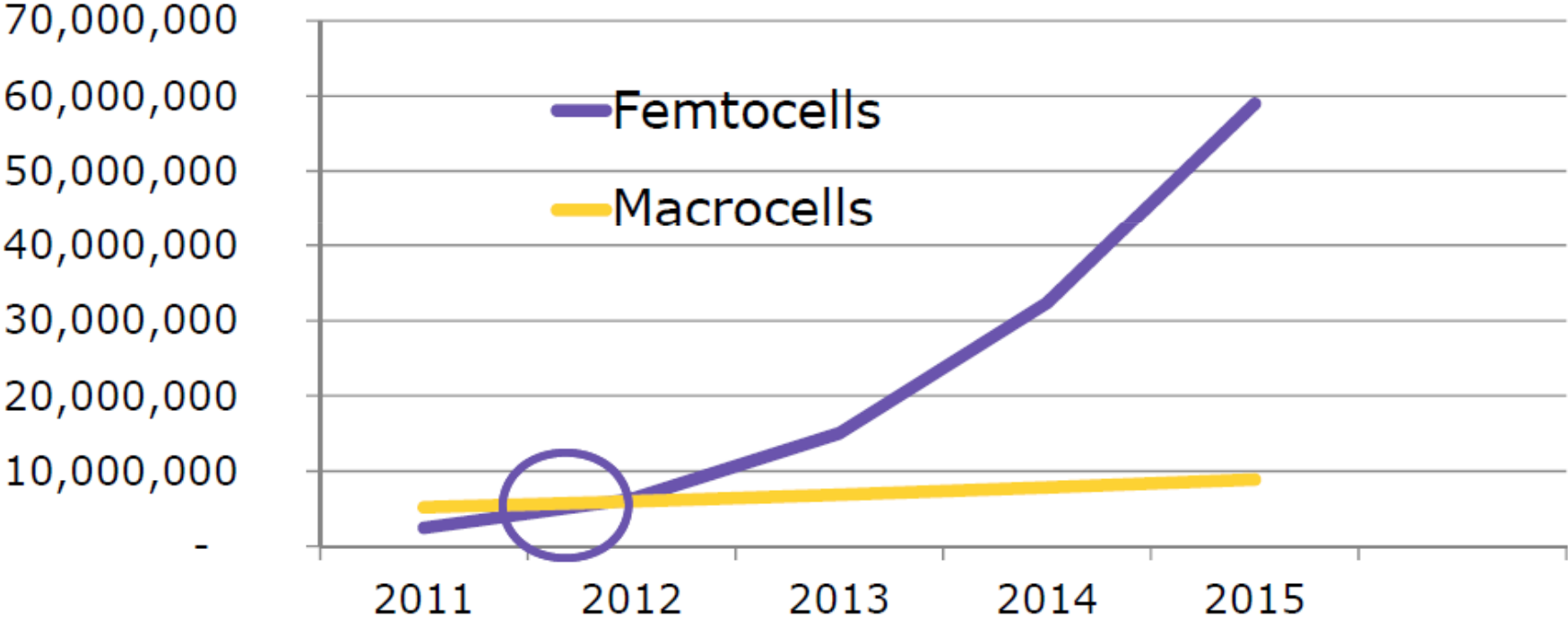
Need for Extra capacity in Hotspot

Need for Better UL+DL

Avoiding new Macro deployment

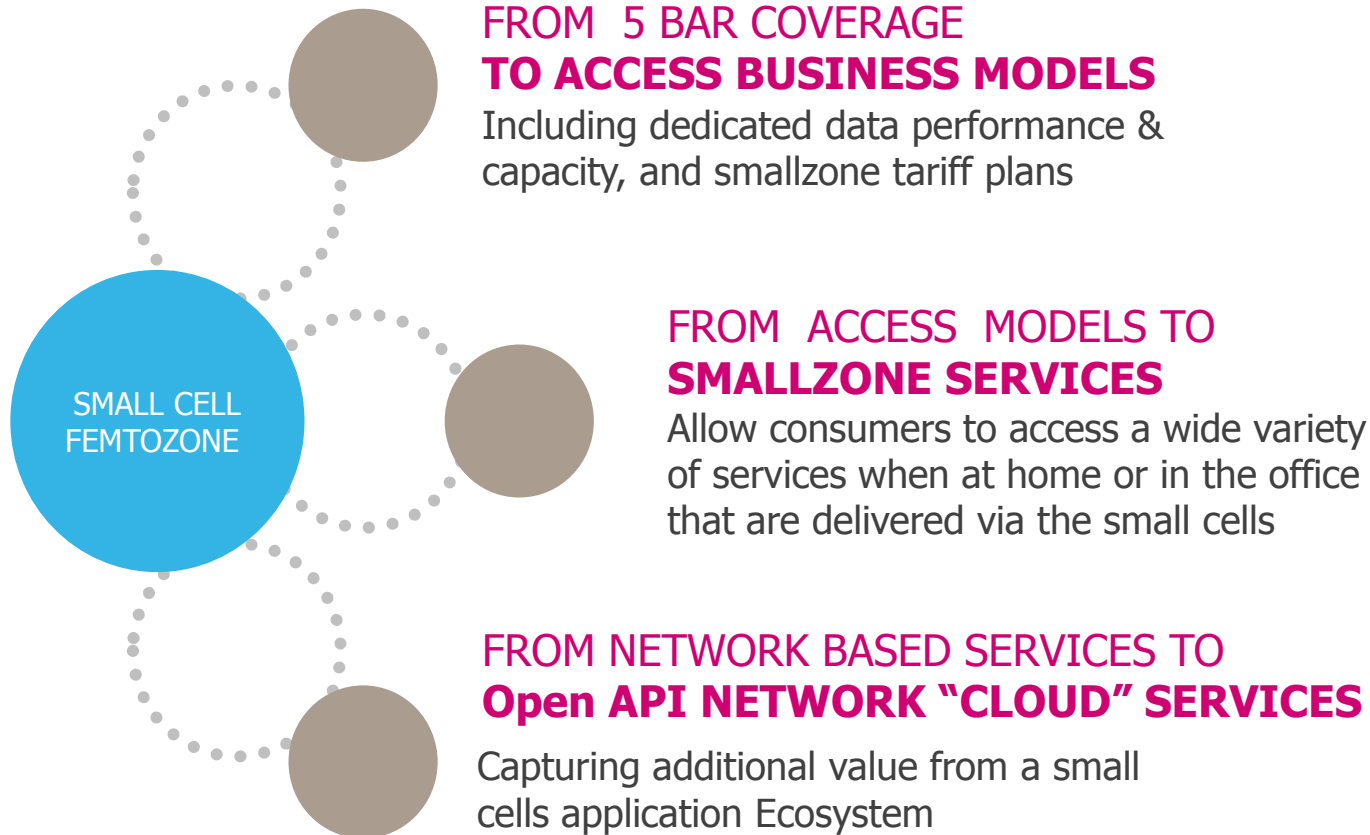
# INCREASE OF FEMTO-CELLS

By the end of 2012: There will be more femtocells than macrocells



# SMALL CELLS AT THE RESCUE

From improved QoE to new revenue potential



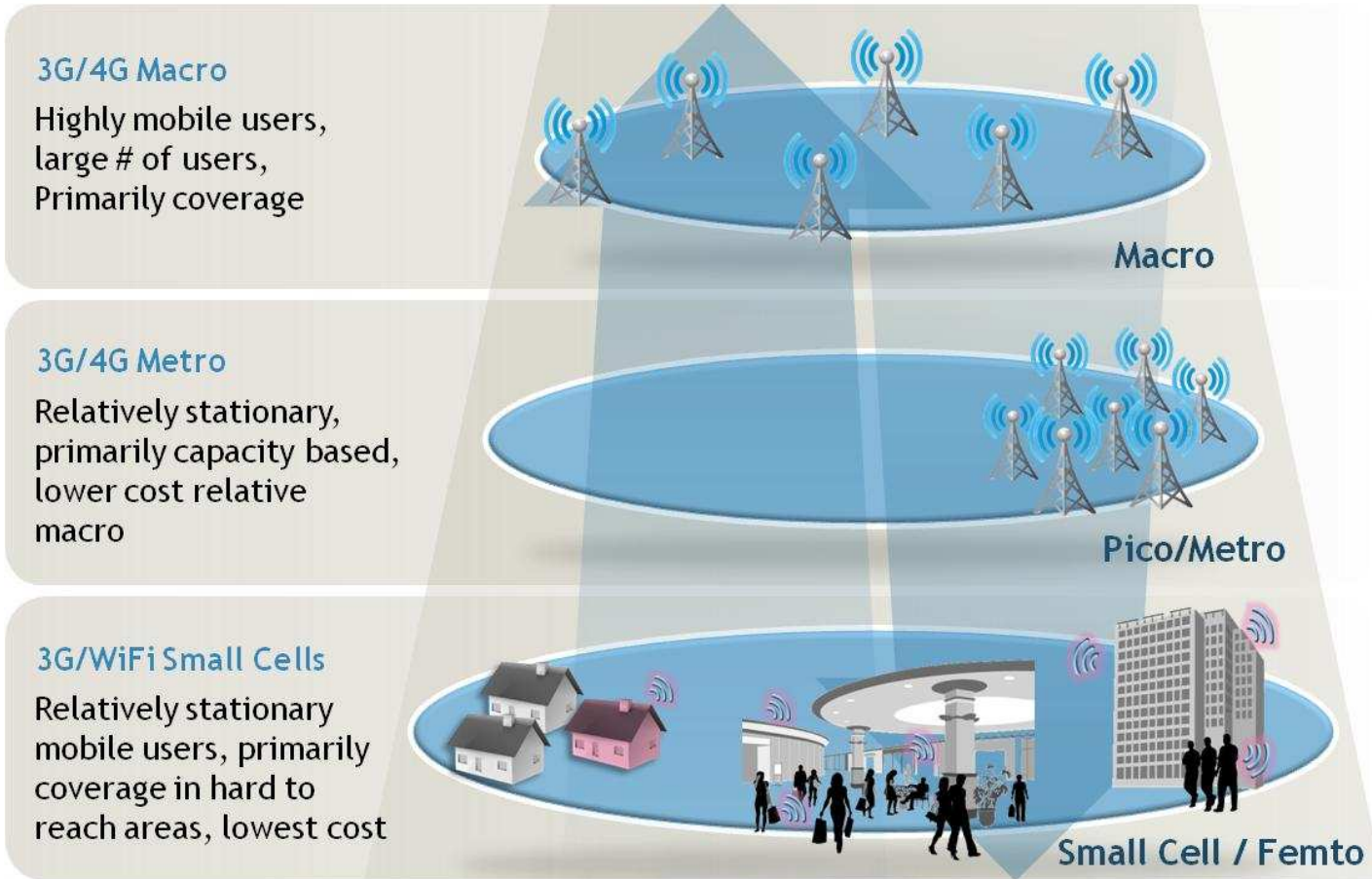


# lightRadio™ SOLUTION

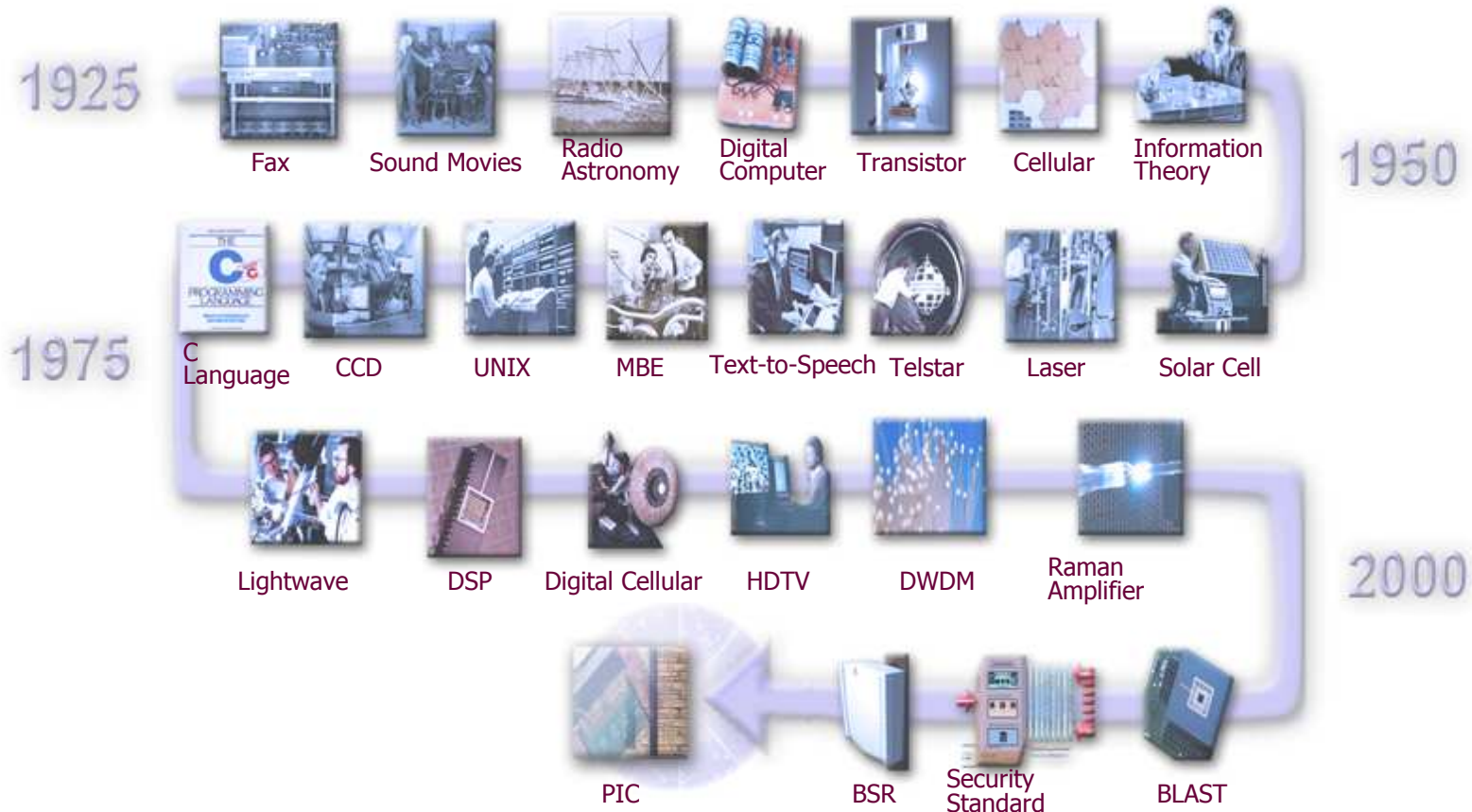


# lightRadio™ NETWORK – TRUE HETNET

2G/3G/4G across macro, metro, enterprise, home



# BELL-LABS CONSISTENT INNOVATION



AT  
THE  
SPEED  
OF  
IDEAS™

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